



NCSSES

# Business Research and Development: 2017

Detailed Statistical Tables | NSF 20-311 | February 20, 2020

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## General Notes

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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.

In conducting 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 that is in business during the survey year and is 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 contains information on more than 3 million establishments with paid employees. It serves as the primary input to the sampling frame from which the sample is selected. For companies with more than one establishment, data are summed to the company level to assign an industry classification code and a measure of size, which are used in designing the sample. Companies are excluded from the frame if they are classified in an industry that is outside the scope of 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 2017, 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 64** through **table 71**) were prepared using the 2017 BRDS statistical file and revised BRDIS statistical files for 2008–16.

Beginning with the tables in this report, disclosure avoidance is handled differently than it has 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**.

## Data Tables

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### Survey aggregate estimates

Table Title

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1 Business Research and Development Survey aggregate estimates, by questionnaire reference: 2017

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### Worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company

Table Title

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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: 2017

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Table Title

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6 Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2017

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### Worldwide R&D paid for by others and performed by the company and others

Table Title

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7 Worldwide R&D paid for by others and performed by the company and others, by industry and company size: 2017

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Table Title

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8 Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by industry and company size: 2017

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9 Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2017

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Table Title

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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: 2017
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## Domestic R&D paid for by the company and performed by the company and others

Table Title

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## Table Title

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## Table Title

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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: 2017

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## Table Title

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## Table Title

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

## Table Title

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49 Domestic R&D performance by source of funds and performer, by industry and company size: 2017

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Table Title

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62 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: 2017

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### Multiyear tables: Worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company

Table Title

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64 Worldwide R&D paid for by the company and others and performed by the company, by industry and company size: 2008–17

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65 Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2008–17

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66 Foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2008–17

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67 Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–17

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### Multiyear tables: Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D

Table Title

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68 Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–17

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69 Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–17

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70 Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–17

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

Table Title

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71 Domestic R&D paid for by the company and others and performed by the company, by business activity: 2008–17

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TABLE 1

**Business Research and Development Survey aggregate estimates, by questionnaire reference: 2017**

(Financial information, employees, patents)

Question	Survey item	Aggregate amount
Company and financial information (US\$millions)		
1.11	Worldwide net sales and operating revenues	12,948,005
1.12	Net sales and operating revenues from domestic operations	9,682,692
-	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	508,914
2.3	Worldwide R&D paid for by the company (expense), adjustments	37,593
2.4, 2.7c	Worldwide R&D paid for by the company and performed by the company and others	471,321
2.7a	Domestic R&D paid for by the company and performed by the company and others	381,739
2.7b	Foreign R&D paid for by the company and performed by the company and others	89,582
2.5	Indirect R&D charges to be recouped from the U.S. federal government (independent R&D [IR&D])	6,159
2.8m(1)	Domestic R&D paid for by the company and performed by the company and others	381,739
2.8a(1)	Salaries, wages, and fringe benefits	195,095
2.8b(1)	Stock-based compensation	24,315
2.8c(1)	Leased or temporary staffing, including on-site contractors, working on R&D	14,013
2.8d(1)	Expensed equipment	5,800
2.8e(1)	Materials and supplies	23,309
2.8f(1)	Leased facilities and equipment	5,694
2.8g(1)	Depreciation and amortization on R&D property, plant, and equipment	13,495
2.8h(1)	Royalties and licensing fees	2,117
2.8i(1)	Payments to business partners for collaborative R&D	10,900
2.8j(1)	Purchased R&D services	31,803
2.8k(1)	All other purchased services except R&D	8,078
2.8l(1)	All other costs	47,120
2.9(3)	Worldwide R&D paid for by the company and performed by others	53,597
2.9(1)	Domestic R&D paid for by the company and performed by others	42,704
2.9(2)	Foreign R&D paid for by the company and performed by others	10,894
2.10(3)	Worldwide R&D paid for and performed by the company	417,724
2.10(1)	Domestic R&D paid for and performed by the company	339,036
2.10(2)	Foreign R&D paid for and performed by the company	78,689
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	552,325
2.10(3) + 3.5(3)	Worldwide R&D paid for by the company and others and performed by the company	487,628
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	452,593
2.10(1) + 3.5(1)	Domestic R&D paid for by the company and others and performed by the company	400,100
-	Domestic R&D paid for and performed by the company	
2.14	Performed at largest domestic location	197,860
2.16	Performed at second-largest domestic location	31,331
2.18	Domestic R&D paid for by foreign operations or subsidiaries and performed by the company	19,240
2.19	Foreign R&D paid for by domestic operations or subsidiaries and performed by the company	13,807
2.20i, 2.9(1)	Domestic R&D paid for by the company and performed by others	42,704
2.20a	Companies in the United States	36,081
2.20b	Your company's foreign parent or owner	1,727
2.20c	Companies outside the United States	3,444
2.2	U.S. federal government agencies or laboratories	88
2.20e	U.S. state and local government agencies or laboratories	10
2.2	U.S. universities, colleges, and academic researchers	498
2.20g	All other organizations in the United States	588
2.20h	All other organizations outside the United States	267
2.22	Monetary gifts made by the company to U.S. universities and colleges	141
-	Projected worldwide R&D expense paid for and performed by the company in 2018	

TABLE 1

**Business Research and Development Survey aggregate estimates, by questionnaire reference: 2017**

(Financial information, employees, patents)

Question	Survey item	Aggregate amount
2.23(3)	Worldwide R&D to be paid for and performed by the company	493,548
2.23(1)	Domestic R&D to be paid for and performed by the company	396,799
2.23(2)	Foreign R&D to be paid for and performed by the company	96,749
2.24	Projected R&D services and projected payments for collaborative R&D	37,782
3.1j, 3.2c	Worldwide R&D paid for by others and performed by the company and others	81,003
3.1a	R&D reimbursed by the company's foreign parent or owner	19,787
3.1b	Collaborative R&D reimbursed by business partners	8,799
3.1c	R&D paid for by government or private foundation grants	10,564 i
3.1	Defense RDT&E goods or services provided to the federal government or government contractors	16,427
3.1	Medical nonclinical R&D services provided to others not owned by the company	3,956 i
3.1e	Medical clinical trial Phase I–III services provided to others not owned by the company	13,874
3.1g	Nondefense custom software development or computer systems designed for others not owned by the company	308
3.1h	Prototype development, production, and testing for customer's products	2,511
3.1i	All other R&D services not included in 3.1a–3.1h provided to the federal government or to others not owned by the company	4,778 i
3.2c, 3.1j	Worldwide R&D paid for by others and performed by the company and others	81,003
3.2a	Domestic R&D paid for by others and performed by the company and others	70,854
3.2b	Foreign R&D paid for by others and performed by the company and others	10,150
3.3m(1)	Domestic R&D paid for by others and performed by the company and others	70,854
3.3a(1)	Salaries, wages, and fringe benefits	36,047
3.3b(1)	Stock-based compensation	591
3.3c(1)	Leased or temporary staffing, including on-site contractors	1,879
3.3d(1)	Expensed equipment	375
3.3e(1)	Materials and supplies	6,341
3.3f(1)	Leased facilities and equipment rental payments	1,113
3.3g(1)	Depreciation and amortization of R&D property and equipment	1,578
3.3h(1)	Royalties and licensing fees	332
3.3i(1)	Payments to business partners for collaborative R&D	2,188 i
3.3j(1)	Purchased R&D services	7,601 i
3.3k(1)	All other purchased services except R&D	2,825 i
3.3l(1)	All other costs	9,986 i
3.4(3)	Worldwide R&D paid for and performed by others	11,099 i
3.4(1)	Domestic R&D paid for and performed by others	9,789 i
3.4(2)	Foreign R&D paid for and performed by others	1,311
3.5(3)	Worldwide R&D paid for by others and performed by the company	69,904
3.5(2)	Foreign R&D paid for by others and performed by the company	8,839
3.5(1), 3.8k	Domestic R&D paid for by others and performed by the company	61,065
3.8a	Other companies in the United States	17,494
3.8b	Your company's foreign parent or owner	15,426
3.8c	Other companies outside the United States	2,978
3.8d, 3.11j, 3.12c	U.S. federal government agencies or laboratories	24,277 i
3.8e	U.S. state and local government agencies or laboratories	121
3.8	Foreign government agencies or laboratories	7
3.8g	U.S. universities, colleges, and academic researchers	70 i
3.8h	Universities, colleges, and academic researchers outside the United States	24 i
3.8i	All other organizations in the United States	521 i
3.8j	All other organizations outside the United States	147
3.11j, 3.8d, 3.12c	Federally funded R&D performed by the company	24,277 i
3.11a	Department of Defense	16,632 i

TABLE 1

**Business Research and Development Survey aggregate estimates, by questionnaire reference: 2017**

(Financial information, employees, patents)

Question	Survey item	Aggregate amount
3.11b	Department of Energy	570 i
3.11c	National Aeronautics and Space Administration	4,298 i
3.11	National Institutes of Health	665
3.11e	Department of Homeland Security	52
3.11	Department of Transportation	53
3.11g	Environmental Protection Agency	1
3.11h	National Science Foundation	10 - 46
3.11i	Other U.S. federal agencies	1,959 - 2,000 i
3.12c, 3.8d, 3.11j	Federally funded R&D performed by the company, by type of agreement	24,277 i
3.12a	Contracts	23,494 i
3.12b	Grants and all other agreements	784
-	Domestic R&D paid for by others and performed by the company	
3.16	Performed at largest domestic location	30,983
3.18	Performed at second-largest domestic location	5,655
3.19	Domestic R&D paid for by U.S. federal government agencies or laboratories and performed by others	3,198 i
-	Projected R&D to be paid for by others and performed by the company in 2018	
3.2	Worldwide R&D to be paid for by others and performed by the company	84,029
3.21	Domestic R&D to be paid for by others and performed by the company	65,503
3.22	Domestic R&D to be paid for by U.S. federal government and performed by the company	24,997 i
4.1	Total domestic capital expenditures	587,332
4.2, 4.3e	Domestic capital expenditures for R&D	31,885
4.3a	Land and structures	3,541
4.3b	Equipment	14,898
4.3c	Capitalized software	8,539
4.3	All other capital expenditures for R&D	4,907
5.1	Worldwide R&D paid for and performed by the company and others directed toward business areas or product lines new to company	54,555
5.2, 2.10(1)	Domestic R&D paid for and performed by the company	339,036
-	Type of R&D (character of work)	
5.4b	Basic research	18,732
5.4a	Applied research	49,149
5.3b	Development	271,155
-	Application areas	
5.5	Energy applications	20,981
5.6	Environmental protection applications	6,976
5.7	Defense applications	11,036
5.8	Health or medical applications	78,495
5.9	Agricultural applications	5,270
-	Technology focus areas	
5.1	Software products and software embedded in other projects or products	130,015
5.11	Biotechnology	39,856
5.12	Nanotechnology	16,689 i
5.14c	Foreign R&D paid for and performed by the company	78,689
5.14a	Research	15,175 i
5.14b	Development	63,514
5.15, 3.5(1)	Domestic R&D paid for by others and performed by the company	61,065
-	Type of R&D (character of work)	
5.17b	Basic research	6,097
5.17a	Applied research	12,984
5.16b	Development	41,984

TABLE 1

**Business Research and Development Survey aggregate estimates, by questionnaire reference: 2017**

(Financial information, employees, patents)

Question	Survey item	Aggregate amount	
-	Application areas		
5.18	Energy applications	2,333	
5.19	Environmental protection applications	949	
5.2	Defense applications	20,054	i
5.21	Health or medical applications	22,171	
5.22	Agricultural applications	516	
-	Technology focus areas		
5.23	Software products and software embedded in other projects or products	10,437	
5.24	Biotechnology	11,781	
5.25	Nanotechnology	1,548	
-	Federally funded R&D performed by the company		
-	Type of R&D (character of work)		
5.28b	Basic research	1,783	i
5.28a	Applied research	5,037	i
5.27b	Development	17,457	i
-	Technology focus areas		
5.29	Software products and software embedded in other projects or products	5,212	i
5.31c	Foreign R&D paid for by others and performed by the company	8,839	
5.31a	Research	1,966	
5.31b	Development	6,873	i
Employees (thousands)			
-	Worldwide		
1.7, 1.8(3)	Total employees	30,450	
6.1b(3)	Non-R&D employees	28,101	
6.1a(3)	R&D employees	2,349	
6.2a(3)	Female	646	
6.2b(3)	Male	1,703	
6.3a(3)	Researchers	1,629	
6.3b(3)	Technicians	496	
6.3c(3)	Support staff	224	
-	Domestic		
1.8(1)	Total employees	19,893	
6.1b(1)	Non-R&D employees	18,284	
6.1a(1)	R&D employees	1,609	
6.2a(1)	Female	423	
6.2b(1)	Male	1,186	
6.3a(1)	Researchers	1,103	
6.3b(1)	Technicians	347	
6.3c(1)	Support staff	160	
-	Foreign		
1.8(2)	Total employees	10,557	
6.1b(2)	Non-R&D employees	9,817	
6.1a(2)	R&D employees	740	
6.2a(2)	Female	223	
6.2b(2)	Male	517	
6.3a(2)	Researchers	526	
6.3b(2)	Technicians	149	
6.3c(2)	Support staff	65	
-	Researchers with PhD		
6.4(3)	Worldwide	147	
6.4(1)	Domestic	119	

TABLE 1

**Business Research and Development Survey aggregate estimates, by questionnaire reference: 2017**

(Financial information, employees, patents)

Question	Survey item	Aggregate amount
6.4(2)	Foreign	28
-	Full-time equivalent	
6.5	R&D employees	1,475
6.5a	Full-time R&D employees	1,231
6.5b	Full-time employees not solely working on R&D	228
6.5c	Part-time employees working on R&D	16
6.6	Researchers	1,023
6.6a	Full-time R&D employees	885
6.6b	Full-time employees not solely working on R&D	130
6.6c	Part-time employees working on R&D	9 <sup>i</sup>
6.7	Non-U.S. citizens employed as researchers under temporary visa	48
U.S. patents (number) <sup>a</sup>		
7.1	Patents applied for, total	151,928
7.2	Nonprovisional utility patents applied for	100,485
7.3	Applications filed or planned in foreign jurisdictions	50,572
7.4	Applications originated from organized R&D activities	79,011
7.6	Utility patents issued	101,607
U.S. patents (US\$millions)		
-	Revenue received	
7.7	From sale of utility patents	1,009
7.8	From licensing utility patents	20,347
-	Amount paid	
7.1	To purchase patents	44
7.11	To license patents	8,098

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

IR&D = independent research and development; RDT&E = research, development, test, and evaluation.

<sup>a</sup> These statistics do not include an adjustment to the weight to account for unit nonresponse.

**Note(s)**

Detail may not add to total because of rounding. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

TABLE 2

## Worldwide, domestic, and foreign R&amp;D paid for by the company and others and performed by the company, by industry and company size: 2017

(Millions of U.S. dollars)

Industry and company size	NAICS code	Worldwide R&D performance			Domestic R&D performance			Foreign R&D performance		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
All industries	21-23, 31-33, 42-81	487,628	417,724	69,904	400,100	339,036	61,065	87,528	78,689	8,839
Manufacturing industries	31-33	314,496	271,860	42,636	257,227	216,155	41,072	57,270	55,706	1,564
Food	311	5,563	5,315	247	4,697	4,453	244	865	863	3
Beverage and tobacco products	312	1,743	1,636	107	1,076	968	107	667	667	0
Textile, apparel, and leather products	313-16	1,080	1,079	1	920	919	1	160	160	* i
Wood products	321	176	170	5	175	170	5	1	1	0
Paper	322	1,580	1,547	34	1,322	1,292	29	259	255	4
Printing and related support activities	323	235	224	11	229	218	11	5	5	0
Petroleum and coal products	324	370	355	15	316	301	15	54	54	* i
Chemicals	325	89,427	77,328	12,099	74,977	63,285	11,692	14,450	14,043	407
Basic chemicals	3251	3,133	2,949	184	2,574	2,393	181	560	557	3
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	949	933	16	628	612	16	321	321	* i
Pesticide, fertilizer, and other agricultural chemicals	3253	1,761 - 1,875	1,477	284 - 397	1,376 - 1,475	1,092	284 - 383	384 - 401	385	0 - 16
Pharmaceuticals and medicines	3254	78,178	66,815	11,363	66,202	55,229	10,973	11,976	11,587	390
Soap, cleaning compound, and toilet preparation	3256	3,383 - 3,479	3,266	118 - 213	2,605 - 2,701	2,488	118 - 213	778	778	0
Paint, coating, adhesive, and other chemicals	3255, 3259	1,910 - 1,927	1,887	23 - 39	1,495	1,471	23	415 - 432	416	0 - 16 i
Plastics and rubber products	326	4,656	4,519	137	3,754	3,637	117	902	882	20
Nonmetallic mineral products	327	1,515	1,485	30	1,334	1,303	30	181	181	0
Primary metals	331	879	869	9	749	741	8	130	129	1
Fabricated metal products	332	2,371	2,264	107	2,206	2,099	107	166	165	* i
Machinery	333	16,463	15,505	958	13,197	12,257	940	3,266	3,248	18
Agricultural implement	33311	2,137	2,077	60	1,570	1,511	59	567	566	1
Semiconductor machinery	333242	4,479	4,002	478	3,694	3,228	465	786	773	12
Engine, turbine, and power transmission equipment	3336	2,397 - 2,540	2,238 - 2,380	159	2,080	1,921	159	317 - 460	317 - 460	0
Other machinery	other 333	7,306 - 7,451	7,045 - 7,189	262	5,853	5,596	257	1,453 - 1,597	1,448 - 1,592	5 i
Computer and electronic products	334	101,223	92,184	9,038	78,575	69,942	8,633	22,648	22,242	405
Communications equipment	3342	15,819	14,098	1,721	12,687	10,972	1,715	3,132	3,126	6
Semiconductor and other electronic components	3344	41,046	38,608	2,438	30,148	27,859	2,289	10,898	10,749	149

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: 2017**  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Worldwide R&D performance			Domestic R&D performance			Foreign R&D performance		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Navigational, measuring, electromedical, and control instruments	3345	18,350	13,686	4,664	14,509	10,089	4,420	3,842	3,597	244
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,773	3,623	151	2,696	2,545	150	1,078	1,077	1
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	8,257	3,953	4,304	7,297	3,214	4,083	960	738	222
Other measuring and controlling device	other 3345	6,320	6,111	209	4,516	4,329	187	1,804	1,782	22
Other computer and electronic products	other 334	26,007	25,792	216	21,231	21,022	209	4,776	4,769	7
Electrical equipment, appliances, and components	335	6,158	5,974	184	4,291	4,110	181	1,867	1,864	3
Transportation equipment	336	62,114	42,779	19,335	53,292	34,629	18,663	8,822	8,150	672
Automobiles, bodies, trailers, and parts	3361-63	30,478	27,419	3,059	23,881	21,137	2,745	6,597	6,282	315
Aerospace products and parts	3364	28,436	13,628	14,808	26,383	11,903	14,480	2,053	1,725	328
Aircraft, aircraft engine, and aircraft parts	336411-13	26,626	13,198	13,429	24,576	11,473	13,103	2,050	1,725	325
Guided missile, space vehicle, and related parts	336414-15, 336419	1,810	431	1,380	1,807	430	1,377	3	1	2
Military armored vehicle, tank, and tank component	336992	9	4	5	9	4	5	0	0	0
Other transportation	other 336	3,190	1,728	1,462	3,018	1,585	1,433	173	143	29
Furniture and related products	337	462	459	3	422	419	3	40	40	0
Miscellaneous	339	18,482	18,168	314	15,695	15,410	285	2,787	2,758	30
Medical equipment and supplies	3391	16,079	15,809	270	13,589	13,348	240	2,490	2,461	30
Other miscellaneous manufacturing	3399	2,403	2,359	44	2,106	2,062	44	297	297	* i
Nonmanufacturing industries	21-23, 42-81	173,132	145,864	27,268	142,874	122,881	19,993	30,258	22,983	7,275
Mining, extraction, and support activities	21	3,479 - 3,486	3,147	332 - 339	3,150	2,841	309	329 - 337	306	24 - 30
Utilities	22	327	290	36	317	281	36	9	9	*
Wholesale trade	42	571	540	31	534	503	31	37	37	*
Electronic shopping and electronic auctions	454111-12	11,873 - 12,096	11,873 - 12,096	0	9,318	9,318	0	2,555 - 2,779	2,555 - 2,779	0
Transportation and warehousing	48-49	1,155	1,122	32	1,147	1,116	31	7	6	1
Information	51	94,898	93,518	1,380	80,252	78,898	1,354	14,646	14,620	26
Publishing	511	43,169	42,099	1,070	34,338	33,276	1,062	8,831	8,824	7
Newspaper, periodical, book, and directory publishers	5111	81	81	0	74	74	0	7	7	0
Software publishers	5112	43,088	42,018	1,070	34,264	33,201	1,062	8,824	8,817	7



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: 2017**  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Worldwide R&D performance			Domestic R&D performance			Foreign R&D performance		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Telecommunications	517	3,776 - 3,900	3,735	41 - 165	3,682 - 3,806	3,643	40 - 163	94	92	2
Data processing, hosting, and related services	518	18,427	18,291	135	16,155	16,037	119	2,272	2,255	17 i
Other information	other 51	29,403 - 29,527	29,392	11 - 134	25,954 - 26,077	25,943	11 - 134	3,450	3,450	0
Finance and insurance	52	8,581	8,530	51	7,616	7,565	51	965	965	0
Real estate and rental and leasing	53	909 i	899 i	10	718	708	10	191 i	191 i	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	311 i	311 i	0	138 i	138 i	0	173 i	173 i	0
Other real estate and rental and leasing	other 53	597	588	10	579	570	10	18 i	18 i	0
Professional, scientific, and technical services	54	47,987	22,864	25,123	36,922	18,972	17,951	11,064	3,892	7,172
Architectural, engineering, and related services	5413	2,761	1,611	1,149	2,708	1,561	1,147	53	51	2
Computer systems design and related services	5415	16,824	15,092	1,733	13,327	11,669	1,658	3,498	3,423	75
Scientific research and development services	5417	24,445	2,899	21,546	17,321	2,817	14,504	7,124	82	7,042
Biotechnology research and development	541711	6,444	801	5,643	4,449	795	3,653	1,996	6	1,990
Physical, engineering, and life sciences (except biotechnology) research and development	541712	17,038	2,012	15,026	11,913	1,936	9,978	5,125	76	5,048
Social sciences and humanities research and development	541720	963	86	877	959	86	873	4	0	4
Other professional, scientific, and technical services	other 54	3,957	3,261	695	3,566	2,925	641	390	336	54
Health care services	621-23	1,325 - 1,332	1,139 i	186 - 193	1,101	958 i	144	224 - 231	182	43 - 49
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,798 - 2,016	1,722 - 1,939	76	1,799	1,722	76	0 - 217	0 - 217	0
All companies (number of domestic employees)	-	487,628	417,724	69,904	400,100	339,036	61,065	87,528	78,689	8,839
Small companies										
10-19 <sup>a</sup>	-	3,447	2,530	917	3,311	2,402	909	136	128	8
20-49	-	10,011	8,162	1,850	9,435	7,593	1,842	577	569	8 i
Medium companies										
50-99	-	10,623	8,543	2,080	10,141	8,070	2,071	482	473	9
100-249	-	18,596	14,729	3,867	17,216	13,514	3,703	1,380	1,215	165
Large companies										
250-499	-	16,376	13,783	2,593	14,103	11,773	2,331	2,272	2,010	262 i

TABLE 2

**Worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Worldwide R&D performance			Domestic R&D performance			Foreign R&D performance		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
500–999	–	20,387	18,675	1,712	17,871	16,295	1,576	2,516	2,380	136
1,000–4,999	–	80,255	66,372	13,883	65,112	52,341	12,771	15,143	14,031	1,112
5,000–9,999	–	54,428	42,209	12,219	40,198	32,701	7,497	14,230	9,508	4,722
10,000–24,999	–	87,990	77,328	10,662	73,485	63,415	10,070	14,505	13,913	592
25,000 or more	–	185,514	165,394	20,120 i	149,227	130,931	18,295 i	36,287	34,462	1,825

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

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: 2017**  
(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	487,628	5,657	25,010	36,838	23,119	397,004
Manufacturing industries	31–33	314,496	2,957	13,428	20,640	16,280	261,191
Food	311	5,563	135	529	571	809	3,518 i
Beverage and tobacco products	312	1,743	20	58	114	264	1,286
Textile, apparel, and leather products	313–16	1,080	63	169	213	382	253
Wood products	321	176	20	59	96	0	0
Paper	322	1,580	28	114	129	62	1,249
Printing and related support activities	323	235	42	129	64 i	0	0
Petroleum and coal products	324	370	13	64	100 i	192	0
Chemicals	325	89,427	311	2,569	6,843	5,132	74,574
Basic chemicals	3251	3,133	63	352	715	577	1,426
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	949	28	189	156	81	496
Pesticide, fertilizer, and other agricultural chemicals	3253	1,761 - 1,875	0 - 165	88	0	247	1,239 - 1,734
Pharmaceuticals and medicines	3254	78,178	57	1,563	5,574	3,519	67,465
Soap, cleaning compound, and toilet preparation	3256	3,383 - 3,479	0 - 165	139	184	141	2,886
Paint, coating, adhesive, and other chemicals	3255, 3259	1,910 - 1,927	0 - 165	237	213	568	564 - 1,060
Plastics and rubber products	326	4,656	213 i	674	948	504	2,317
Nonmetallic mineral products	327	1,515	67	136	377	0	935
Primary metals	331	879	52	183	158	214	272
Fabricated metal products	332	2,371	330	1,035	555	452	0
Machinery	333	16,463	452	1,714	1,962	947	11,388
Agricultural implement	33311	2,137	0 - 303	113	152	50 - 353	1,753
Semiconductor machinery	333242	4,479	3	41	166	146	4,122
Engine, turbine, and power transmission equipment	3336	2,397 - 2,540	32	100	179	50 - 258	2,165
Other machinery	other 333	7,306 - 7,451	113 - 419	1,460	1,464	190 - 702	3,348
Computer and electronic products	334	101,223	500	2,261	3,424	3,354	91,683
Communications equipment	3342	15,819	49	400	525	824	14,020
Semiconductor and other electronic components	3344	41,046	116	690	1,373	1,164	37,703
Navigational, measuring, electromedical, and control instruments	3345	18,350	228	953	1,069	792	15,307
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,773	22	219	324	452	2,757
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	8,257	37	154	214	0	7,851

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: 2017**  
(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	6,320	169	580	531	340	4,700
Other computer and electronic products	other 334	26,007	106	219	457	573	24,653
Electrical equipment, appliances, and components	335	6,158	174	783	1,004	796	3,401 i
Transportation equipment	336	62,114	169	1,298	1,943	1,980	56,723
Automobiles, bodies, trailers, and parts	3361–63	30,478	52	802	1,252	1,046	27,326
Aerospace products and parts	3364	28,436	72	353	525	774	26,712
Aircraft, aircraft engine, and aircraft parts	336411–13	26,626	68	331	423	604	25,200 i
Guided missile, space vehicle, and related parts	336414–15, 336419	1,810	4	22	102	170	1,512
Military armored vehicle, tank, and tank component	336992	9	2	7	0	0	0
Other transportation	other 336	3,190	44	135	167	159	2,685
Furniture and related products	337	462	43	111	308	0	0
Miscellaneous manufacturing	339	18,482	325	1,542	1,831	1,192	13,593
Medical equipment and supplies	3391	16,079	153	1,114	1,427	1,064	12,321
Other miscellaneous manufacturing	3399	2,403	172	427	404	128 i	1,272
Nonmanufacturing industries	21–23, 42–81	173,132	2,700	11,582	16,199	6,839	135,813
Mining, extraction, and support activities	21	3,479 - 3,486	0 - 252	193	103	50 - 96	3,104
Utilities	22	327	0 - 239	56	184	50 - 96 i	0
Wholesale trade	42	571	209	361 i	0	0	0
Electronic shopping and electronic auctions	454111–12	11,873 - 12,096	0 - 252	31	45	0	11,802
Transportation and warehousing	48–49	1,155	13	39	317	0	786
Information	51	94,898	762	4,019	6,550	4,720	78,847
Publishing	511	43,169	413	1,405	1,796	1,368	38,187
Newspaper, periodical, book, and directory publishers	5111	81	17 i	26	39	0	0
Software publishers	5112	43,088	396	1,379	1,758	1,368	38,187
Telecommunications	517	3,776 - 3,900	0 - 77	163	369	50 - 544	3,082
Data processing, hosting, and related services	518	18,427	274	2,111	4,124	2,515	9,403
Other information	other 51	29,403 - 29,527	0 - 77	340	261	291 - 789	28,175
Finance and insurance	52	8,581	0 - 252	210	698	50 - 96	7,617
Real estate and rental and leasing	53	909 i	305 i	73	47	106	378
Lessors of nonfinancial intangible assets (except copyrighted works)	533	311 i	271 - 304 i	0	10 - 38 i	0	0
Other real estate and rental and leasing	other 53	597	0 - 34	73	10 - 38	106	378

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: 2017**  
(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
Professional, scientific, and technical services	54	47,987	1,146	5,732	7,187	1,711	32,210
Architectural, engineering, and related services	5413	2,761	365	843	1,060	106	387
Computer systems design and related services	5415	16,824	458	1,668	1,850	577	12,271
Scientific research and development services	5417	24,445	192	2,477	2,985	773	18,017
Biotechnology research and development	541711	6,444	37	553	569	0	5,285
Physical, engineering, and life sciences (except biotechnology) research and development	541712	17,038	153	1,903	2,389	694	11,900
Social sciences and humanities research and development	541720	963	2	21	28	79	832
Other professional, scientific, and technical services	other 54	3,957	131	743	1,292	255	1,536
Health care services	621–23	1,325 - 1,332	16 - 115	236	602	109	307
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,798 - 2,016	0 - 252	632	465	0	762
All companies (number of domestic employees)	–	487,628	5,657	25,010	36,838	23,119	397,004
Small companies							
10–19 <sup>a</sup>	–	3,447	1,061	2,180	154	52	0
20–49	–	10,011	2,280	5,491	2,240	0	0
Medium companies							
50–99	–	10,623	1,001	4,880	4,383	359	0
100–249	–	18,596	820	5,383	7,555	2,702	2,136
Large companies							
250–499	–	16,376	302	2,942	5,859	3,096	4,177
500–999	–	20,387	118	2,087	6,064	4,899	7,219
1,000–4,999	–	80,255	66	1,631	7,495	7,906	63,157
5,000–9,999	–	54,428	2	194	1,524	2,512	50,197
10,000–24,999	–	87,990	6	134	874	1,232	85,744
25,000 or more	–	185,514	1	88	690	361	184,374

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D. 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, 2017.



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: 2017**

(Number of companies)

Industry and company size	NAICS code		Worldwide R&D performance <sup>a</sup>			Domestic R&D performance <sup>a</sup>			Foreign R&D performance <sup>a</sup>		
			Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
10–19 <sup>b</sup>		–	3,643	3,308	744	3,618	3,283	742	218	162	61
20–49		–	6,439	6,020	937	6,420	6,001	935	383	335	65
Medium companies											
50–99		–	3,816	3,578	534	3,806	3,569	533	232	218	17
100–249		–	3,183	2,991	406	3,176	2,986	399	301	282	27
Large companies											
250–499		–	1,478	1,393	192	1,475	1,390	190	222	215	16
500–999		–	940	888	113	939	887	111	204	201	11
1,000–4,999		–	990	952	158	984	947	145	411	405	44
5,000–9,999		–	207	199	40	206	198	36	118	113	18
10,000–24,999		–	154	149	54	154	149	53	89	88	20
25,000 or more		–	106	106	37	105	105	36	68	66	22

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not 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.

<sup>b</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D.

**Source(s)**

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2017.



TABLE 5

## Worldwide R&amp;D paid for by the company and performed by the company and others, by industry and company size: 2017

(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	471,321	417,724	53,597
Manufacturing industries	31-33	320,796	271,860	48,936
Food	311	5,521	5,315	206
Beverage and tobacco products	312	2,003	1,636	367
Textile, apparel, and leather products	313-16	1,106	1,079	27
Wood products	321	180	170	10
Paper	322	1,599	1,547	53
Printing and related support activities	323	229	224	6
Petroleum and coal products	324	445	355	90
Chemicals	325	116,161	77,328	38,832
Basic chemicals	3251	3,026 - 3,121	2,949	77 - 172
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	965	933	32
Pesticide, fertilizer, and other agricultural chemicals	3253	1,670	1,477	193
Pharmaceuticals and medicines	3254	104,819	66,815	38,004
Soap, cleaning compound, and toilet preparation	3256	3,645	3,266	379
Paint, coating, adhesive, and other chemicals	3255, 3259	1,941 - 2,037	1,887	55 - 150
Plastics and rubber products	326	4,729	4,519	210
Nonmetallic mineral products	327	1,507	1,485	22
Primary metals	331	934	869	64
Fabricated metal products	332	2,358	2,264	94
Machinery	333	16,147	15,505	642
Agricultural implement	33311	2,309	2,077	231
Semiconductor machinery	333242	4,002 - 4,147	4,002	0 - 145
Engine, turbine, and power transmission equipment	3336	2,431	2,238 - 2,380	51 - 192
Other machinery	other 333	7,260 - 7,407	7,045 - 7,189	215 - 360
Computer and electronic products	334	94,871	92,184	2,687
Communications equipment	3342	14,896	14,098	798
Semiconductor and other electronic components	3344	39,467	38,608	858
Navigational, measuring, electromedical, and control instruments	3345	14,259	13,686	573
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,741	3,623	119
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	4,247	3,953	294
Other measuring and controlling device	other 3345	6,271	6,111	160
Other computer and electronic products	other 334	26,249	25,792	458
Electrical equipment, appliances, and components	335	6,281	5,974	307
Transportation equipment	336	46,763	42,779	3,984
Automobiles, bodies, trailers, and parts	3361-63	30,577	27,419	3,158
Aerospace products and parts	3364	14,403	13,628	775
Aircraft, aircraft engine, and aircraft parts	336411-13	13,862	13,198	664
Guided missile, space vehicle, and related parts	336414-15, 336419	541	431	111
Military armored vehicle, tank, and tank component	336992	5	4	1
Other transportation	other 336	1,778	1,728	49
Furniture and related products	337	479	459	21
Miscellaneous manufacturing	339	19,482	18,168	1,314
Medical equipment and supplies	3391	16,933	15,809	1,124
Other miscellaneous manufacturing	3399	2,549	2,359	190
Nonmanufacturing industries	21-23, 42-81	150,526	145,864	4,662

TABLE 5

**Worldwide R&D paid for by the company and performed by the company and others, by industry and company size: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Performed by the company	Performed by others
Mining, extraction, and support activities	21	3,509	3,147	361
Utilities	22	491	290	200
Wholesale trade	42	685	540	146
Electronic shopping and electronic auctions	454111-12	12,169	11,873 - 12,096	72 - 296
Transportation and warehousing	48-49	1,167	1,122	45
Information	51	95,800	93,518	2,282
Publishing	511	43,516	42,099	1,416
Newspaper, periodical, book, and directory publishers	5111	91	81	10
Software publishers	5112	43,424	42,018	1,406
Telecommunications	517	3,991	3,735	256
Data processing, hosting, and related services	518	18,608	18,291	316
Other information	other 51	29,686	29,392	293
Finance and insurance	52	9,018	8,530	488
Real estate and rental and leasing	53	903	899	4
Lessors of nonfinancial intangible assets (except copyrighted works)	533	314	311	2
Other real estate and rental and leasing	other 53	589	588	1
Professional, scientific, and technical services	54	23,580	22,864	717
Architectural, engineering, and related services	5413	1,752	1,611	141
Computer systems design and related services	5415	15,233	15,092	141
Scientific research and development services	5417	3,308	2,899	409
Biotechnology research and development	541711	973	801	172
Physical, engineering, and life sciences (except biotechnology) research and development	541712	2,249	2,012	237
Social sciences and humanities research and development	541720	86	86	*
Other professional, scientific, and technical services	other 54	3,287	3,261	26
Health care services	621-23	1,174	1,139	34
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	2,031	1,722 - 1,939	92 - 310
All companies (number of domestic employees)	-	471,321	417,724	53,597
Small companies				
10-19 <sup>a</sup>	-	3,068	2,530	538
20-49	-	9,663	8,162	1,501
Medium companies				
50-99	-	10,245	8,543	1,702
100-249	-	18,202	14,729	3,472
Large companies				
250-499	-	15,168	13,783	1,385
500-999	-	21,365	18,675	2,691
1,000-4,999	-	76,790	66,372	10,419
5,000-9,999	-	46,403	42,209	4,193
10,000-24,999	-	92,582	77,328	15,254
25,000 or more	-	177,836	165,394	12,442

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

NAICS = 2012 North American Industry Classification System.

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

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&amp;D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of

companies located in the United States that performed or funded 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, 2017.

TABLE 6

**Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2017**

(Millions of U.S. dollars)

<b>Business activity<sup>a</sup></b>	<b>Business code<sup>b</sup></b>	<b>Amount</b>
All business activities	21100–81000	471,321
Oil and gas extraction	21100	986
Mining	21200	164
Support activities for mining, including oil and gas	21300	1,474
Utilities	22100	487
Construction	23000	580
Food manufacturing	31100	5,941
Beverage manufacturing	31210	839
Tobacco manufacturing	31220	847
Textile, apparel, and leather products manufacturing	31990	1,046
Wood products manufacturing	32100	265
Paper manufacturing	32200	1,705
Printing and related support activities	32300	283
Petroleum refineries	32401	567
Asphalt paving, roofing, and saturated materials manufacturing	32402	139
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	378
Basic chemicals manufacturing	32510	3,726
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	1,257
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	2,469
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing	32541	71,788
In vitro diagnostic substances manufacturing	32542	1,587
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	30,008
Soap, cleaning compound, and toilet preparation manufacturing	32591	3,056
Paint, adhesive, and other chemicals manufacturing	32592	2,228
Plastics and rubber products manufacturing	32600	3,918
Clay and glass products manufacturing	32710	1,383
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	449
Primary metal manufacturing	33100	699
Fabricated metal products manufacturing	33200	2,651
Agricultural machinery and equipment manufacturing	33311	1,875
Construction machinery manufacturing	33312	1,569
Mining, oil, and gas field machinery and equipment manufacturing	33319	1,550
Semiconductor machinery manufacturing	33321	3,950
Industrial machinery manufacturing (except semiconductor machinery)	33322	1,185
Photographic and photocopying equipment manufacturing	33331	54
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	2,311
Digital cameras manufacturing	33333	511
Engine, turbine, and power transmission equipment manufacturing	33360	3,120
Metalworking and other general purpose machinery manufacturing	33390	2,623
Computers and peripheral equipment manufacturing and magnetic and optical media	33412	26,759
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	10,575
Radio, television, and wireless communication equipment manufacturing	33422	2,517
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	2,002
Audio and video equipment manufacturing	33430	1,146
Semiconductor and other electronic components manufacturing	33440	40,730
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	3,926
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument manufacturing	33452	2,300
Measuring and control instruments manufacturing (not listed elsewhere)	33459	5,664
Electrical equipment, appliances, and components manufacturing	33500	6,238
Motor vehicles manufacturing	33610	22,807
Motor vehicle body and trailer manufacturing	33620	46

TABLE 6

**Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2017**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	Amount
Motor vehicle parts manufacturing	33630	7,811
Aircraft manufacturing	33641	4,644
Aircraft engine and engine parts manufacturing	33642	1,448
Other aircraft parts and auxiliary equipment manufacturing	33643	3,176
Guided missile, space vehicle, and related parts manufacturing	33644	1,132
Railroad rolling stock manufacturing	33651	251
Ship and boat building	33660	156
Motorcycle, bicycle, and parts manufacturing	33691	358
Military armored vehicle, tank, and tank component manufacturing	33692	367
All other transportation equipment manufacturing	33699	507
Furniture and related products manufacturing	33700	471
Medical equipment and supplies manufacturing	33910	16,683
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	2,720
Merchant wholesalers, durable goods	42300	588
Merchant wholesalers, nondurable goods	42400	329
Wholesale electronic markets and agents and brokers (business to business)	42500	24 - 188
Retail trade (except electronic shopping and electronic auctions)	44000	131
Electronic shopping and electronic auctions	45411	12,193
Transportation	48000	808
Couriers, messengers, and express delivery services	49200	268
Warehousing and storage	49300	89
Newspaper, periodical, book, and directory publishers (except Internet)	51110	108
Software publishers (except Internet)	51120	32,186
Motion picture and sound recording (except Internet)	51200	24 - 188
Broadcasting (except Internet)	51500	466
Wired telecommunications carriers	51710	1,017
Wireless telecommunications carriers (except satellite)	51720	1,953
Satellite telecommunications	51740	621
Other telecommunications (not listed elsewhere)	51790	370
Data processing, hosting, and related services	51800	6,778
Cloud computing applications and Internet-based software services	51801	19,237
Other information services, including Internet publishing, broadcasting, and Web search portals	51910	32,696
Finance: banking and credit intermediation	52200	5,640
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	1,799
Insurance carriers and related activities	52400	1,428
Real estate	53100	390
Rental and leasing services	53200	213
Lessors of nonfinancial intangible assets, including patent licensing	53300	330
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	1,047
Architectural, engineering, and related services	54130	1,893
Specialized design services	54140	132
Computer systems design and related services	54150	14,040
Management, scientific, and technical consulting services	54160	1,611
Research and development services in social sciences and humanities	54172	0 - 430
Research and development services in biotechnology	54173	918
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	2,393
Advertising and related services	54180	383
Professional, scientific, and technical services (not listed elsewhere)	54190	660
Management of companies and enterprises	55100	93
Administrative and support services	56100	1,730
Waste management and remediation services	56200	0 - 187

TABLE 6

**Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2017**

(Millions of U.S. dollars)

<b>Business activity<sup>a</sup></b>	<b>Business code<sup>b</sup></b>	<b>Amount</b>	
Offices of physicians	62110	107	i
Medical and diagnostic laboratories	62150	1,022	
Other ambulatory health care services (ambulance, dental, home health care)	62199	87	
Hospitals and nursing care facilities	62200	18	
Social assistance services	62400	0 - 430	
Arts, entertainment, and recreation	71000	53	
Accommodation and food services	72000	77	
Other services (not listed elsewhere)	81000	891	
Undistributed	-	0	

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

NAICS = 2012 North American Industry Classification System.

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

<sup>b</sup> Business codes and descriptions are based on 2012 NAICS 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

TABLE 7

## Worldwide R&amp;D paid for by others and performed by the company and others, by industry and company size: 2017

(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	81,003	69,904	11,099	i
Manufacturing industries	31-33	51,254	42,636	8,617	i
Food	311	258	247	11	
Beverage and tobacco products	312	107	107	*	
Textile, apparel, and leather products	313-16	1	1	*	i
Wood products	321	5	5	0	
Paper	322	35	34	1	
Printing and related support activities	323	11	11	*	
Petroleum and coal products	324	17	15	2	
Chemicals	325	17,760	12,099	5,661	
Basic chemicals	3251	183 - 221	184	0 - 36	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	16	16	*	
Pesticide, fertilizer, and other agricultural chemicals	3253	284 - 432	284 - 397	0 - 36	i
Pharmaceuticals and medicines	3254	16,989	11,363	5,626	
Soap, cleaning compound, and toilet preparation	3256	118 - 249	118 - 213	0 - 36	
Paint, coating, adhesive, and other chemicals	3255, 3259	23 - 75	23 - 39	0 - 36	
Plastics and rubber products	326	150	137	13	
Nonmetallic mineral products	327	30	30	*	i
Primary metals	331	11	9	2	
Fabricated metal products	332	113	107	5	
Machinery	333	995	958	37	
Agricultural implement	33311	62	60	2	i
Semiconductor machinery	333242	477 - 503	478	0 - 25	
Engine, turbine, and power transmission equipment	3336	169	159	10	
Other machinery	other 333	261 - 288	262	0 - 27	
Computer and electronic products	334	9,227	9,038	189	
Communications equipment	3342	1,733	1,721	12	i
Semiconductor and other electronic components	3344	2,472	2,438	35	
Navigational, measuring, electromedical, and control instruments	3345	4,798	4,664	134	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	162	151	11	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	4,421	4,304	117	
Other measuring and controlling device	other 3345	215	209	6	
Other computer and electronic products	other 334	223	216	7	
Electrical equipment, appliances, and components	335	191	184	7	
Transportation equipment	336	21,986	19,335	2,651	i
Automobiles, bodies, trailers, and parts	3361-63	3,199	3,059	139	
Aerospace products and parts	3364	17,316	14,808	2,508	i
Aircraft, aircraft engine, and aircraft parts	336411-13	15,936	13,429	2,508	i
Guided missile, space vehicle, and related parts	336414-15, 336419	1,380	1,380	1	
Military armored vehicle, tank, and tank component	336992	5	5	0	
Other transportation	other 336	1,466	1,462	3	
Furniture and related products	337	3	3	*	
Miscellaneous	339	352	314	37	
Medical equipment and supplies	3391	306	270	36	
Other miscellaneous manufacturing	3399	46	44	2	

TABLE 7

**Worldwide R&D paid for by others and performed by the company and others, by industry and company size: 2017**

(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	29,750	27,268	2,482	i
Mining, extraction, and support activities	21	338	332 - 339	0 - 6	
Utilities	22	81	36	i	45
Wholesale trade	42	42	31		11
Electronic shopping and electronic auctions	454111-12	0	0		0
Transportation and warehousing	48-49	32	32		*
Information	51	1,473	1,380		93
Publishing	511	1,155	1,070		85
Newspaper, periodical, book, and directory publishers	5111	*	0		*
Software publishers	5112	1,155	1,070		85
Telecommunications	517	44 - 168	41 - 165		3
Data processing, hosting, and related services	518	140	135		5 i
Other information	other 51	11 - 134	11 - 134		0
Finance and insurance	52	54	51		3
Real estate and rental and leasing	53	11	10		1
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0		0
Other real estate and rental and leasing	other 53	11	10		1
Professional, scientific, and technical services	54	27,415	25,123		2,292 i
Architectural, engineering, and related services	5413	1,469	1,149		320
Computer systems design and related services	5415	1,771	1,733		38
Scientific research and development services	5417	23,370	21,546		1,824 i
Biotechnology research and development	541711	5,695	5,643		52
Physical, engineering, and life sciences (except biotechnology) research and development	541712	16,634	15,026		1,608 i
Social sciences and humanities research and development	541720	1,041	877		164
Other professional, scientific, and technical services	other 54	805	695		110
Health care services	621-23	192	186 - 193		0 - 6
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	111	76		35
All companies (number of domestic employees)	-	81,003	69,904		11,099 i
Small companies					
10-19 <sup>a</sup>	-	1,049	917		132
20-49	-	2,213	1,850		364
Medium companies					
50-99	-	2,560	2,080		480
100-249	-	4,882	3,867		1,015
Large companies					
250-499	-	2,948	2,593		355
500-999	-	1,980	1,712		269
1,000-4,999	-	16,382	13,883		2,498
5,000-9,999	-	13,786	12,219		1,566 i
10,000-24,999	-	12,387	10,662		1,725 i
25,000 or more	-	22,816 i	20,120 i		2,696 i

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

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: 2017**  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Sales					
		R&D performers or funders <sup>a</sup>			Domestic R&D performers <sup>b</sup>		
		Worldwide	Domestic	Foreign	Worldwide	Domestic	Foreign
All industries	21-23, 31-33, 42-81	12,948,005	9,682,692	3,265,314	12,445,698	9,278,005	3,167,692
Manufacturing industries	31-33	7,593,041	5,423,997	2,169,044	7,476,731	5,345,784	2,130,946
Food	311	844,347	647,782	196,565	840,210	643,675	196,535
Beverage and tobacco products	312	251,654	150,683	100,971	215,582	150,540	65,042
Textile, apparel, and leather products	313-16	104,261	81,151	23,109	102,856	79,903	22,954
Wood products	321	28,458	27,589	869	27,971	27,103	869
Paper	322	225,561	166,833	58,728	223,806	165,107	58,699
Printing and related support activities	323	48,808	40,404	8,404	48,665	40,261	8,404
Petroleum and coal products	324	289,120	233,600	55,520	289,118	233,597	55,520
Chemicals	325	1,303,635	901,859	401,776	1,298,828	897,168	401,661
Basic chemicals	3251	220,526	158,316	62,210	220,440	158,230	62,210
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	61,672	43,430	18,242	61,359	43,132	18,227
Pesticide, fertilizer, and other agricultural chemicals	3253	80,558	69,085	11,473	80,381	68,909	11,473
Pharmaceuticals and medicines	3254	639,147	466,391	172,755	636,860	464,105	172,755
Soap, cleaning compound, and toilet preparation	3256	194,579	98,208	96,371	194,426	98,055	96,371
Paint, coating, adhesive, and other chemicals	3255, 3259	107,153	66,428	40,725	105,362	64,738	40,624
Plastics and rubber products	326	265,955	187,102	78,853	262,721	184,101	78,620
Nonmetallic mineral products	327	56,954	45,621	11,333	52,665	41,332	11,333
Primary metals	331	117,039	91,446	25,593	109,632	85,183	24,449
Fabricated metal products	332	142,711	111,740	30,971	141,434	110,592	30,842
Machinery	333	506,634	323,082	183,552	505,363	321,852	183,511
Agricultural implement	33311	71,107	46,786	24,321	70,649	46,327	24,321
Semiconductor machinery	333242	37,934	20,067	17,866	37,934	20,067	17,866
Engine, turbine, and power transmission equipment	3336	66,516	35,990	30,526	66,434	35,908	30,526
Other machinery	other 333	331,077	220,238	110,839	330,347	219,549	110,798
Computer and electronic products	334	1,182,375	697,118	485,257	1,181,501	696,277	485,224
Communications equipment	3342	129,733	88,593	41,140	129,389	88,248	41,140
Semiconductor and other electronic components	3344	297,753	171,921	125,833	297,569	171,757	125,813
Navigational, measuring, electromedical, and control instruments	3345	252,030	168,019	84,011	251,706	167,704	84,002
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	41,084	22,449	18,635	40,916	22,281	18,635
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	103,021	76,530	26,491	103,021	76,530	26,491
Other measuring and controlling device	other 3345	107,924	69,039	38,885	107,769	68,892	38,877
Other computer and electronic products	other 334	502,858	268,585	234,273	502,837	268,568	234,269
Electrical equipment, appliances, and components	335	181,020	113,434	67,586	180,242	112,659	67,583

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: 2017**  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Sales					
		R&D performers or funders <sup>a</sup>			Domestic R&D performers <sup>b</sup>		
		Worldwide	Domestic	Foreign	Worldwide	Domestic	Foreign
Transportation equipment	336	1,487,960	1,173,095	314,865	1,441,688	1,126,833	314,855
Automobiles, bodies, trailers, and parts	3361-63	961,170	756,472	204,697	915,344	710,656	204,687
Aerospace products and parts	3364	445,364	350,201	95,163	445,357	350,194	95,163
Aircraft, aircraft engine, and aircraft parts	336411-13	419,846	331,306	88,539	419,846	331,306	88,539
Guided missile, space vehicle, and related parts	336414-15, 336419	25,519	18,895	6,624	25,511	18,888	6,624
Military armored vehicle, tank, and tank components	336992	322	322	0	308	308	0
Other transportation	other 336	81,104	66,100	15,005	80,680	65,675	15,005
Furniture and related products	337	48,649	43,772	4,877	48,070	43,193	4,877
Miscellaneous manufacturing	339	507,901	387,688	120,213	506,377	386,408	119,969
Medical equipment and supplies	3391	403,909	309,223	94,686	403,724	309,037	94,686
Other miscellaneous manufacturing	3399	103,991	78,464	25,527	102,654	77,371	25,283
Nonmanufacturing industries	21-23, 42-81	5,354,965	4,258,695	1,096,270	4,968,967	3,932,221	1,036,746
Mining, extraction, and support activities	21	530,099	249,285	280,814	526,208 - 529,968	245,525 - 249,286	280,682
Utilities	22	411,267	404,968	6,299	295,639	289,340	6,299
Wholesale trade	42	219,621	186,263	33,358	205,493	172,665	32,828
Electronic shopping and electronic auctions	454111-12	200,504	137,551	62,952	200,026	137,074	62,952
Transportation and warehousing	48-49	240,650	186,668	53,981	236,890 - 240,650	182,908 - 186,669	53,981
Information	51	1,486,356	1,192,143	294,213	1,464,186	1,175,499	288,687
Publishing	511	346,794	232,373	114,421	345,746	231,423	114,323
Newspaper, periodical, book, and directory publishers	5111	2,467	2,175	292	2,129	1,844	285
Software publishers	5112	344,327	230,197	114,129	343,617	229,579	114,038
Telecommunications	517	536,572	522,690	13,882	527,557 - 532,988	519,105	8,453 - 13,883
Data processing, hosting, and related services	518	369,102	302,527	66,575	369,043	302,468	66,575
Other information	other 51	233,888	134,554	99,334	216,407 - 221,838	122,503	93,905 - 99,335
Finance and insurance	52	835,773	736,468	99,305	810,001	712,395	97,606
Real estate and rental and leasing	53	13,254	10,823	2,431	12,069	9,637	2,431
Lessors of nonfinancial intangible assets (except copyrighted works)	533	2,117	2,068	50	1,939	1,889	50
Other real estate and rental and leasing	other 53	11,137	8,755	2,381	10,130	7,748	2,381
Professional, scientific, and technical services	54	560,472	400,375	160,097	558,752	398,712	160,039
Architectural, engineering, and related services	5413	117,848	92,417	25,431	117,319	91,888	25,431
Computer systems design and related services	5415	234,694	152,271	82,423	234,049	151,652	82,398

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: 2017**  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Sales					
		R&D performers or funders <sup>a</sup>			Domestic R&D performers <sup>b</sup>		
		Worldwide	Domestic	Foreign	Worldwide	Domestic	Foreign
Scientific research and development services	5417	84,411	69,134	15,277	84,257	68,986	15,271
Biotechnology research and development	541711	30,331	26,808	3,523	30,315	26,793	3,523
Physical, engineering, and life sciences (except biotechnology) research and development	541712	52,836	41,083	11,754	52,697	40,949	11,748
Social sciences and humanities research and development	541720	1,244	1,244	0	1,244	1,244	0
Other professional, scientific, and technical services	other 54	123,519	86,553	36,966	123,126	86,187	36,939
Health care services	621-23	116,380	115,007	1,373	115,091	113,718	1,373
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	740,588	639,143	101,446	540,848	490,982	49,866
All companies (number of domestic employees)	-	12,948,005	9,682,692	3,265,314	12,445,698	9,278,005	3,167,692
Small companies							
10-19 <sup>c</sup>	-	51,341	24,126	27,214	48,112 - 48,747	21,532	26,581 - 27,215
20-49	-	88,804	86,131	2,672	83,192	80,599	2,593
Medium companies							
50-99	-	122,854	116,967	5,887	118,234	112,829	5,405
100-249	-	319,116	258,031	61,085	274,842	249,889	24,953
Large companies							
250-499	-	324,148	280,138	44,009	314,390	270,948	43,443
500-999	-	436,803	368,694	68,110	421,782	354,824	66,958
1,000-4,999	-	1,685,650	1,249,905	435,744	1,653,915	1,220,374	433,541
5,000-9,999	-	1,324,619	939,230	385,388	1,289,731	909,050	380,681
10,000-24,999	-	2,633,889	1,851,278	782,611	2,571,086 - 2,571,721	1,789,109	781,978 - 782,612
25,000 or more	-	5,960,783	4,508,191	1,452,592	5,669,775	4,268,852	1,400,922

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Statistics are representative of companies located in the United States that performed or funded R&D.

<sup>b</sup> Statistics are representative of companies located in the United States that performed R&D.

<sup>c</sup> 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. 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, 2017.

TABLE 9

**Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2017**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	Sales		
		Worldwide	Domestic	Foreign
All business activities	21100–81000	12,948,005	9,682,692	3,265,314
Oil and gas extraction	21100	109,273	52,023	57,250
Mining	21200	22,509	17,133	5,376
Support activities for mining, including oil and gas	21300	60,844	37,568	23,277
Utilities	22100	396,134	389,447	6,686
Construction	23000	77,156	71,838	5,318
Food manufacturing	31100	799,010	625,212	173,798
Beverage manufacturing	31210	148,875	95,712	53,163
Tobacco manufacturing	31220	71,720	35,262	36,458
Textile, apparel, and leather products manufacturing	31990	84,497	66,085	18,411
Wood products manufacturing	32100	36,213	32,000	4,213
Paper manufacturing	32200	146,227	110,383	35,844
Printing and related support activities	32300	47,965	39,269	8,696
Petroleum refineries	32401	324,107 - 555,481	324,108	0 - 231,373
Asphalt paving, roofing, and saturated materials manufacturing	32402	16,003	12,998	3,005
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	19,161	14,153	5,007
Basic chemicals manufacturing	32510	237,198	168,210	68,988
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	97,108	58,861	38,247
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	73,305	54,774	18,531
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing	32541	619,783	478,088	141,695
In vitro diagnostic substances manufacturing	32542	15,914	9,183	6,731
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	99,127	81,126	18,001
Soap, cleaning compound, and toilet preparations manufacturing	32591	168,785	88,341	80,444
Paint, adhesive, and other chemical manufacturing	32592	127,257	80,003	47,254
Plastics and rubber products manufacturing	32600	227,168	161,672	65,496
Clay and glass products manufacturing	32710	42,173	28,177	13,996
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	30,491	26,360	4,130
Primary metal manufacturing	33100	100,878	83,339	17,539
Fabricated metal products manufacturing	33200	175,352	127,982	47,370
Agricultural machinery and equipment manufacturing	33311	60,583	39,296	21,287
Construction machinery manufacturing	33312	59,675	38,879	20,797
Mining, oil, and gas field machinery and equipment manufacturing	33319	63,193	30,135	33,058
Semiconductor machinery manufacturing	33321	37,848	19,812	18,036
Industrial machinery manufacturing (except semiconductor machinery)	33322	36,711	26,111	10,600
Photographic and photocopying equipment manufacturing	33331	7,438	6,513	925
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	104,926	70,030	34,896
Digital cameras manufacturing	33333	5,574	1,433	4,141
Engine, turbine, and power transmission equipment manufacturing	33360	105,285	57,233	48,051
Metalworking and other general purpose machinery manufacturing	33390	117,062	76,941	40,121
Computers and peripheral equipment manufacturing and magnetic and optical media	33412	438,419	230,968	207,452
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	75,277	41,786	33,491
Radio, television, and wireless communication equipment manufacturing	33422	37,605	31,698	5,907

TABLE 9

**Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2017**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	Sales		
		Worldwide	Domestic	Foreign
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	13,998	11,961	2,037
Audio and video equipment manufacturing	33430	32,459 i	28,886 i	3,573
Semiconductor and other electronic components manufacturing	33440	366,749	179,804	186,945
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	44,539	24,347	20,192 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	65,594 i	53,381 i	12,213 i
Measuring and control instruments manufacturing (not listed elsewhere)	33459	92,340	60,689	31,651
Electrical equipment, appliances, and components manufacturing	33500	184,347	118,813	65,533
Motor vehicles manufacturing	33610	625,969	507,269	118,700
Motor vehicle body and trailer manufacturing	33620	19,883	19,177	706
Motor vehicle parts manufacturing	33630	268,118	179,016	89,102
Aircraft manufacturing	33641	127,450	120,502	6,948
Aircraft engine and engine parts manufacturing	33642	42,094	40,321	1,773
Other aircraft parts and auxiliary equipment manufacturing	33643	101,928	82,023	19,905
Guided missiles, space vehicles, and related parts manufacturing	33644	38,398	36,954	1,444 i
Railroad rolling stock manufacturing	33651	13,433	8,235	5,198
Ship and boat building	33660	22,585	20,899	1,685
Motorcycle, bicycle, and parts manufacturing	33691	9,187	5,468	3,720
Military armored vehicle, tank, and tank components manufacturing	33692	11,267 i	9,629 i	1,638 i
All other transportation equipment manufacturing	33699	14,717	11,606	3,111
Furniture and related products manufacturing	33700	46,246	42,418	3,828
Medical equipment and supplies manufacturing	33910	244,936	161,449	83,487
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	121,824	87,312	34,512
Merchant wholesalers, durable goods	42300	254,445	191,142	63,303
Merchant wholesalers, nondurable goods	42400	527,563	367,555	160,008
Wholesale electronic markets and agents and brokers (business to business)	42500	20,879	20,549	331
Retail trade (except electronic shopping and electronic auctions)	44000	390,679	371,991	18,688 i
Electronic shopping and electronic auctions	45411	201,534	138,396	63,138
Transportation	48000	196,106	158,870	37,236
Couriers, messengers, and express delivery services	49200	84,691	64,033	20,659
Warehousing and storage	49300	14,230	8,900	5,330
Newspaper, periodical, book, and directory publishers (except Internet)	51110	6,190	4,509	1,681
Software publishers (except Internet)	51120	232,939	135,245	97,694
Motion picture and sound recording (except Internet)	51200	9,119	6,477	2,642
Broadcasting (except Internet)	51500	88,173	71,374	16,799
Wired telecommunications carriers	51710	221,017	218,689	2,328
Wireless telecommunications carriers (except satellite)	51720	199,344 - 430,718	199,345	0 - 231,373
Satellite telecommunications	51740	57,078	56,785	293
Other telecommunications (not listed elsewhere)	51790	15,164	13,438	1,726
Data processing, hosting, and related services	51800	73,963	55,062	18,901
Cloud computing applications and Internet-based software services	51801	98,001	77,055	20,946
Other information services, including Internet publishing, broadcasting, and Web search portals	51910	164,943	108,357	56,586
Finance: banking and credit intermediation	52200	471,876	400,158	71,719
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	102,511	83,735	18,776
Insurance carriers and related activities	52400	312,714	294,274	18,440 i
Real estate	53100	11,173	11,080	93

TABLE 9

**Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2017**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	Sales		
		Worldwide	Domestic	Foreign
Rental and leasing services	53200	25,351	17,228	8,123
Lessors of nonfinancial intangible assets, including patent licensing	53300	4,713	4,000	712
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	19,827	17,275	2,552
Architectural, engineering, and related services	54130	90,076	69,096	20,979
Specialized design services	54140	4,160 i	2,228 i	1,932 i
Computer systems design and related services	54150	225,307	153,903	71,405
Management, scientific, and technical consulting services	54160	49,336	42,365	6,971
Research and development services in social sciences and humanities	54172	1,300	1,294	5
Research and development services in biotechnology	54173	9,401	6,341	3,060
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	39,842	29,560	10,282
Advertising and related services	54180	107,770	52,826	54,944
Professional, scientific, and technical services (not listed elsewhere)	54190	25,732	23,515	2,217
Management of companies and enterprises	55100	18,063	16,387	1,677
Administrative and support services	56100	59,208	30,881	28,327
Waste management and remediation services	56200	22,541	21,190	1,351
Offices of physicians	62110	63,828	63,827	1
Medical and diagnostic laboratories	62150	31,160	29,465	1,695
Other ambulatory health care services (ambulance, dental, home health care)	62199	11,101	10,562	539
Hospitals and nursing care facilities	62200	34,370	34,370	0
Social assistance services	62400	112	112	0
Arts, entertainment, and recreation	71000	25,033	19,384	5,649
Accommodation and food services	72000	32,190	25,877	6,313
Other services (not listed elsewhere)	81000	220,241 - 451,615	220,242	0 - 231,373
Less: intersegment eliminations	-	190,205	116,556	73,649
Undistributed	-	0	0	0

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Data are tabulated independent of the industry classification of the company. Companies were asked to report their sales and R&D activity in one or more business activity codes.<sup>b</sup> Business codes and descriptions are based on 2012 NAICS 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.



TABLE 10

## Domestic R&amp;D paid for by the company and others and performed by the company, by type of cost, industry, and company size: 2017

(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	400,100	231,142	24,905	15,892	6,175	29,649	6,807	15,072	2,449	10,903	57,106
Manufacturing industries	31-33	257,227	141,985	10,100	8,915	3,662	25,324	3,733	10,815	2,235	7,141	43,317
Food	311	4,697	2,998	46	86	25	499	39	216	2	187	599
Beverage and tobacco products	312	1,076	612	15	34	2	87	13	58	*	49	205
Textile, apparel, and leather products	313-16	920	590	16	25	67	96	3	18	*	15	90
Wood products	321	175	130	*	5	2	23	1	3	0	4	7
Paper	322	1,322	703	*	42	36	422	6	40	1	8	64
Printing and related support activities	323	229	155	2	9	10	21	3	10	*	1	19
Petroleum and coal products	324	316	201	0	6	8	34	4	12	1	9	41
Chemicals	325	74,977	34,285	3,899	4,062	371	6,083	1,441	3,677	686	2,288	18,187
Basic chemicals	3251	2,574	1,513	3	50	38	270	51	153	25	107	365
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	628	408	0 - 107	25	1	44	16	26	*	5	0 - 107
Pesticide, fertilizer, and other agricultural chemicals	3253	1,376 - 1,475	687	0 - 149	187	1	89	45	161	3	6	46 - 300
Pharmaceuticals and medicines	3254	66,202	29,119	3,737	3,670	310	5,463	1,287	3,180	655	2,128	16,654
Soap, cleaning compound, and toilet preparation	3256	2,605 - 2,701	1,585	12	104	6	129	24	89	*	22	638 - 728
Paint, coating, adhesive, and other chemicals	3255, 3259	1,495	973	0 - 149	26	15	89	19	67	3	20	129 - 287
Plastics and rubber products	326	3,754	2,220	55	86	47	590	61	198	7	156	336
Nonmetallic mineral products	327	1,334	851	1	61	6	66	10	104	*	16	219
Primary metals	331	749	398	6	9	5	151	8	37	*	9	125
Fabricated metal products	332	2,206	1,410	23	47	25	384	15	32	6	32	231
Machinery	333	13,197	8,090	224	463	113	1,689	119	534	16	117	1,833
Agricultural implement	33311	1,570	935	0	107	5	281	5	40	2	4	191
Semiconductor machinery	333242	3,694	1,945	165	23	3	432	32	290	2	16	785
Engine, turbine, and power transmission equipment	3336	2,080	1,286	1	0 - 315	5	269	4	79	*	9	109 - 431
Other machinery	other 333	5,853	3,924	57	19 - 334	100	706	79	125	11	87	425 - 747

TABLE 10

## Domestic R&amp;D paid for by the company and others and performed by the company, by type of cost, industry, and company size: 2017

(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	78,575	46,532	5,418	1,569	1,513	5,038	1,343	4,266	1,261	2,873	8,762
Communications equipment	3342	12,687	7,700	677	446	181	490	897	576	38	476	1,207
Semiconductor and other electronic components	3344	30,148	18,533	1,935	388	363	1,642	226	1,956	620	1,150	3,335
Navigational, measuring, electromedical, and control instruments	3345	14,509	9,528	162	498	156	1,305	116	295	247	266	1,933
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	2,696	1,525	30	95	12	195	25	68	4	93	648
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	7,297	5,060	31	290	38	704	24	130	196 - 242	110	664 - 715
Other measuring and controlling device	other 3345	4,516	2,943	101	113	106	406	67	98	1 - 47	63	571 - 622
Other computer and electronic products	other 334	21,231	10,770	2,644	237	814	1,602	104	1,439	355	980	2,287
Electrical equipment, appliances, and components	335	4,291	2,905	42	106	36	343	70	115	5	103	567
Transportation equipment	336	53,292	30,043	10	1,701	1,210	8,548	460	923	203	850	9,344
Automobiles, bodies, trailers, and parts	3361-63	23,881	13,811	6	1,311	1,027	4,090	282	657	168	311	2,219
Aerospace products and parts	3364	26,383	14,600	*	299	133	3,615	149	208	14	469	6,896
Aircraft, aircraft engine, and aircraft parts	336411-13	24,576	13,615	*	284	130	3,052	147	206	14	469	6,659
Guided missile, space vehicle, and related parts	336414-15, 336419	1,807	986	0	15	2	563	2	2	0	*	237
Military armored vehicle, tank, and tank component	336992	9	5	0	0 - 5	*	0 - 5	*	*	*	*	0 - 5
Other transportation	other 336	3,018	1,626	3	85 - 93	51	836 - 845	28	58	22	70	223 - 231
Furniture and related products	337	422	310	1	10	1	44	5	4	2	6	38
Miscellaneous	339	15,695	9,553	342	593	184	1,207	131	570	46	420	2,648
Medical equipment and supplies	3391	13,589	7,984	335	570	178	1,018	119	535	36	406	2,406

TABLE 10

## Domestic R&amp;D paid for by the company and others and performed by the company, by type of cost, industry, and company size: 2017

(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	2,106	1,569	6	23	6	189	12	35	10	13	242
Nonmanufacturing industries	21-23, 42-81	142,874	89,157	14,805	6,977	2,513	4,325	3,074	4,257	214	3,762	13,789
Mining, extraction, and support activities	21	3,150	2,022	30	140	12	125	58	98	1	283	382
Utilities	22	317	114	1	18	4	50	1	56	4	44	26
Wholesale trade	42	534	387	1	13	2	37	6	5	21	10	52
Electronic shopping and electronic auctions	454111-12	9,318	6,122	1,369 - 1,515	58	65	16	40 - 186	544	0	3	809 - 955
Transportation and warehousing	48-49	1,147	699	6	90	51	175	11	32	0	27	57
Information	51	80,252	48,865	12,077	3,817	1,967	1,450	2,093	2,214	122	1,025	6,621
Publishing	511	34,338	23,167	3,240	1,264	201	436	550	571	98	854	3,956
Newspaper, periodical, book, and directory publishers	5111	74	51	1	2	1	3	*	5	0	0	10
Software publishers	5112	34,264	23,116	3,239	1,261	200	433	550	566	98	854	3,947
Telecommunications	517	3,682 - 3,806	2,371	168	213	9	0 - 692	162	15	5	31	13 - 836
Data processing, hosting, and related services	518	16,155	11,010	1,746	646	245	319	237	281	16	103	1,552
Other information	other 51	25,954 - 26,077	12,318	6,924	1,695	1,511	4 - 696	1,143	1,347	3	37	278 - 1,099
Finance and insurance	52	7,616	4,899	178	1,204	44	42	57	156	2	566	467
Real estate and rental and leasing	53	718	534	79	8	7	2	7	24	3	3	51
Lessors of nonfinancial intangible assets (except copyrighted works)	533	138	135	*	*	*	*	*	*	*	2	*
Other real estate and rental and leasing	other 53	579	399	78	8	7	2	6	24	3	*	51
Professional, scientific, and technical services	54	36,922	23,369	850	1,540	343	2,266	612	1,083	58	1,764	5,037
Architectural, engineering, and related services	5413	2,708	2,027	3	97	14	185	34	18	1	79	251

TABLE 10

## Domestic R&amp;D paid for by the company and others and performed by the company, by type of cost, industry, and company size: 2017

(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 systems design and related services	5415	13,327	9,184	634	i 626	105	483	90	451	5	59	1,690
Scientific research and development services	5417	17,321	9,486	151	647	146	1,281	457	579	46	1,589	i 2,940
Biotechnology research and development	541711	4,449	2,286	47	189	7	371	84	156	22	819	i 469
Physical, engineering, and life sciences (except biotechnology) research and development	541712	11,913	6,551	78	442	124	905	341	411	23	770	2,267
Social sciences and humanities research and development	541720	959	649	26	16	15	5	31	12	*	*	204 i
Other professional, scientific, and technical services	other 54	3,566	2,672	63	i 170	79	318	32	35	6	37	155
Health care services	621-23	1,101	614	i 72	i 45	i 14	i 112	i 44	i 29	i 1	i 32	i 137
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,799	1,531	0 - 137	43	6	i 50	i 3 - 142	16	2	i 3	9 - 148
All companies (number of domestic employees)	-	400,100	231,142	24,905	15,892	6,175	29,649	6,807	15,072	2,449	10,903	57,106
Small companies												
10-19 <sup>a</sup>	-	3,311	2,205	53	168	33	243	73	49	32	i 58	397
20-49	-	9,435	6,084	167	378	100	836	262	231	98	200	1,079
Medium companies												
50-99	-	10,141	6,302	278	515	72	850	262	220	139	304	1,200
100-249	-	17,216	10,424	690	686	186	1,574	430	407	249	314	2,257
Large companies												
250-499	-	14,103	8,737	624	586	162	1,093	309	324	118	308	1,844
500-999	-	17,871	10,887	1,147	705	351	1,329	317	541	139	426	2,028
1,000-4,999	-	65,112	37,435	4,236	2,271	729	3,968	939	2,477	399	1,748	i 10,911
5,000-9,999	-	40,198	24,071	1,875	1,763	304	2,424	510	1,616	39	1,135	6,461
10,000-24,999	-	73,485	42,247	4,780	2,460	986	6,383	1,072	3,524	192	2,356	9,484
25,000 or more	-	149,227	82,748	11,055	6,360	3,253	10,950	2,633	5,686	1,044	4,053	21,446

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

TABLE 11

## Domestic R&amp;D paid for by the company and others and performed by the company, by industry and company size: 2017

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)											
		All companies	10-19 <sup>a</sup>	20-49	50-99	100-249	250-499	500-999	1,000-4,999	5,000-9,999	10,000-24,999	25,000 or more	
All industries	21-23, 31-33, 42-81	400,100	3,311	9,435	10,141	17,216	14,103	17,871	65,112	40,198	73,485	149,227	
Manufacturing industries	31-33	257,227	1,189	4,782	5,490	10,315	8,561	10,987	43,637	22,664	55,683	93,919	
Food	311	4,697	i 0	48	31	225	181	146	564	292	2,328	i 881	i
Beverage and tobacco products	312	1,076	0	5	14	10	120	17	41	177	140	553	
Textile, apparel, and leather products	313-16	920	0-47	10	28	38	46	22	222	284	89	130-186	
Wood products	321	175	2	4	4	8	7	33	57	22	38	0	
Paper	322	1,322	0	2	10	34	19	22	89	255	326	565	
Printing and related support activities	323	229	0	10	13	20	27	51	51	i 31	26	0	
Petroleum and coal products	324	316	2	8	23	14	84	i 46	20	0	119	0	
Chemicals	325	74,977	466	1,994	2,664	4,534	3,379	3,046	16,236	5,413	23,627	13,620	
Basic chemicals	3251	2,574	18	127	100	109	257	118	1,034	288	523	0	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	628	9	16	22	41	73	66	112	0	289	0	
Pesticide, fertilizer, and other agricultural chemicals	3253	1,376 - 1,475	1	17	0-61	54	15	0	452	0-326	372 - 964	0	
Pharmaceuticals and medicines	3254	66,202	410	1,739	2,450	4,198	2,828	2,734	13,756	4,384	20,393	i 13,310	
Soap, cleaning compound, and toilet preparation	3256	2,605 - 2,701	4	29	34	63	63	76	315	417	i 1,461	0-280	i
Paint, coating, adhesive, and other chemicals	3255, 3259	1,495	23	66	0-61	70	141	52	566	0-326	0-587	29-311	
Plastics and rubber products	326	3,754	18	118	109	197	256	234	772	494	243	1,311	
Nonmetallic mineral products	327	1,334	3	20	i 40	39	12	69	257	69	826	0	
Primary metals	331	749	1	15	30	88	31	39	111	104	330	0	
Fabricated metal products	332	2,206	98	192	172	533	206	329	394	218	63	0	
Machinery	333	13,197	104	366	514	1,012	503	753	2,430	3,308	1,149	3,058	
Agricultural implement	33311	1,570	0-104	44	0-480	80	18	44	230	0-1,160	i 0	0-1,160	
Semiconductor machinery	333242	3,694	1	3	18	129	46	0-702	984	1,721 - 2,541	0	0	
Engine, turbine, and power transmission equipment	3336	2,080	0-104	35	18	69	62	4	168	0-1,587	0-1,150	0-1,738	
Other machinery	other 333	5,853	0-104	285	0-480	733	378	4-707	1,047	0-1,587	0-1,150	160-3,059	
Computer and electronic products	334	78,575	276	1,032	913	1,859	1,976	3,752	13,766	7,027	12,487	i 35,487	

TABLE 11

## Domestic R&amp;D paid for by the company and others and performed by the company, by industry and company size: 2017

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)											
		All companies	10-19 <sup>a</sup>	20-49	50-99	100-249	250-499	500-999	1,000-4,999	5,000-9,999	10,000-24,999	25,000 or more	
Communications equipment	3342	12,687	19	127	0-219	356	321	1,209	3,035	1,362	178-2,117	i	3,911-6,097
Semiconductor and other electronic components	3344	30,148	48	468	305	738	1,134	1,526	5,743	1,975	8,426	i	9,786
Navigational, measuring, electromedical, and control instruments	3345	14,509	162	365	391	611	373	353	3,788	645	1,946		5,875
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	2,696	12-163	129	i 105	273	85	78	1,186	0	628-842		0
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	7,297	0-150	66	0-287	94	78	23	773	0-646	221-1,318		4,995
Other measuring and controlling device	other 3345	4,516	0-150	170	0-287	244	210	252	1,829	0-646	0-941		880
Other computer and electronic products	other 334	21,231	47	71	0-219	154	148	665	1,200	3,044	0-1,939		13,728-15,914
Electrical equipment, appliances, and components	335	4,291	64	169	239	312	337	607	1,016	286	807		453
Transportation equipment	336	53,292	52	253	176	518	983	1,067	4,252	2,876	8,419		34,696
Automobiles, bodies, trailers, and parts	3361-63	23,881	0-23	179	0-80	291	613	759	3,372	1,268	3,793		13,490-13,750
Aerospace products and parts	3364	26,383	29	56	95	167	211	205	706	1,176	4,626		19,112
Aircraft, aircraft engine, and aircraft parts	336411-13	24,576	i 24	46	69	164	211	143	i 546	415	3,845		19,112
Guided missile, space vehicle, and related parts	336414-15, 336419	1,807	5	10	26	3	0	62	161	761	781		0
Military armored vehicle, tank, and tank components	336992	9	2	*	3	0-6	0-6	0	0	0	0		0
Other transportation	other 336	3,018	0-23	18	0-80	53-62	152-161	103	173	432	0		1,833-2,093
Furniture and related products	337	422	1	10	14	45	22	16	79	220	14		0
Miscellaneous manufacturing	339	15,695	61-108	528	496	828	371	737	3,278	1,589	4,652		3,104-3,160
Medical equipment and supplies	3391	13,589	62	438	375	618	240	558	2,424	1,282	4,652		2,939
Other miscellaneous manufacturing	3399	2,106	0-47	89	121	210	131	179	854	307	0	i	164-220
Nonmanufacturing industries	21-23, 42-81	142,874	2,123	4,653	4,651	6,902	5,543	6,883	21,475	17,535	17,802		55,308
Mining, extraction, and support activities	21	3,150	2	0-93	68	0-154	0-166	44	91	222	i 1,822		124-911
Utilities	22	317	0	11	*	1	*	6	48	11	115		126

TABLE 11

## Domestic R&amp;D paid for by the company and others and performed by the company, by industry and company size: 2017

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10-19 <sup>a</sup>	20-49	50-99	100-249	250-499	500-999	1,000-4,999	5,000-9,999	10,000-24,999	25,000 or more
Wholesale trade	42	534	38	93	111	149	86	41	11	1	4	0
Electronic shopping and electronic auctions	454111-12	9,318	3	4	0	26	23	24	5	457-1,509	0	7,717-8,779
Transportation and warehousing	48-49	1,147	4	1	2	78	3	634	45	0	25	356
Information	51	80,252	571	1,446	1,394	2,472	2,855	4,038	12,730	8,192	11,420	35,135
Publishing	511	34,338	249	707	550	842	651	903	6,541	5,806	586	17,503
Newspaper, periodical, book, and directory publishers	5111	74	0	14	2	10	39	9	0	0	0	0
Software publishers	5112	34,264	249	692	547	833	612	894	6,541	5,806	586	17,503
Telecommunications	517	3,682-3,806	6	69	46	0-267	0-347	36	214	0	0-3,441	0-3,441
Data processing, hosting, and related services	518	16,155	249	9-672	0-800	1,364	1,859	2,852	4,769	1,508	0-3,554	0-3,554
Other information	other 51	25,954-26,077	66	0-663	0-800	0-267	0-347	246	1,207	878	3,838-10,835	10,636-17,633
Finance and insurance	52	7,616	53	21	30	118	118	139	1,376	1,601	1,693	2,468
Real estate and rental and leasing	53	718	0-6	144	10	32	0-6	13	517	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	138	0-6	125	0-11	0-14	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	579	0	19	0-11	17-33	0-6	13	517	0	0	0
Professional, scientific, and technical services	54	36,922	1,406	2,768	2,894	3,688	2,037	1,445	6,181	5,905	2,708	7,889
Architectural, engineering, and related services	5413	2,708	164	281	381	493	329	126	289	22	236	387
Computer systems design and related services	5415	13,327	332	619	831	820	457	559	2,601	451	2,203	4,452
Scientific research and development services	5417	17,321	800	1,625	1,361	2,024	873	300	2,924	5,392	174	1,848
Biotechnology research and development	541711	4,449	231	373	290	85	140	0	1,482	0	0	1,848
Physical, engineering, and life sciences (except biotechnology) research and development	541712	11,913	564	1,240	1,065	1,832	733	300	1,171	4,834	174	0
Social sciences and humanities research and development	541720	959	5	13	6	107	0	0	270	558	0	0
Other professional, scientific, and technical services	other 54	3,566	109	243	321	351	378	460	367	40	95	1,202



TABLE 11

**Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2017**

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)											
		All companies	10–19 <sup>a</sup>	20–49	50–99	100–249	250–499	500–999	1,000–4,999	5,000–9,999	10,000–24,999	25,000 or more	
Health care services	621–23	1,101	15	65	61	189	i	259	257	52	98	0	106
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,799	20–35	12–105	80	0–154		0–166	243	420	0–1,044	17	0–1,044

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

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: 2017**

(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	400,100	24,829	62,132	313,139
Manufacturing industries	31–33	257,227	18,624	43,698	194,904
Food	311	4,697 i	466 i	1,518 i	2,713
Beverage and tobacco products	312	1,076	142	257	677
Textile, apparel, and leather products	313–16	920	35	79	806
Wood products	321	175	11	39	125
Printing and related support activities	323	229	17	52	160
Chemicals	325	74,977	10,193	17,021	47,763
Pharmaceuticals and medicines	3254	66,202	9,362	14,890	41,950
Other chemicals	other 325	8,775	831	2,132	5,813
Plastics and rubber products	326	3,754	375	771	2,608
Nonmetallic mineral products	327	1,334	161 i	280 i	893 i
Primary metals	331	749	36	80	633
Fabricated metal products	332	2,206	187	347	1,672
Machinery	333	13,197	639	1,521	11,037
Computer and electronic products	334	78,575	2,543 i	11,194	64,837
Semiconductor and other electronic components	3344	30,148	923 i	4,720 i	24,506 i
Navigational, measuring, electromedical, and control instruments	3345	14,509	726 i	2,108	11,675
Other computer and electronic products	other 334	33,918	894	4,367	28,656
Electrical equipment, appliances, and components	335	4,291	300 i	708	3,284
Transportation equipment	336	53,292	2,824	7,490	42,978
Aerospace products and parts	3364	26,383	1,616 i	3,782	20,986
Other transportation equipment	other 336	26,908	1,208	3,708	21,992
Furniture and related products	337	422	32	77	313
Miscellaneous manufacturing	322, 324, 339	17,332	663	2,263	14,407
Nonmanufacturing industries	21–23, 42–81	142,874	6,205	18,434	118,235
Information	51	80,252	2,243	7,626	70,383
Publishing	511	34,338	1,095	2,702	30,542
Telecommunications	517	3,682 - 3,806	268	1,511	1,902 - 2,027
Data processing, hosting, and related services	518	16,155	687	2,004	13,464
Other information	other 51	25,954 - 26,077	194	1,408	24,351 - 24,476
Professional, scientific, and technical services	54	36,922	2,491	8,584	25,848
Architectural, engineering, and related services	5413	2,708	260	968	1,479
Computer systems design and related services	5415	13,327	898	2,243	10,185
Scientific research and development services	5417	17,321	1,178	4,814	11,329
Biotechnology research and development	541711	4,449	515	253	3,680
Physical, engineering, and life sciences (except biotechnology) research and development	541712	11,913	594	3,943	7,377
Social sciences and humanities research and development	541720	959	70 i	618 i	271 i
Other professional, scientific, and technical services	other 54	3,566	154	559	2,854
Other nonmanufacturing	21–23, 42–49, 52, 53, 55–81	25,700	1,471	2,225	22,004 i
All companies (number of domestic employees)	–	400,100	24,829	62,132	313,139
Small companies					
10–19 <sup>a</sup>	–	3,311	311	713	2,287
20–49	–	9,435	1,050	1,808	6,577
Medium companies					
50–99	–	10,141	738	2,288	7,116

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: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
100-249	-	17,216	1,424	3,632	12,160
Large companies					
250-499	-	14,103	959	2,126	11,019
500-999	-	17,871	1,196	2,931	13,744
1,000-4,999	-	65,112	5,214	12,109	47,789
5,000-9,999	-	40,198	2,144	6,094	31,961
10,000-24,999	-	73,485	4,428 i	12,795 i	56,262 i
25,000 or more	-	149,227	7,366	17,637	124,224

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Business 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

TABLE 13

**Domestic R&D paid for by the company and others and performed by the company, by source of funds and state: 2017**

(Millions of U.S. dollars)

State	Total	Paid for by the company	Paid for by others		
			Total	Federal	Nonfederal
All states	400,100	339,036	61,065	24,277	36,787
Alabama	1,896	968	928	821	107
Alaska	912	905	7	3	4
Arizona	6,338	4,476	1,862	932	929
Arkansas	466	442	24	6	18
California	132,473	120,111	12,362	5,573	6,789
Colorado	4,703	3,828	875	645	230
Connecticut	8,694	6,423	2,272	1,835	437
Delaware	2,048	1,445	603	9	593
District of Columbia	406	279	127	111	16
Florida	6,463	4,496	1,966	1,300	667
Georgia	6,450	5,085	1,365	110	1,255
Hawaii	169	105	64	22	41
Idaho	1,747	1,527	220	5	215
Illinois	14,399	12,743	1,655	768	887
Indiana	6,283	5,394	889	115	774
Iowa	2,938	2,195	743	0 - 744	0 - 744
Kansas	2,212	1,486	726	7	719
Kentucky	983	758	225	156	69
Louisiana	297	243	53	22	31
Maine	292	257	35	22	12
Maryland	5,595	3,106	2,488	2,030	458
Massachusetts	23,655	18,912	4,743	641	4,102
Michigan	21,042	19,101	1,941	229	1,712
Minnesota	7,146	6,633	513	239	274
Mississippi	266	221	45	28	17
Missouri	5,299	3,433	1,866	989 - 1,867	0 - 877
Montana	133	114	18	6	12
Nebraska	592	470	122	68	53
Nevada	624	439	186	21	165
New Hampshire	1,361	754	607	386	221
New Jersey	16,405	13,228	3,177	408	2,768
New Mexico	802	298	503	298	205
New York	15,671	13,430	2,241	1,024	1,216
North Carolina	10,246	7,502	2,744	175	2,569
North Dakota	304	276	28	4	25
Ohio	9,769	6,697	3,071	576	2,495
Oklahoma	833	775	58	24	34
Oregon	7,691	7,426	265	58	207
Pennsylvania	10,986	9,576	1,410	173	1,237
Rhode Island	730	657	73	44	30
South Carolina	1,370	1,212	158	60	98
South Dakota	199	189	10	1	9
Tennessee	1,407	1,172	235	39	195
Texas	21,002	17,752	3,250	729	2,521
Utah	2,846	2,171	675	539	136
Vermont	253	241	11	4	7
Virginia	4,332	2,659	1,674	1,338	336
Washington	21,462	20,820	642	169	472
West Virginia	212	182	30	23	7

TABLE 13

**Domestic R&D paid for by the company and others and performed by the company, by source of funds and state: 2017**

(Millions of U.S. dollars)

State	Total	Paid for by the company	Paid for by others		
			Total	Federal	Nonfederal
Wisconsin	5,436	4,777	659	105	554
Wyoming	87	82	5	2	3
Undistributed <sup>a</sup>	2,181	1,561	620	0 - 621	0 - 621

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

<sup>a</sup> Includes data reported on Form BRD-1 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

TABLE 14

**Domestic R&D performed by companies, by source of funds and core-based statistical area: 2017**

(Millions of U.S. dollars)

Core-based statistical area	CBSA code	Total	Paid for by the company	Paid for by others
All locations		400,100	339,036	61,065
San Jose-Sunnyvale-Santa Clara, CA	41940	56,898	54,078	2,820
San Francisco-Oakland-Berkeley, CA	41860	33,156	31,289	1,867
Seattle-Tacoma-Bellevue, WA	42660	28,912	28,387	525
New York-Newark-Jersey City, NY-NJ-PA	35620	24,461	20,652	3,809
Boston-Cambridge-Newton, MA-NH	14460	21,949	17,380	4,569
Detroit-Warren-Dearborn, MI	19820	15,402	14,355	1,047
San Diego-Chula Vista-Carlsbad, CA	41740	13,423	11,343	2,080
Los Angeles-Long Beach-Anaheim, CA	31080	12,938	9,154	3,783
Chicago-Naperville-Elgin, IL-IN-WI	16980	11,612	10,140	1,472
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	37980	10,051	8,233	1,819
Austin-Round Rock-Georgetown, TX	12420	7,926	7,304	622
Portland-Vancouver-Hillsboro, OR-WA	38900	7,369	7,197	172
Dallas-Fort Worth-Arlington, TX	19100	7,007	5,146	1,861
Minneapolis-St. Paul-Bloomington, MN-WI	33460	6,434	6,030	403
Atlanta-Sandy Springs-Alpharetta, GA	12060	5,455	4,173	1,282
Washington-Arlington-Alexandria, DC-VA-MD-WV	47900	4,921	2,781	2,141
Phoenix-Mesa-Chandler, AZ	38060	4,786	3,483	1,302
Houston-The Woodlands-Sugar Land, TX	26420	4,313	3,794	519
St. Louis, MO-IL	41180	4,170	276 - 4,171	0 - 3,894
Indianapolis-Carmel-Anderson, IN	26900	4,167	3,399	768
Norwich-New London, CT	35980	4,069	175 - 4,070	0 - 3,894
Durham-Chapel Hill, NC	20500	4,036	2,403	1,633
Cincinnati, OH-KY-IN	17140	3,574	2,650	923
Baltimore-Columbia-Towson, MD	12580	3,042	1,496	1,545
Raleigh-Cary, NC	39580	2,664	1,877	787
Sacramento-Roseville-Folsom, CA	40900	2,440	1,748	692
Kansas City, MO-KS	28140	2,288	1,571	717
Columbus, OH	18140	2,167	865	1,303
Denver-Aurora-Lakewood, CO	19740	2,134	1,827	308
Miami-Fort Lauderdale-Pompano Beach, FL	33100	2,092	1,776	316
Oxnard-Thousand Oaks-Ventura, CA	37100	2,032	1,671	361
Trenton-Princeton, NJ	45940	1,939	1,291	647
Hartford-East Hartford-Middletown, CT	25540	1,875	1,279	597
Milwaukee-Waukesha, WI	33340	1,706	1,583	123
Madison, WI	31540	1,642	1,254	388
Charlotte-Concord-Gastonia, NC-SC	16740	1,641	1,585	56
Boise City, ID	14260	1,597	1,404	193
Bridgeport-Stamford-Norwalk, CT	14860	1,590	1,303	286
Pittsburgh, PA	38300	1,538	1,421	117
Providence-Warwick, RI-MA	39300	1,451	1,376	75
Cleveland-Elyria, OH	17460	1,380	1,209	171
Tampa-St. Petersburg-Clearwater, FL	45300	1,281	871	410
Boulder, CO	14500	1,272	1,140	131
Tucson, AZ	46060	1,267	757	511
Huntsville, AL	26620	1,252	411	842
Albany-Schenectady-Troy, NY	10580	1,146	1,057	89
Salt Lake City, UT	41620	1,106	976	130
Rochester, NY	40380	1,042	943	99
New Haven-Milford, CT	35300	1,019	0 - 1,020	0 - 1,020
Palm Bay-Melbourne-Titusville, FL	37340	989	199	790

TABLE 14

**Domestic R&D performed by companies, by source of funds and core-based statistical area: 2017**

(Millions of U.S. dollars)

Core-based statistical area	CBSA code	Total	Paid for by the company		Paid for by others	
Worcester, MA-CT	49340	940	833		107	i
Ogden-Clearfield, UT	36260	917	443		475	
Orlando-Kissimmee-Sanford, FL	36740	908	708		201	i
Cedar Rapids, IA	16300	903	0 - 904	i	0 - 904	
Des Moines-West Des Moines, IA	19780	862	0 - 863	i	0 - 863	
Manchester-Nashua, NH	31700	858	372		486	i
Kalamazoo-Portage, MI	28020	857	573		285	
Riverside-San Bernardino-Ontario, CA	40140	820	721		99	i
Buffalo-Cheektowaga, NY	15380	790	593		197	i
Santa Maria-Santa Barbara, CA	42200	748	576		172	i
Akron, OH	10420	747	642		105	i
Grand Rapids-Kentwood, MI	24340	723	573		150	
Albuquerque, NM	10740	716	249		468	i
Anchorage, AK	11260	715	711	i	4	
Lansing-East Lansing, MI	29620	710	701	i	9	i
Provo-Orem, UT	39340	694	646		48	
Corning, NY	18500	680	680	i	*	e
Flint, MI	22420	655	652	i	3	i
Richmond, VA	40060	632	581		51	i
Bloomington, IL	14010	611	593		18	i
Ann Arbor, MI	11460	578	357		221	
San Antonio-New Braunfels, TX	41700	553	478		76	i
Greensboro-High Point, NC	24660	543	510	i	33	i
Columbus, IN	18020	535	475	i	59	
Lancaster, PA	29540	531	392	i	139	i
Syracuse, NY	45060	528	420		108	i
Santa Rosa-Petaluma, CA	42220	513	472		41	i
Allentown-Bethlehem-Easton, PA-NJ	10900	507	491		17	i
Wichita, KS	48620	497	487		9	
Jacksonville, FL	27260	493	444		49	i
Colorado Springs, CO	17820	477	345	i	132	i
Omaha-Council Bluffs, NE-IA	36540	470	371		99	i
Niles, MI	35660	469	459		10	i
Fort Collins, CO	22660	443	420		22	
Oshkosh-Neenah, WI	36780	438	437		1	e
Dayton, OH	19380	409	238		170	
Salisbury, MD-DE	41540	406	396	i	10	i
Greenville-Anderson, SC	24860	401	385		16	
Bakersfield, CA	12540	377	117		261	i
Savannah, GA	42340	368	364		5	
Memphis, TN-MS-AR	32820	362	348		15	i
Lexington-Fayette, KY	30460	350	308		43	
Las Vegas-Henderson-Paradise, NV	29820	350	329		21	
Midland, MI	33220	325	324		1	
Charleston-North Charleston, SC	16700	314	246		68	
Tulsa, OK	46140	302	290		12	i
Davenport-Moline-Rock Island, IA-IL	19340	298	296		2	e
Nashville-Davidson--Murfreesboro--Franklin, TN	34980	283	240		43	i
Peoria, IL	37900	0 - 1,114	0 - 1,114	i	0 - 1,114	i
Winston-Salem, NC	49180	260 - 1,375	261		0 - 1,114	
All other CBSAs		22,779	19,262		3,517	

TABLE 14

**Domestic R&D performed by companies, by source of funds and core-based statistical area: 2017**

(Millions of U.S. dollars)

Core-based statistical area	CBSA code	Total		Paid for by the company		Paid for by others	
Locations outside a CBSA		3,581	i	2,167	i	1,414	i
Undistributed <sup>a</sup>		2,181		1,561		620	

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.

<sup>a</sup> Includes data reported on Form BRD-1 that were not allocated to a specific location by multi-establishment companies. For single-establishment companies, data reported were allocated to the location in the address used to mail the survey form.

**Note(s)**

Detail may not add to total because of rounding. Statistics are representative of companies located in the United States that performed or funded R&D. 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, 2017.



TABLE 15

## Domestic R&amp;D paid for by the company and others and performed by the company, by industry, company size, and domestic R&amp;D program size: 2017

(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	400,100	5,569	24,738	36,351	21,196	312,246
Manufacturing industries	31–33	257,227	2,974	13,499	20,714	14,765	205,274
Food	311	4,697	134	521	673	542	2,826
Beverage and tobacco products	312	1,076	20	57	114	264	620
Textile, apparel, and leather products	313–16	920	62	186	164	335	175
Wood products	321	175	20	59	96	0	0
Paper	322	1,322	28	101	108	62	1,022
Printing and related support activities	323	229	42	127	60	0	0
Petroleum and coal products	324	316	0 - 132	62	124	0 - 132	0
Chemicals	325	74,977	313	2,605	6,900	4,278	60,883
Basic chemicals	3251	2,574	64	379	787	438	905
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	628	28	208	103	0	289
Pesticide, fertilizer, and other agricultural chemicals	3253	1,376 - 1,475	0 - 133	76	97	0 - 251	920 - 1,303
Pharmaceuticals and medicines	3254	66,202	59	1,581	5,427	3,410	55,725
Soap, cleaning compound, and toilet preparation	3256	2,605 - 2,701	31 - 131	134	169	181	2,088
Paint, coating, adhesive, and other chemicals	3255, 3259	1,495	0 - 133	227	316	0 - 251	570 - 953
Plastics and rubber products	326	3,754	215	703	894	193	1,749
Nonmetallic mineral products	327	1,334	69	142	297	0	826
Primary metals	331	749	52	177	137	199	183
Fabricated metal products	332	2,206	332	1,023	489	362	0
Machinery	333	13,197	449	1,714	1,817	1,214	8,003
Agricultural implement	33311	1,570	38	115	129	0 - 1,066	220 - 1,290
Semiconductor machinery	333242	3,694	3	41	194	149	3,307
Engine, turbine, and power transmission equipment	3336	2,080	0 - 410	108	149	0 - 1,066	347 - 1,825
Other machinery	other 333	5,853	0 - 410	1,451	1,346	0 - 1,066	1,580 - 3,058
Computer and electronic products	334	78,575	503	2,256	3,571	3,199	69,045
Communications equipment	3342	12,687	51	375	534	812	10,916
Semiconductor and other electronic components	3344	30,148	116	724	1,264	1,056	26,988
Navigational, measuring, electromedical, and control instruments	3345	14,509	228	956	1,283	696	11,346
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	2,696	22	218	415	312	1,728

TABLE 15

## Domestic R&amp;D paid for by the company and others and performed by the company, by industry, company size, and domestic R&amp;D program size: 2017

(Millions of U.S. dollars)

Industry	NAICS code	R&D program size					
		All companies	Less than \$1 million	\$1 million–\$9.999 million	\$10 million–\$49.999 million	\$50 million–\$99.999 million	\$100 million or more
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	7,297	0 - 129	160	201	0 - 129	6,809
Other measuring and controlling device	other 3345	4,516	76 - 207	578	667	254 - 385	2,809
Other computer and electronic products	other 334	21,231	108	202	490	636	19,795
Electrical equipment, appliances, and components	335	4,291	181	805	835	1,050	1,420 i
Transportation equipment	336	53,292	169	1,296	2,148	1,901	47,777
Automobiles, bodies, trailers, and parts	3361–63	23,881	52	807	1,382	1,252	20,388
Aerospace products and parts	3364	26,383	67 - 117	352	563	545 - 598	24,804 i
Aircraft, aircraft engine, and aircraft parts	336411–13	24,576 i	68	330	462	421	23,295 i
Guided missile, space vehicle, and related parts	336414–15, 336419	1,807	0 - 49	22	101	124 - 176	1,510
Military armored vehicle, tank, and tank components	336992	9	2	7	0	0	0
Other transportation	other 336	3,018	0 - 49	130	202	51 - 104	2,584
Furniture and related products	337	422	43	118	260	0	0
Miscellaneous manufacturing	339	15,695	205 - 351	1,545	2,026	1,028 - 1,172	10,745
Medical equipment and supplies	3391	13,589	153	1,126	1,676	826	9,808
Other miscellaneous manufacturing	3399	2,106	51 - 198	419	351	201 - 347	938
Nonmanufacturing industries	21–23, 42–81	142,874	2,595	11,238	15,637	6,432	106,972
Mining, extraction, and support activities	21	3,150	27	173	138	0	2,812
Utilities	22	317	5	46	184	82 i	0
Wholesale trade	42	534	208	326 i	0	0	0
Electronic shopping and electronic auctions	454111–12	9,318	8	31	45	0	9,234
Transportation and warehousing	48–49	1,147	13	39	310	0	786
Information	51	80,252	820	3,830	6,350	4,396	64,855
Publishing	511	34,338	437	1,282	1,747	1,134	29,739
Newspaper, periodical, book, and directory publishers	5111	74	17 i	21	36	0	0
Software publishers	5112	34,264	420	1,261	1,710	1,134	29,739
Data processing, hosting, and related services	518	16,155	299	2,065	4,026	2,508	7,258
Other information	other 51	29,758	85	483	578	754	27,859
Finance and insurance	52	7,616	4	203	655	139	6,616
Real estate and rental and leasing	53	718	132 i	68	47	104	367
Lessors of nonfinancial intangible assets (except copyrighted works)	533	138 i	90 - 133 i	0	5 - 48 i	0	0
Other real estate and rental and leasing	other 53	579	0 - 42	68	0 - 42	104	367
Professional, scientific, and technical services	54	36,922	1,153	5,674	6,738	1,602	21,755

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: 2017**

(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	2,708	366	810	1,039	106	387
Computer systems design and related services	5415	13,327	459	1,614	1,690	398	9,166
Scientific research and development services	5417	17,321	196	2,508	2,917	906	10,794
Biotechnology research and development	541711	4,449	38	549	566	0	3,296
Physical, engineering, and life sciences (except biotechnology) research and development	541712	11,913	155	1,938	2,324	827	6,670
Social sciences and humanities research and development	541720	959	2	21	28	79	829
Other professional, scientific, and technical services	other 54	3,566	133	742	1,092	191	1,408
Health care services	621–23	1,101	75	230	687	i 109	0
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,799	149	618	484	0	548
All companies (number of domestic employees)	–	400,100	5,569	24,738	36,351	21,196	312,246
Small companies							
10–19 <sup>a</sup>	–	3,311	1,082	2,089	87	52	0
20–49	–	9,435	2,105	5,354	1,975	0	0
Medium companies							
50–99	–	10,141	1,036	4,738	4,020	347	0
100–249	–	17,216	831	5,390	6,997	2,475	1,523
Large companies							
250–499	–	14,103	312	2,934	5,445	2,662	2,750
500–999	–	17,871	125	2,095	6,379	3,700	5,572
1,000–4,999	–	65,112	67	1,699	8,038	7,643	47,664
5,000–9,999	–	40,198	2	228	1,937	2,370	35,662
10,000–24,999	–	73,485	7	i 124	817	1,499	71,039
25,000 or more	–	149,227	1	87	655	447	148,036

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Business 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. Statistics are representative of companies located in the United States that performed or funded R&D. 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, 2017.

TABLE 16

**Domestic R&D paid for by the company and others and performed by the company, by business activity: 2017**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	Total	Paid for by the company	Paid for by others
All business activities	21100-81000	400,100	339,036	61,065
Oil and gas extraction	21100	738 - 2,072	739	0 - 1,333
Mining	21200	117	117	1
Support activities for mining, including oil and gas	21300	1,474	1,238	235
Utilities	22100	314	277	36
Construction	23000	587	564	23
Food manufacturing	31100	4,897	4,684	213
Beverage manufacturing	31210	722	614	107
Tobacco manufacturing	31220	170	170	*
Textile, apparel, and leather products manufacturing	31990	866	865	1
Wood products manufacturing	32100	238	232	5
Paper manufacturing	32200	1,386	1,384	2
Printing and related support activities	32300	262	251	11
Petroleum refineries	32401	395	393	3
Asphalt paving, roofing, and saturated materials manufacturing	32402	126	126	0
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	214	202	12
Basic chemicals manufacturing	32510	3,045	2,862	183
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	831	813	18
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	1,964	1,554	410
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing	32541	45,515	37,122	8,392
In vitro diagnostic substances manufacturing	32542	1,324	1,302	22
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	18,330	15,892	2,439
Soap, cleaning compound, and toilet preparations manufacturing	32591	2,168 - 3,502	2,169	0 - 1,333
Paint, adhesive, and other chemical manufacturing	32592	1,663	1,640	23
Plastics and rubber products manufacturing	32600	3,275	3,158	117
Clay and glass products manufacturing	32710	1,234	1,215	19
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	382	369	13
Primary metal manufacturing	33100	589	572	17
Fabricated metal products manufacturing	33200	2,616	2,319	297
Agricultural machinery and equipment manufacturing	33311	1,227	1,171	56
Construction machinery manufacturing	33312	1,190	1,180	10
Mining, oil, and gas field machinery and equipment manufacturing	33319	1,242	1,181	60
Semiconductor machinery manufacturing	33321	3,663	3,199	465
Industrial machinery manufacturing (except semiconductor machinery)	33322	1,019	943	76
Photographic and photocopying equipment manufacturing	33331	61	47	14
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	1,814	1,756	59
Digital cameras manufacturing	33333	431	414	17
Engine, turbine, and power transmission equipment manufacturing	33360	2,489	2,271	218
Metalworking and other general purpose machinery manufacturing	33390	2,066	1,925	141
Computers and peripheral equipment manufacturing and magnetic and optical media	33412	21,276	21,120	156
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	7,918	7,914	4
Radio, television, and wireless communication equipment manufacturing	33422	4,206	1,815	2,392
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	1,551	1,379	172
Audio and video equipment manufacturing	33430	982	962	20

TABLE 16

**Domestic R&D paid for by the company and others and performed by the company, by business activity: 2017**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	Total	Paid for by the company	Paid for by others
Semiconductor and other electronic components manufacturing	33440	30,629	28,371	2,258
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	3,137	2,952	185
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	7,271	2,180	5,092 i
Measuring and control instruments manufacturing (not listed elsewhere)	33459	4,016	3,860	156
Electrical equipment, appliances, and components manufacturing	33500	4,504	4,301	203
Motor vehicles manufacturing	33610	16,546	15,039	1,507
Motor vehicle body and trailer manufacturing	33620	44	42	1
Motor vehicle parts manufacturing	33630	7,066	5,978	1,088
Aircraft manufacturing	33641	10,511 i	4,344	6,167 i
Aircraft engine and engine parts manufacturing	33642	1,840	1,212	628
Other aircraft parts and auxiliary equipment manufacturing	33643	4,378	2,538	1,840
Guided missiles, space vehicles, and related parts manufacturing	33644	3,529	957	2,572
Railroad rolling stock manufacturing	33651	169 - 1,503	170	0 - 1,333
Ship and boat building	33660	1,299	151	1,147
Motorcycle, bicycle, and parts manufacturing	33691	298 - 1,632	299	0 - 1,333
Military armored vehicle, tank, and tank components manufacturing	33692	652 i	300 i	352 i
All other transportation equipment manufacturing	33699	568	466	101
Furniture and related products manufacturing	33700	430	428	2
Medical equipment and supplies manufacturing	33910	12,981	12,764	218
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	2,243	2,172	71
Merchant wholesalers, durable goods	42300	460	438	22
Merchant wholesalers, nondurable goods	42400	256	251	5
Wholesale electronic markets and agents and brokers (business to business)	42500	40 i	25 i	15
Retail trade (except electronic shopping and electronic auctions)	44000	73	73	0
Electronic shopping and electronic auctions	45411	9,337	9,337	0
Transportation	48000	784	764	20
Couriers, messengers, and express delivery services	49200	264	264	0
Warehousing and storage	49300	98	88	10
Newspaper, periodical, book, and directory publishers (except Internet)	51110	91	91	0
Software publishers (except Internet)	51120	24,775	24,114	661
Motion picture and sound recording (except Internet)	51200	25 i	25 i	0
Broadcasting (except Internet)	51500	213 - 1,547	214	0 - 1,333
Wired telecommunications carriers	51710	908 - 2,242	909	0 - 1,333
Wireless telecommunications carriers (except satellite)	51720	1,901	1,821	80
Satellite telecommunications	51740	590	585	4
Other telecommunications (not listed elsewhere)	51790	408	305	103
Data processing, hosting, and related services	51800	6,060	5,874	187 i
Cloud computing applications and Internet-based software services	51801	16,515	16,403	112
Other information services, including Internet publishing, broadcasting, and Web search portals	51910	28,514 - 29,848	28,515	0 - 1,333
Finance: banking and credit intermediation	52200	4,812	4,760	51
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	1,601	1,601	*
Insurance carriers and related activities	52400	1,125	1,125	0
Real estate	53100	386	386	0

TABLE 16

**Domestic R&D paid for by the company and others and performed by the company, by business activity: 2017**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	Total	Paid for by the company	Paid for by others
Rental and leasing services	53200	204	194	10
Lessors of nonfinancial intangible assets, including patent licensing	53300	154	154	*
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	802	802	0
Architectural, engineering, and related services	54130	2,844	1,679	1,165
Specialized design services	54140	195	131	64
Computer systems design and related services	54150	12,221	10,660	1,561
Management, scientific, and technical consulting services	54160	1,907	1,520	387
Research and development services in social sciences and humanities	54172	0 - 1,631	0 - 359	0 - 1,333
Research and development services in biotechnology	54173	3,786	710	3,075
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	12,958	2,061	10,897
Advertising and related services	54180	353	353	0
Professional, scientific, and technical services (not listed elsewhere)	54190	1,049	577	473
Management of companies and enterprises	55100	91	76	15
Administrative and support services	56100	1,548	1,540	9
Waste management and remediation services	56200	24	0 - 25	0 - 25
Offices of physicians	62110	195	105	90
Medical and diagnostic laboratories	62150	1,395	816	579
Other ambulatory health care services (ambulance, dental, home health care)	62199	79	75	3
Hospitals and nursing care facilities	62200	17 - 1,351	18	0 - 1,333
Social assistance services	62400	0 - 359	0 - 359	0
Arts, entertainment, and recreation	71000	59	52	7
Accommodation and food services	72000	60	60	0
Other services (not listed elsewhere)	81000	645	529	116
Undistributed	-	0	0	0

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

NAICS = 2012 North American Industry Classification System.

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

<sup>b</sup> Business codes and descriptions are based on 2012 NAICS 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

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: 2017**  
(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
All industries	21-23, 31-33, 42-81	400,100	4.1	4.3
Manufacturing industries	31-33	257,227	4.7	4.8
Food	311	4,697	0.7	0.7
Beverage and tobacco products	312	1,076	0.7	0.7
Textile, apparel, and leather products	313-16	920	1.1	1.2
Wood products	321	175	0.6	0.6
Paper	322	1,322	0.8	0.8
Printing and related support activities	323	229	0.6	0.6
Petroleum and coal products	324	316	0.1	0.1
Chemicals	325	74,977	8.3	8.4
Basic chemicals	3251	2,574	1.6	1.6
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	628	1.4	1.5
Pesticide, fertilizer, and other agricultural chemicals	3253	1,376 - 1,475	D	D
Pharmaceuticals and medicines	3254	66,202	14.2	14.3
Soap, cleaning compound, and toilet preparation	3256	2,605 - 2,701	D	D
Paint, coating, adhesive, and other chemicals	3255, 3259	1,495	2.3	2.3
Plastics and rubber products	326	3,754	2.0	2.0
Nonmetallic mineral products	327	1,334	2.9	3.2
Primary metals	331	749	0.8	0.9
Fabricated metal products	332	2,206	2.0	2.0
Machinery	333	13,197	4.1	4.1
Agricultural implement	33311	1,570	3.4	3.4
Semiconductor machinery	333242	3,694	18.4	18.4
Engine, turbine, and power transmission equipment	3336	2,080	5.8	5.8
Other machinery	other 333	5,853	2.7	2.7
Computer and electronic products	334	78,575	11.3	11.3
Communications equipment	3342	12,687	14.3	14.4
Semiconductor and other electronic components	3344	30,148	17.5	17.6
Navigational, measuring, electromedical, and control instruments	3345	14,509	8.6	8.7
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	2,696	12.0	12.1
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	7,297	9.5	9.5
Other measuring and controlling device	other 3345	4,516	6.5	6.6



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: 2017**  
(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
Other computer and electronic products	other 334	21,231	7.9	7.9
Electrical equipment, appliances, and components	335	4,291	3.8	3.8
Transportation equipment	336	53,292	4.5	4.7
Automobiles, bodies, trailers, and parts	3361-63	23,881	3.2	3.4
Aerospace products and parts	3364	26,383	7.5	7.5
Aircraft, aircraft engine, and aircraft parts	336411-13	24,576	7.4	7.4
Guided missile, space vehicle, and related parts	336414-15, 336419	1,807	9.6	9.6
Military armored vehicle, tank, and tank component	336992	9	2.9	3.0
Other transportation	other 336	3,018	4.6	4.6
Furniture and related products	337	422	1.0	1.0
Miscellaneous manufacturing	339	15,695	4.0	4.1
Medical equipment and supplies	3391	13,589	4.4	4.4
Other miscellaneous manufacturing	3399	2,106	2.7	2.7
Nonmanufacturing industries	21-23, 42-81	142,874	3.4	3.6
Mining, extraction, and support activities	21	3,150	1.3	D
Utilities	22	317	0.1	0.1
Wholesale trade	42	534	0.3	0.3
Electronic shopping and electronic auctions	454111-12	9,318	6.8	6.8
Transportation and warehousing	48-49	1,147	0.6	D
Information	51	80,252	6.7	6.8
Publishing	511	34,338	14.8	14.8
Newspaper, periodical, book, and directory publishers	5111	74	3.4	4.0
Software publishers	5112	34,264	14.9	14.9
Telecommunications	517	3,682 - 3,806	D	D
Data processing, hosting, and related services	518	16,155	5.3	5.3
Other information	other 51	25,954 - 26,077	D	D
Finance and insurance	52	7,616	1.0	1.1
Real estate and rental and leasing	53	718	6.6	7.4
Lessors of nonfinancial intangible assets (except copyrighted works)	533	138	6.7	7.3
Other real estate and rental and leasing	other 53	579	6.6	7.5
Professional, scientific, and technical services	54	36,922	9.2	9.3
Architectural, engineering, and related services	5413	2,708	2.9	2.9

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: 2017**  
(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
Computer systems design and related services	5415	13,327	8.8	8.8
Scientific research and development services	5417	17,321	25.1	25.1
Biotechnology research and development	541711	4,449	16.6	16.6
Physical, engineering, and life sciences (except biotechnology) research and development	541712	11,913	29.0	29.1
Social sciences and humanities research and development	541720	959	77.1	77.1
Other professional, scientific, and technical services	other 54	3,566	4.1	4.1
Health care services	621-23	1,101	1.0	1.0
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,799	0.3	0.4
All companies (number of domestic employees)	-	400,100	4.1	4.3
Small companies				
10-19 <sup>c</sup>	-	3,311	13.7	15.4
20-49	-	9,435	11.0	11.7
Medium companies				
50-99	-	10,141	8.7	9.0
100-249	-	17,216	6.7	6.9
Large companies				
250-499	-	14,103	5.0	5.2
500-999	-	17,871	4.8	5.0
1,000-4,999	-	65,112	5.2	5.3
5,000-9,999	-	40,198	4.3	4.4
10,000-24,999	-	73,485	4.0	4.1
25,000 or more	-	149,227	3.3	3.5

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

NAICS = 2012 North American Industry Classification System.

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

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

<sup>c</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D, unless indicated otherwise. 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, 2017.

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: 2017**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers only <sup>b</sup>
All industries	21-23, 31-33, 42-81	452,593	4.7	4.9
Manufacturing industries	31-33	304,030	5.6	5.7
Food	311	4,854	0.7	0.8
Beverage and tobacco products	312	1,294	0.9	0.9
Textile, apparel, and leather products	313-16	943	1.2	1.2
Wood products	321	184	0.7	0.7
Paper	322	1,364	0.8	0.8
Printing and related support activities	323	233	0.6	0.6
Petroleum and coal products	324	381	0.2	0.2
Chemicals	325	111,030	12.3	12.4
Basic chemicals	3251	2,650 - 2,700	D	1.7
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	645	1.5	1.5
Pesticide, fertilizer, and other agricultural chemicals	3253	1,492 - 1,626	D	D
Pharmaceuticals and medicines	3254	101,680	21.8	21.9
Soap, cleaning compound, and toilet preparation	3256	2,869 - 3,001	D	D
Paint, coating, adhesive, and other chemicals	3255, 3259	1,549 - 1,599	D	D
Plastics and rubber products	326	3,927	2.1	2.1
Nonmetallic mineral products	327	1,353	3.0	3.3
Primary metals	331	805	0.9	0.9
Fabricated metal products	332	2,302	2.1	2.1
Machinery	333	13,713	4.2	4.3
Agricultural implement	33311	1,746 - 1,766	D	3.8
Semiconductor machinery	333242	3,715	18.5	18.5
Engine, turbine, and power transmission equipment	3336	2,140 - 2,160	D	D
Other machinery	other 333	6,071 - 6,112	D	D
Computer and electronic products	334	80,626	11.6	11.6
Communications equipment	3342	13,453	15.2	15.2
Semiconductor and other electronic components	3344	30,562	17.8	17.8
Navigational, measuring, electromedical, and control instruments	3345	14,980	8.9	8.9
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	2,794 - 2,805	D	D
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	7,535 - 7,568	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: 2017**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers only <sup>b</sup>
Other measuring and controlling device	other 3345	4,616 - 4,640	D	D
Other computer and electronic products	other 334	21,631	8.1	8.1
Electrical equipment, appliances, and components	335	4,508	4.0	4.0
Transportation equipment	336	59,306	5.1	5.2
Automobiles, bodies, trailers, and parts	3361-63	26,720	3.5	3.7
Aerospace products and parts	3364	29,513	i 8.4	8.4
Aircraft, aircraft engine, and aircraft parts	336411-13	27,594	i 8.3	8.3
Guided missile, space vehicle, and related parts	336414-15, 336419	1,919	10.2	10.2
Military armored vehicle, tank, and tank component	336992	10	3.1	3.0
Other transportation	other 336	3,064	4.6	4.7
Furniture and related products	337	442	1.0	1.0
Miscellaneous manufacturing	339	16,763	4.3	4.3
Medical equipment and supplies	3391	14,531	4.7	4.7
Other miscellaneous manufacturing	3399	2,232	2.8	2.9
Nonmanufacturing industries	21-23, 42-81	148,563	3.5	3.8
Mining, extraction, and support activities	21	3,449 - 3,456	D	D
Utilities	22	562	0.1	0.2
Wholesale trade	42	653	0.4	0.3
Electronic shopping and electronic auctions	454111-12	9,320	6.8	6.8
Transportation and warehousing	48-49	1,192	0.6	D
Information	51	82,149	6.9	7.0
Publishing	511	35,505	15.3	15.3
Newspaper, periodical, book, and directory publishers	5111	85	3.9	4.5
Software publishers	5112	35,421	15.4	15.4
Telecommunications	517	3,922 - 4,045	D	D
Data processing, hosting, and related services	518	16,395	5.4	5.4
Other information	other 51	26,204 - 26,327	D	D
Finance and insurance	52	7,979	1.1	1.1
Real estate and rental and leasing	53	723	6.7	7.5
Lessors of nonfinancial intangible assets (except copyrighted works)	533	141	i 6.8	7.4
Other real estate and rental and leasing	other 53	582	6.6	7.5

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: 2017**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers only <sup>b</sup>
Professional, scientific, and technical services	54	39,472	9.9	9.9
Architectural, engineering, and related services	5413	3,108	3.4	3.4
Computer systems design and related services	5415	13,484	8.9	8.9
Scientific research and development services	5417	19,184	27.7	27.8
Biotechnology research and development	541711	4,611	17.2	17.2
Physical, engineering, and life sciences (except biotechnology) research and development	541712	13,457	32.8	32.8
Social sciences and humanities research and development	541720	1,116	89.7	89.7
Other professional, scientific, and technical services	other 54	3,696	4.3	4.3
Health care services	621-23	1,134 - 1,141	D	1.0
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,927	0.3	0.4
All companies (number of domestic employees)	-	452,593	4.7	4.9
Small companies				
10-19 <sup>c</sup>	-	3,888	16.1	17.9
20-49	-	10,993	12.8	13.5
Medium companies				
50-99	-	12,031	10.3	10.6
100-249	-	21,242	8.2	8.5
Large companies				
250-499	-	15,609	5.6	5.8
500-999	-	20,354	5.5	5.7
1,000-4,999	-	75,403	6.0	6.2
5,000-9,999	-	44,552	4.7	4.9
10,000-24,999	-	86,984	4.7	4.9
25,000 or more	-	161,537	3.6	3.8

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

NAICS = 2012 North American Industry Classification System.

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

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

percentages in this column excludes R&D and sales of companies that fund R&D but do not perform R&D.

<sup>c</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D, unless indicated otherwise. 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, 2017.

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: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Software products and embedded software R&D										
		Domestic R&D		Total		Paid for by the company		Paid for by others				
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Total		Federally funded		
								Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	
All industries	21-23, 31-33, 42-81	20,884	400,100	8,367	i 140,452	7,835	i 130,015	1,030	10,437	548	5,212	i
Manufacturing industries	31-33	12,151	257,227	3,623	i 36,804	3,493	i 32,084	350	4,719	60	3,140	i
Food	311	563	4,697	i 20	16	19	12	D	4	0	0	
Chemicals	325	1,840	74,977	121	451	114	372	16	79	i 11	4	
Basic chemicals	3251	269	2,574	10	9	10	9	0	0	0	0	
Pharmaceuticals and medicines	3254	841	66,202	47	214	41	149	13	66	i D	3	
Other chemicals	other 325	731	6,202	64	i 227	63	i 214	3	13	D	*	i
Plastics and rubber products	326	638	3,754	85	i 55	85	i 55	0	0	0	0	
Nonmetallic mineral products	327	193	1,334	15	i 24	15	i 24	0	0	0	0	
Fabricated metal products	332	1,260	2,206	254	i 152	223	i 149	D	3	0	0	
Machinery	333	1,793	13,197	610	i 1,264	603	i 1,196	18	68	D	1 - 21	
Agricultural implement	33311	183	1,570	42	i 255	42	i 253	D	2	D	2	
Semiconductor machinery	333242	39	3,694	16	82	14	62	i 3	20	D	0 - 19	i
Engine, turbine, and power transmission equipment	3336	120	2,080	37	i 221	D	174 - 222	i D	0 - 48	D	0 - 19	
Other machinery	other 333	1,452	5,853	515	i 705	D	658 - 706	D	0 - 48	i D	0 - 19	i
Computer and electronic products	334	1,793	78,575	1,261	i 25,571	1,224	i 23,593	166	i 1,978	28	1,181	i
Semiconductor and other electronic components	3344	471	30,148	243	i 6,402	225	i 6,161	44	i 241	i D	25	
Other electronic products	other 334	1,322	48,427	1,018	i 19,169	998	i 17,432	122	1,737	D	1,156	i
Electrical equipment, appliances, and components	335	731	4,291	443	i 811	433	i 797	30	i 14	D	1	
Transportation equipment	336	844	53,292	268	i 5,994	251	i 3,468	44	2,525	i 12	1,936	i
Automobiles, bodies, trailers, and parts	3361-63	396	23,881	87	i 1,733	72	1,506	31	228	D	0 - 228	
Other transportation	other 336	449	29,410	181	i 4,260	179	i 1,963	13	2,298	i D	1,707 - 1,937	i
Miscellaneous manufacturing	339	1,428	15,695	397	i 2,243	379	2,204	40	i 38	D	0 - 19	
Other manufacturing	312-16, 321-24, 331, 337	1,078	5,209	148	i 224	147	i 215	D	8	D	0 - 9	
Nonmanufacturing industries	21-23, 42-81	8,736	142,874	4,744	i 103,648	4,342	i 97,931	680	5,718	488	2,072	





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: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Software products and embedded software R&D											
		Domestic R&D		Total		Paid for by the company		Paid for by others					
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Total		Federally funded			
								Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount		
50–99	–	3,806	10,141	1,509	i	3,098	1,387	i	2,438	191	660	108	312
100–249	–	3,176	17,216	1,137		4,820	1,056		3,819	132	1,001	70	490
Large companies													
250–499	–	1,475	14,103	478		4,512	455		4,056	48	456	17	77
500–999	–	939	17,871	345		6,716	336		6,572	25	144	7	13
1,000–4,999	–	984	65,112	427		22,861	413		21,299	45	1,561	11	703
5,000–9,999	–	206	40,198	95		15,921	91		14,485	14	1,435	4	86
10,000–24,999	–	154	73,485	79		20,374	i	75	18,848	i	1,525	i	725
25,000 or more	–	105	149,227	53		58,206	51		55,229	12	2,977	i	7
													2,445

\* = 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.

<sup>a</sup> Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not 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.

<sup>b</sup> Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not include an adjustment to the weight to account for unit nonresponse. These company count estimates reflect a new 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.

<sup>c</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D. 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, 2017.

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: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Biotechnology R&D							
				Total		Paid for by the company		Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount		
All industries	21-23, 31-33, 42-81	20,884	400,100	1,772	51,637	1,560	39,856	509	11,781		
Manufacturing industries	31-33	12,151	257,227	1,250	44,753	1,171	38,089	279	6,664		
Food	311	563	4,697	77	761	75	740	6	21		
Chemicals	325	1,840	74,977	746	38,205	714	32,087	195	6,118		
Basic chemicals	3251	269	2,574	64	469	58	361	14	108		
Pharmaceuticals and medicines	3254	841	66,202	609	36,642	583	30,786	175	5,856		
Other chemicals	other 325	731	6,202	74	1,094	73	939	6	155		
Plastics and rubber products	326	638	3,754	44	278	44	278	0	0		
Nonmetallic mineral products	327	193	1,334	17	2	17	2	0	0		
Fabricated metal products	332	1,260	2,206	7	15	6	9	D	6		
Machinery	333	1,793	13,197	15	12	14	12	D	1		
Agricultural implement	33311	183	1,570	D	2	D	2	0	0		
Semiconductor machinery	333242	39	3,694	D	1	D	1	0	0		
Engine, turbine, and power transmission equipment	3336	120	2,080	D	3	D	3	0	0		
Other machinery	other 333	1,452	5,853	10	7	9	6	D	1		
Computer and electronic products	334	1,793	78,575	125	2,974	116	2,567	20	407		
Semiconductor and other electronic components	3344	471	30,148	6	566	6	566	0	0		
Other electronic products	other 334	1,322	48,427	119	2,408	110	2,001	20	407		
Electrical equipment, appliances, and components	335	731	4,291	12	16	7	11	7	5		
Transportation equipment	336	844	53,292	10	177	10	170	D	6		
Automobiles, bodies, trailers, and parts	3361-63	396	23,881	4	7	4	7	0	0		
Other transportation	other 336	449	29,410	6	170	6	163	D	6		
Miscellaneous manufacturing	339	1,428	15,695	D	2,087 - 2,191	150	2,088	D	0 - 103		
Other manufacturing	312-16, 321-24, 331, 337	1,078	5,209	D	126 - 230	17	127	D	0 - 103		
Nonmanufacturing industries	21-23, 42-81	8,736	142,874	522	6,884	390	1,767	230	5,118		
Mining, extraction, and support activities	21	117	3,150	6	27	6	26	D	1		
Utilities	22	36	317	D	1	D	1	D	*		
Wholesale trade	42	691	534	D	1	D	1	0	0		
Information	51	2,527	80,252	15	55	15	55	D	* i		

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: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Biotechnology R&D							
				Total		Paid for by the company		Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount		
Publishing	511	1,074	34,338	11	48	11	48	D	* i		
Telecommunications	517	D	3,682 - 3,806	0	0	0	0	0	0		
Data processing, hosting, and related services	518	1,131	16,155	4	7	4	7	0	0		
Other information	other 51	D	25,954 - 26,077	0	0	0	0	0	0		
Professional, scientific, and technical services	54	4,304	36,922	460	i 6,230	328	i 1,138	222	5,092		
Architectural, engineering, and related services	5413	1,265	2,708	43	i 60	39	i 27	8	i 33		
Scientific research and development services	5417	1,035	17,321	365	i 6,020	250	1,052	199	i 4,968		
Biotechnology research and development	541711	212	4,449	188	i 2,746	150	701	95	2,045		
Other scientific research and development	other 5417	823	12,872	177	i 3,273	100	i 351	104	i 2,923		
Other professional, scientific, and technical services	other 54	2,005	16,893	52	150	40	59	15	91		
Health care services	621-23	177	1,101	31	i 561	30	i 536	D	24		
Other nonmanufacturing	23, 44-45, 48-49, 52-53, 55-56, 624, 71-72, 81	885	20,598	5	10	5	10	0	0		
All companies (number of domestic employees)	-	20,884	400,100	1,772	51,637	1,560	39,856	509	11,781		
Small companies											
10-19 <sup>c</sup>	-	3,618	3,311	338	i 673	272	477	118	i 196		
20-49	-	6,420	9,435	515	i 2,235	443	i 1,755	168	i 480		
Medium companies											
50-99	-	3,806	10,141	330	2,637	304	2,160	73	477		
100-249	-	3,176	17,216	244	4,628	223	3,746	56	882		
Large companies											
250-499	-	1,475	14,103	111	3,249	101	2,875	29	374		
500-999	-	939	17,871	57	2,707	54	2,418	15	289		
1,000-4,999	-	984	65,112	94	12,458	88	8,551	23	3,907		
5,000-9,999	-	206	40,198	32	4,375	27	1,517	7	2,858		
10,000-24,999	-	154	73,485	36	15,706	34	14,118	13	1,588		
25,000 or more	-	105	149,227	15	2,970	15	2,239	6	730		

\* = 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.

<sup>a</sup> Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not 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.

<sup>b</sup> Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not include an adjustment to the weight to account for unit nonresponse. These company count estimates reflect a new 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.

<sup>c</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D. 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, 2017.

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: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Nanotechnology R&D									
		Domestic R&D		Total		Paid for by the company		Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount		
All industries	21-23, 31-33, 42-81	20,884	400,100	867	18,237	733	16,689	212	1,548		
Manufacturing industries	31-33	12,151	257,227	636	16,565	602	15,405	79	1,160		
Food	311	563	4,697	D	7	D	7	0	0		
Chemicals	325	1,840	74,977	188	449	183	423	13	26		
Basic chemicals	3251	269	2,574	42	123	41	115	3	7		
Pharmaceuticals and medicines	3254	841	66,202	51	218	50	212	4	6		
Other chemicals	other 325	731	6,202	94	108	92	96	6	12		
Plastics and rubber products	326	638	3,754	53	49	52	44	5	5		
Nonmetallic mineral products	327	193	1,334	14	56	14	48	D	7		
Fabricated metal products	332	1,260	2,206	10	20	10	18	D	1		
Machinery	333	1,793	13,197	51	2,060	51	2,015	3	45		
Agricultural implement	33311	183	1,570	0	0	0	0	0	0		
Semiconductor machinery	333242	39	3,694	9	1,925	9	1,923	D	2		
Engine, turbine, and power transmission equipment	3336	120	2,080	D	0-93	D	0-93	0	0		
Other machinery	other 333	1,452	5,853	D	42-136	D	0-93	D	43		
Computer and electronic products	334	1,793	78,575	179	13,543	157	12,493	44	1,050		
Semiconductor and other electronic components	3344	471	30,148	75	13,070	59	12,061	28	1,010		
Other electronic products	other 334	1,322	48,427	104	472	97	432	15	40		
Electrical equipment, appliances, and components	335	731	4,291	52	67	52	62	D	5		
Transportation equipment	336	844	53,292	11	83	8	66	3	17		
Automobiles, bodies, trailers, and parts	3361-63	396	23,881	7	19	5	8	D	11		
Other transportation	other 336	449	29,410	4	64	3	58	D	6		
Miscellaneous manufacturing	339	1,428	15,695	59	197	56	193	5	4		
Other manufacturing	312-16, 321-24, 331, 337	1,078	5,209	D	34	D	34	D	*		
Nonmanufacturing industries	21-23, 42-81	8,736	142,874	231	1,672	131	1,284	132	388		
Mining, extraction, and support activities	21	117	3,150	D	78	D	75	D	3		
Utilities	22	36	317	0	0	0	0	0	0		
Wholesale trade	42	691	534	D	*	D	*	0	0		
Information	51	2,527	80,252	18	769	18	765	D	5		
Publishing	511	1,074	34,338	D	769	D	764	D	5		

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: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Nanotechnology R&D										
		Domestic R&D		Total		Paid for by the company		Paid for by others				
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount			
Telecommunications	517	D	3,682 - 3,806	0	0	0	0	0	0	0		
Data processing, hosting, and related services	518	1,131	16,155	D	* i	D	* i	0	0	0		
Other information	other 51	D	25,954 - 26,077	0	0	0	0	0	0	0		
Professional, scientific, and technical services	54	4,304	36,922	202	i	822	105	i	442	127	380	
Architectural, engineering, and related services	5413	1,265	2,708	18	i	42	14	i	29	6	13	
Scientific research and development services	5417	1,035	17,321	157	i	435	70	i	105	111	330	
Biotechnology research and development	541711	212	4,449	20	i	40	16		29	7	11	
Other scientific research and development	other 5417	823	12,872	137	i	395	53	i	76	104	319	
Other professional, scientific, and technical services	other 54	2,005	16,893	27	i	345	21	i	308	10	37	
Health care services	621-23	177	1,101	D	2	i	D	2	i	0	0	
Other nonmanufacturing	23, 44-45, 48-49, 52-53, 55-56, 624, 71-72, 81	885	20,598	D	*	0	0	D	*	0	0	
All companies (number of domestic employees)	-	20,884	400,100	867	i	18,237	733	i	16,689	212	i	1,548
Small companies												
10-19 <sup>c</sup>	-	3,618	3,311	166	i	118	126	i	77	53	i	41
20-49	-	6,420	9,435	245	i	463	190	i	259	77	i	204
Medium companies												
50-99	-	3,806	10,141	159	i	315	145	i	247	19	i	68
100-249	-	3,176	17,216	115	i	402	104	i	236	21	i	166
Large companies												
250-499	-	1,475	14,103	50		368	47		345	10		23
500-999	-	939	17,871	38		524	36		383	7		141
1,000-4,999	-	984	65,112	56		3,504	52		2,894	D		610
5,000-9,999	-	206	40,198	12		2,831	11		2,818	i		13
10,000-24,999	-	154	73,485	15		4,571	11		4,352	i		219
25,000 or more	-	105	149,227	11		5,139	11		5,078	i		62

\* = 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.

<sup>a</sup> Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not 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.

<sup>b</sup> Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not include an adjustment to the weight to account for unit nonresponse. These company count estimates reflect a new 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.

<sup>c</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D. 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, 2017.



TABLE 22

## Foreign R&amp;D paid for by the company and others and performed by the company, by type of R&amp;D, industry, and company size: 2017

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total foreign R&D performance			Research (basic and applied)			Development			
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	
All industries	21-23, 31-33, 42-81	87,528	78,689	8,839	17,141	15,175	i 1,966	70,387	63,514	6,873	i
Manufacturing industries	31-33	57,270	55,706	1,564	11,986	11,638	348	45,284	44,067	1,217	
Food	311	865	863	3	156	i 156	i 0	709	i 706	i 3	
Beverage and tobacco products	312	667	667	0	208	208	0	459	459	0	
Textile, apparel, and leather products	313-16	160	160	* i	13	i 13	i 0	146	146	* i	
Wood products	321	1	1	0	1	1	0	0	0	0	
Paper	322	259	255	4	24	24	*	235	230	4	
Printing and related support activities	323	5	5	0	*	*	0	5	5	0	
Petroleum and coal products	324	54	54	* i	4	4	* i	50	50	* i	
Chemicals	325	14,450	14,043	407	3,976	3,810	167	10,474	10,234	240	
Basic chemicals	3251	560	557	3	261	258 - 262	0 - 4	298	295 - 299	0 - 4	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	321	321	* i	224	224	* i	97	97	* i	
Pesticide, fertilizer, and other agricultural chemicals	3253	384 - 401	385	0 - 16	79 - 97	i 79 - 85	i 0 - 15	305	i 300 - 306	i 0 - 4	i
Pharmaceuticals and medicines	3254	11,976	11,587	390	3,252	3,099	i 153	8,725	8,488	237	
Soap, cleaning compound, and toilet preparation	3256	778	778	0	99	99	0	679	679	0	
Paint, coating, adhesive, and other chemicals	3255, 3259	415 - 432	416	0 - 16	i 45 - 63	45 - 51	0 - 15	i 370	365 - 371	0 - 4	i
Plastics and rubber products	326	902	882	20	172	172	*	730	710	20	
Nonmetallic mineral products	327	181	181	0	17	i 17	i 0	165	i 165	i 0	
Primary metals	331	130	129	1	5	5	0	125	124	1	
Fabricated metal products	332	166	165	* i	43	43	* i	122	122	* i	
Machinery	333	3,266	3,248	18	326	i 322	i 3	2,940	2,925	15	
Agricultural implement	33311	567	i 566	i 1	62	61	1	505	i 505	i 1	
Semiconductor machinery	333242	786	773	12	50	47	3	736	726	10	
Engine, turbine, and power transmission equipment	3336	317 - 460	317 - 460	0	0 - 215	0 - 215	0	102 - 460	102 - 460	0	
Other machinery	other 333	1,453 - 1,597	1,448 - 1,592	5	i 0 - 215	i 0 - 215	i *	i 1,238 - 1,597	1,234 - 1,592	4	i
Computer and electronic products	334	22,648	22,242	405	4,681	i 4,591	i 91	17,967	i 17,652	i 315	
Communications equipment	3342	3,132	3,126	6	447	446	1	i 2,686	2,680	5	
Semiconductor and other electronic components	3344	10,898	10,749	149	2,079	i 2,077	i 3	8,818	i 8,673	i 146	
Navigational, measuring, electromedical, and control instruments	3345	3,842	3,597	244	973	i 886	i 86	2,869	i 2,711	i 158	

TABLE 22

## Foreign R&amp;D paid for by the company and others and performed by the company, by type of R&amp;D, industry, and company size: 2017

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total foreign R&D performance			Research (basic and applied)			Development		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	1,078	1,077	1	159	159	*	919	918	1
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	960	738	222	400	325	75	560	413	147
Other measuring and controlling device	other 3345	1,804	1,782	22	414	402	11	1,390	1,379	10
Other computer and electronic products	other 334	4,776	4,769	7	1,182	1,181	1	3,594	3,588	6
Electrical equipment, appliances, and components	335	1,867	1,864	3	254	252	1	1,613	1,611	2
Transportation equipment	336	8,822	8,150	672	1,734	1,653	82	7,088	6,497	590
Automobiles, bodies, trailers, and parts	3361-63	6,597	6,282	315	1,088	1,076	12	5,509	5,206	303
Aerospace products and parts	3364	2,053	1,725	328	589	545	44	1,464	1,180	284
Aircraft, aircraft engine, and aircraft parts	336411-13	2,050	1,725	325	587	545	42	1,463	1,179	284
Guided missile, space vehicle, and related parts	336414-15, 336419	3	1	2	2	0	2	1	1	*
Military armored vehicle, tank, and tank component	336992	0	0	0	0	0	0	0	0	0
Other transportation	other 336	173	143	29	58	32	26	115	112	3
Furniture and related products	337	40	40	0	8	8	0	31	31	0
Miscellaneous	339	2,787	2,758	30	363	359	4	2,424	2,398	26
Medical equipment and supplies	3391	2,490	2,461	30	321	318	4	2,169	2,143	26
Other miscellaneous manufacturing	3399	297	297	*	42	42	0	255	255	*
Nonmanufacturing industries	21-23, 42-81	30,258	22,983	7,275	5,155	3,537	1,619	25,103	19,446	5,656
Mining, extraction, and support activities	21	329 - 337	306	24 - 30	94 - 102	78 - 102	0 - 17	235	204 - 227	8 - 30
Utilities	22	9	9	*	5	5	0	5	5	*
Wholesale trade	42	37	37	*	1	1	0	36	36	*
Electronic shopping and electronic auctions	454111-12	2,555 - 2,779	2,555 - 2,779	0	1,038 - 1,271	1,038 - 1,271	0	1,291 - 1,523	1,291 - 1,523	0
Transportation and warehousing	48-49	7	6	1	1	1	0	6	5	1
Information	51	14,646	14,620	26	1,236	1,232	4	13,410	13,388	22
Publishing	511	8,831	8,824	7	807	807	*	8,024	8,016	7
Newspaper, periodical, book, and directory publishers	5111	7	7	0	0	0	0	7	7	0
Software publishers	5112	8,824	8,817	7	807	807	*	8,017	8,009	7
Telecommunications	517	94	92	2	22	22	*	72	70	2
Data processing, hosting, and related services	518	2,272	2,255	17	246	242	4	2,026	2,012	13
Other information	other 51	3,450	3,450	0	160	160	0	3,289	3,289	0
Finance and insurance	52	965	965	0	42	42	0	923	923	0

TABLE 22

## Foreign R&amp;D paid for by the company and others and performed by the company, by type of R&amp;D, industry, and company size: 2017

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total foreign R&D performance			Research (basic and applied)			Development		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Real estate and rental and leasing	53	191	191	0	33	33	0	158	158	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	173	173	0	27	27	0	146	146	0
Other real estate and rental and leasing	other 53	18	18	0	6	6	0	12	12	0
Professional, scientific, and technical services	54	11,064	3,892	7,172	2,301	685 - 702	1,599 - 1,616	8,763	3,190 - 3,208	5,556 - 5,574
Architectural, engineering, and related services	5413	53	51	2	10	9	*	43	41	2
Computer systems design and related services	5415	3,498	3,423	75	576	509	67	2,921	2,913	8
Scientific research and development services	5417	7,124	82	7,042	1,549	17	1,533	5,574	65	5,509
Biotechnology research and development	541711	1,996	6	1,990	243	2	242	1,752	4	1,748
Physical, engineering, and life sciences (except biotechnology) research and development	541712	5,125	76	5,048	1,303	15	1,287	3,822	61	3,761
Social sciences and humanities research and development	541720	4	0	4	4	0	4	0	0	0
Other professional, scientific, and technical services	other 54	390	336	54	165	149 - 166	0 - 17	225	170 - 188	37 - 55
Health care services	621-23	224 - 231	182	43 - 49	176	176	0	48 - 56	6	43 - 49
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	0 - 217	0 - 217	0	0 - 217	0 - 217	0	0 - 217	0 - 217	0
All companies (number of domestic employees)	-	87,528	78,689	8,839	17,141	15,175	1,966	70,387	63,514	6,873
Small companies										
10-19 <sup>a</sup>	-	136	128	8	21	18	3	115	110	5
20-49	-	577	569	8	114	114	*	463	455	8
Medium companies										
50-99	-	482	473	9	55	50	5	426	423	4
100-249	-	1,380	1,215	165	249	231	18	1,131	984	147
Large companies										
250-499	-	2,272	2,010	262	338	337	1	1,934	1,673	261
500-999	-	2,516	2,380	136	601	476	126	1,915	1,904	11
1,000-4,999	-	15,143	14,031	1,112	2,527	2,330	197	12,616	11,701	915
5,000-9,999	-	14,230	9,508	4,722	3,303	2,307	996	10,927	7,201	3,726
10,000-24,999	-	14,505	13,913	592	2,700	2,536	164	11,804	11,377	427

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: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total foreign R&D performance			Research (basic and applied)			Development		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
25,000 or more	–	36,287	34,462	1,825	7,232 i	6,776 i	456	29,055	27,686	1,369

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

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: 2017

(Millions of U.S. dollars)

Industry	NAICS code	Total	Paid for by the company	Paid for by others	Research (basic and applied)			Development			
					Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	
Total domestic R&D performance											
All industries	21-23, 31-33, 42-81	300,472	266,198	34,274	56,861	47,832	9,029	243,612	218,366	25,245	i
Manufacturing industries	31-33	192,459	169,176	23,284	43,304	37,559	5,746	149,155	131,617	17,538	i
Chemicals	325	44,441	43,012	1,428	16,127	15,520	607	28,314	27,493	822	
Pharmaceuticals and medicines	3254	38,514	37,468	1,046	14,343	13,873 - 14,119	224 - 470	24,172	23,349 - 23,595	577 - 822	
Other chemicals	other 325	5,926	5,544	382	1,784	1,401 - 1,647	137 - 383	4,143	3,898 - 4,143	0 - 245	i
Computer and electronic products	334	67,751	63,380	4,371	11,258	10,543	715	56,493	52,838	3,656	i
Semiconductor and other electronic components	3344	26,962	26,552	410	5,003	4,958	45	21,959	21,594	365	i
Other computer and electronic products	other 334	40,789	36,828	3,961	6,255	5,584	671	34,534	31,244	3,290	
Nonmanufacturing industries	21-23, 42-81	108,013	97,022	10,991	13,557	10,273	3,283	94,456	86,749	7,707	
Information	51	69,447	68,976	471	6,052	5,974	77	63,395	63,002	394	
Software publishers	5112	30,875	30,458	418	2,914	2,863	50	27,962	27,594	367	
Other information	other 51	38,572	38,518	54	3,138	3,111	27	35,434	35,407	26	
Professional, scientific, and technical services	54	21,228	10,803	10,425	5,543	2,343	3,200	15,685	8,460	7,225	
Scientific R&D services	5417	9,931	553	9,378	2,864	93	2,771	7,067	460	6,607	i
Other professional, scientific, and technical services	other 54	11,298	10,250	1,047	2,679	2,251	428	8,619	8,000	619	
Total foreign R&D performance											
All industries	21-23, 31-33, 42-81	87,528	78,689	8,839	17,141	15,175	1,966	70,387	63,514	6,873	i
Manufacturing industries	31-33	57,270	55,706	1,564	11,986	11,638	348	45,284	44,067	1,217	
Chemicals	325	14,450	14,043	407	3,976	3,810	167	10,474	10,234	240	
Pharmaceuticals and medicines	3254	11,976	11,587	390	3,252	3,099	153	8,725	8,488	237	
Other chemicals	other 325	2,474	2,456	17	725	711	14	1,749	1,746	3	i
Computer and electronic products	334	22,648	22,242	405	4,681	4,591	91	17,967	17,652	315	i
Semiconductor and other electronic components	3344	10,898	10,749	149	2,079	2,077	3	8,818	8,673	146	i
Other computer and electronic products	other 334	11,750	11,493	257	2,602	2,514	88	9,148	8,979	169	
Nonmanufacturing industries	21-23, 42-81	30,258	22,983	7,275	5,155	3,537	1,619	25,103	19,446	5,656	i
Information	51	14,646	14,620	26	1,236	1,232	4	13,410	13,388	22	

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: 2017**

(Millions of U.S. dollars)

Industry	NAICS code	Total	Paid for by the company	Paid for by others	Research (basic and applied)			Development			
					Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	
Software publishers	5112	8,824	8,817	7	807	807	*	8,017	8,009	7	i
Other information	other 51	5,822	5,803	18	428	425	4	5,394	5,379	15	i
Professional, scientific, and technical services	54	11,064	3,892	7,172	2,301	685 - 702	1,599 - 1,616	8,763	3,190 - 3,207	5,556 - 5,574	i
Scientific R&D services	5417	7,124	82	7,042	1,549	17	1,533	5,574	65	5,509	i
Other professional, scientific, and technical services	other 54	3,940	3,810	131	751	668 - 685	66 - 83	3,189	3,124 - 3,142	47 - 65	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.

**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. Statistics are representative of companies located in the United States that performed foreign 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, 2017.

TABLE 24

**Foreign R&D paid for by the company and others and performed by the company, by type of R&D and selected industry and location: 2017**

(Millions of U.S. dollars)

Industry and location	NAICS code	Total foreign R&D performance	Research (basic and applied)	Development
<b>All locations</b>				
All industries	21-23, 31-33, 42-81	87,528	17,141	70,387
Manufacturing industries	31-33	57,270	11,986	45,284
Chemicals	325	14,450	3,976	10,474
Pharmaceuticals and medicines	3254	11,976	3,252	8,725
Computer and electronic products	334	22,648	4,681	17,967
Semiconductor and other electronic components	3344	10,898	2,079	8,818
Nonmanufacturing industries	21-23, 42-81	30,258	5,155	25,103
Information	51	14,646	1,236	13,410
Software publishers	5112	8,824	807	8,017
Professional, scientific, and technical services	54	11,064	2,301	8,763
Scientific R&D services	5417	7,124	1,549	5,574
<b>Africa</b>				
All industries	21-23, 31-33, 42-81	318	48	270
Manufacturing industries	31-33	148	32	116
Chemicals	325	62	19	43
Pharmaceuticals and medicines	3254	49	16	33
Computer and electronic products	334	8	1	7
Semiconductor and other electronic components	3344	4	*	4
Nonmanufacturing industries	21-23, 42-81	170	16	154
Information	51	54	3	50
Software publishers	5112	15 - 20	0 - 4	16
Professional, scientific, and technical services	54	98	3	94
Scientific R&D services	5417	90	2	87
<b>Asia and Pacific</b>				
All industries	21-23, 31-33, 42-81	27,781	4,982	22,798
Manufacturing industries	31-33	18,133	3,573	14,560
Chemicals	325	2,808	832	1,976
Pharmaceuticals and medicines	3254	2,266	716	1,550
Computer and electronic products	334	9,511	1,794	7,717
Semiconductor and other electronic components	3344	5,159	893	4,266
Nonmanufacturing industries	21-23, 42-81	9,648	1,410	8,238
Information	51	5,319	457	4,863
Software publishers	5112	3,952	371	3,581
Professional, scientific, and technical services	54	2,720	416	2,304
Scientific R&D services	5417	1,559	180	1,380
<b>Canada</b>				
All industries	21-23, 31-33, 42-81	5,375	1,100	4,275
Manufacturing industries	31-33	2,962	589	2,373
Chemicals	325	522	117	405
Pharmaceuticals and medicines	3254	456	108	347
Computer and electronic products	334	1,546	329	1,217
Semiconductor and other electronic components	3344	613	93	520
Nonmanufacturing industries	21-23, 42-81	2,413	511	1,902
Information	51	1,356	135	1,221
Software publishers	5112	1,046	113	933
Professional, scientific, and technical services	54	793	272	522
Scientific R&D services	5417	372	203	170
<b>Europe</b>				

TABLE 24

**Foreign R&D paid for by the company and others and performed by the company, by type of R&D and selected industry and location: 2017**

(Millions of U.S. dollars)

Industry and location	NAICS code	Total foreign R&D performance		Research (basic and applied)		Development	
All industries	21-23, 31-33, 42-81	43,036		8,776	i	34,260	
Manufacturing industries	31-33	28,172		5,995	i	22,177	
Chemicals	325	9,830		2,682	i	7,149	
Pharmaceuticals and medicines	3254	8,351		2,182	i	6,169	
Computer and electronic products	334	7,300		1,495	i	5,804	i
Semiconductor and other electronic components	3344	3,153		659	i	2,493	i
Nonmanufacturing industries	21-23, 42-81	14,864		2,780	i	12,084	i
Information	51	6,762		553		6,210	i
Software publishers	5112	3,253		280		2,973	
Professional, scientific, and technical services	54	6,115		1,437		4,677	i
Scientific R&D services	5417	4,700	i	1,128		3,571	i
<b>Latin America and Other Western Hemisphere</b>							
All industries	21-23, 31-33, 42-81	4,367		1,002	i	3,365	i
Manufacturing industries	31-33	3,554		879	i	2,676	i
Chemicals	325	838		213	i	625	i
Pharmaceuticals and medicines	3254	598		155	i	443	i
Computer and electronic products	334	1,189	i	369	i	820	i
Semiconductor and other electronic components	3344	296		84	i	213	i
Nonmanufacturing industries	21-23, 42-81	813		123	i	690	i
Information	51	275		22		253	
Software publishers	5112	132		8		124	
Professional, scientific, and technical services	54	402	i	52	i	350	i
Scientific R&D services	5417	331	i	27		304	i
<b>Middle East</b>							
All industries	21-23, 31-33, 42-81	4,551		760	i	3,792	i
Manufacturing industries	31-33	3,164		569	i	2,595	i
Chemicals	325	239		64	i	176	
Pharmaceuticals and medicines	3254	222		61	i	161	
Computer and electronic products	334	2,392		442	i	1,950	i
Semiconductor and other electronic components	3344	1,584		331	i	1,252	i
Nonmanufacturing industries	21-23, 42-81	1,387		191	i	1,197	
Information	51	743		51		692	
Software publishers	5112	419		34		385	
Professional, scientific, and technical services	54	522		82		441	
Scientific R&D services	5417	70	i	9		60	i
<b>Puerto Rico<sup>a</sup></b>							
All industries	21-23, 31-33, 42-81	437		187		250	
Manufacturing industries	31-33	418		186		232	
Chemicals	325	75		38		36	i
Pharmaceuticals and medicines	3254	33		8 - 17		16 - 25	i
Computer and electronic products	334	263 - 344		89 - 149		115 - 197	
Semiconductor and other electronic components	3344	3		1	i	2	i
Nonmanufacturing industries	21-23, 42-81	18		1	i	18	i
Information	51	0 - 18		0 - 1	i	0 - 18	i
Software publishers	5112	0 - 9		*		0 - 8	
Professional, scientific, and technical services	54	0 - 18	i	0		0 - 18	i
Scientific R&D services	5417	1	i	0		1	i

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



NAICS = 2012 North American Industry Classification System.

<sup>a</sup> 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. Statistics are representative of companies located in the United States that performed foreign 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, 2017.

TABLE 25

## Domestic R&amp;D paid for and performed by the company, by type of cost, industry, and company size: 2017

(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	339,036	195,095	24,315	14,013	5,800	23,309	5,694	13,495	2,117	8,078	47,120
Manufacturing industries	31-33	216,155	117,622	9,665	7,787	3,436	20,248	3,076	9,760	1,931	5,941	36,689
Food	311	4,453	2,863	45	76	25	484	24	206	2	160	568
Beverage and tobacco products	312	968	544	15	31	2	79	10	48	*	40	198
Textile, apparel, and leather products	313-16	919	589	16	25	67	96	3	18	*	15	90
Wood products	321	170	126	0	5	2	23	1	2	0	4	6
Paper	322	1,292	692	0	38	36	412	6	39	1	7	61
Printing and related support activities	323	218	146	2	8	10	20	3	10	*	1	18
Petroleum and coal products	324	301	191	0	0 - 7	8	33	0 - 5	6 - 13	1	9	35 - 42
Chemicals	325	63,285	28,469	3,513	3,584	307	5,471	1,094	3,126	666	1,629	15,428
Basic chemicals	3251	2,393	1,393	3	33 - 51	32	258	46	143	24	93	348 - 366
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	612	401	0 - 107	15 - 26	1	43	16	25	0	5	0 - 107
Pesticide, fertilizer, and other agricultural chemicals	3253	1,092	513 - 541	0 - 149	67 - 119	1	70 - 90	41	136 - 162	3	6	46 - 257
Pharmaceuticals and medicines	3254	55,229	23,689	3,351	3,318	253	4,885	957	2,671	635	1,488	13,982
Soap, cleaning compound, and toilet preparation	3256	2,488	1,498	12	95	6	124	16	81	0	17	639
Paint, coating, adhesive, and other chemicals	3255, 3259	1,471	949 - 974	0 - 149	2 - 27	14	70 - 90	19	43 - 68	3	20	107 - 287
Plastics and rubber products	326	3,637	2,186	55	86	44	520	60	197	7	153	330
Nonmetallic mineral products	327	1,303	835	1	61	6	63	10	103	*	16	207
Primary metals	331	741	393	6	9	5	148	8	37	*	9	125
Fabricated metal products	332	2,099	1,349	23	47	23	349	15	32	5	32	222
Machinery	333	12,257	7,419	221	439	108	1,557	112	490	15	112	1,783
Agricultural implement	33311	1,511	892	0	106	4	277	4	36	2	4	186
Semiconductor machinery	333242	3,228	1,571	165	20	3	394	32	255	2	15	771
Engine, turbine, and power transmission equipment	3336	1,921	1,182	1	0 - 314	2	232	3	79	*	8	95 - 418

TABLE 25

## Domestic R&amp;D paid for and performed by the company, by type of cost, industry, and company size: 2017

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Salaries, wages, and fringe benefits	Stock-based compensation	Temporary staffing	Expensed equipment	Materials and supplies	Lease and rental payments	Depreciation	Royalties and licensing fees	Other purchased services (except R&D)	Other
Other machinery	other 333	5,596	3,774	55	0 - 314	99	654	73	120	11	85	408 - 730
Computer and electronic products	334	69,942	40,465	i 5,373	1,263	1,453	4,313	1,230	4,044	i 992	i 2,776	i 8,035
Communications equipment	3342	10,972	6,351	673	412	169	349	840	545	19	465	i 1,149
Semiconductor and other electronic components	3344	27,859	17,003	i 1,905	i 335	i 342	i 1,552	i 183	i 1,839	i 613	i 1,094	i 2,994
Navigational, measuring, electromedical, and control instruments	3345	10,089	6,497	151	297	133	819	104	230	6	240	i 1,611
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	2,545	1,429	30	80	11	183	25	66	3	93	625
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,214	2,231	18 - 32	115	i 15 - 39	i 253	14	71	i *	82 - 111	i 363 - 416
Other measuring and controlling device	other 3345	4,329	2,837	88 - 102	102	83 - 107	384	66	92	2	35 - 64	571 - 622
Other computer and electronic products	other 334	21,022	10,613	2,644	218	808	1,593	102	1,430	355	977	2,281
Electrical equipment, appliances, and components	335	4,110	2,803	42	106	35	327	69	i 98	i 4	102	i 524
Transportation equipment	336	34,629	18,867	10	1,408	1,123	5,134	293	727	189	455	6,423
Automobiles, bodies, trailers, and parts	3361-63	21,137	12,534	6	1,168	981	3,468	201	557	156	i 226	1,840
Aerospace products and parts	3364	11,903	5,400	*	173 - 190	103	1,259	62 - 93	110 - 171	13	192	4,479 - 4,584
Aircraft, aircraft engine, and aircraft parts	336411-13	11,473	5,185	*	174	101	1,169	59 - 92	108 - 171	13	192	4,372 - 4,471
Guided missile, space vehicle, and related parts	336414-15, 336419	430	215	0	0 - 16	1	90	2	0 - 3	0	*	103 - 124
Military armored vehicle, tank, and tank component	336992	4	0 - 5	0	*	i *	i 0 - 5	i *	i 0 - 1	i *	i *	i *
Other transportation	other 336	1,585	927 - 935	3	48 - 67	40	401 - 409	i 0 - 29	0 - 59	19	i 37	i 0 - 105
Furniture and related products	337	419	309	1	10	1	44	5	4	2	6	37





TABLE 25

**Domestic R&D paid for and performed by the company, by type of cost, industry, and company size: 2017**

(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
250-499	-	11,773	7,223	613	485	131	948	249	272	111	242	1,498
500-999	-	16,295	9,878	1,124	650	309	1,201	288	484	134	385	1,843
1,000-4,999	-	52,341	30,839	3,954	1,764	646	2,772	656	1,950	382	828	8,550
5,000-9,999	-	32,701	19,636	1,804	1,463	233	2,074	402	1,352	35	537	5,165
10,000-24,999	-	63,415	36,132	4,690	2,231	957	4,893	901	3,250	167	1,930	8,264
25,000 or more	-	130,931	71,307	11,051	6,039	3,190	8,708	2,477	5,445	793 - 834	i 3,537	18,340 - 18,388

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

TABLE 26

## Domestic R&amp;D paid for and performed by the company, by industry, and company size: 2017

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10-19 <sup>a</sup>	20-49	50-99	100-249	250-499	500-999	1,000-4,999	5,000-9,999	10,000-24,999	25,000 or more
All industries	21-23, 31-33, 42-81	339,036	2,402	7,593	8,070	13,514	11,773	16,295	52,341	32,701	63,415	130,931
Manufacturing industries	31-33	216,155	991	4,138	4,866	8,920	7,485	9,797	34,226	20,619	46,603	78,510
Food	311	4,453 i	0	0 - 53	31	139	176	143	477	0 - 436	2,325 i	880 i
Beverage and tobacco products	312	968	0	5	14	10	13	17	41	177	140	553
Textile, apparel, and leather products	313-16	919	0 - 53	10	28	37	46	22	222	284	89	82 - 208
Wood products	321	170	2	4	4	8	7	28	57	22	38	0
Paper	322	1,292	0	2	10	0 - 41	19	22	88	255	326	457 - 617
Printing and related support activities	323	218	0	9	13	20	26	42	51 i	31	26	0
Petroleum and coal products	324	301	2	8	23	0 - 22	84 i	46	0 - 175	0	30 - 190	0
Chemicals	325	63,285	35 - 759	1,730	2,338	4,012	3,181	2,749	11,099	2,142 - 7,670	19,571	12,969 - 13,901
Basic chemicals	3251	2,393	0 - 105	111 - 129	99	0 - 150	254	105	469 - 1,004	284	522	0
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	612	9	15	22	39	73	54	112	0	287	0
Pesticide, fertilizer, and other agricultural chemicals	3253	1,092	1	1 - 19	0 - 60	53	15	0	0 - 535	0 - 709	0 - 1,141	0
Pharmaceuticals and medicines	3254	55,229	0 - 724	1,488	2,126	3,686	2,637	2,461	9,106	382 - 6,970	16,496	10,947 - 13,901
Soap, cleaning compound, and toilet preparation	3256	2,488	4	28	34	62	63	76	315	417 i	430 - 1,758	0 - 1,328 i
Paint, coating, adhesive, and other chemicals	3255, 3259	1,471	23	50 - 68	0 - 60	19 - 175	138	52	565	0 - 350	0 - 694	0 - 694
Plastics and rubber products	326	3,637	18	109	106	176	251	215	717	494	241	1,310
Nonmetallic mineral products	327	1,303	0 - 7	0 - 21	35	34	9	69	247	69	826	0
Primary metals	331	741	1	0 - 17	28	87	31	39	111	103	255 - 399	0
Fabricated metal products	332	2,099	0 - 103	123 - 194	0 - 269	485	200	329	385	217	63	0
Machinery	333	12,257	0 - 266	304	472	930	444	706	1,906	2,207 - 3,778	1,146	3,058
Agricultural implement	33311	1,511	0 - 159	44	0 - 438	0 - 124	18	44	221	0 - 1,219 i	0	0 - 1,380
Semiconductor machinery	333242	3,228	1	3	18	0 - 173	45	0 - 660	0 - 1,686	341 - 3,007	0	0

TABLE 26

## Domestic R&amp;D paid for and performed by the company, by industry, and company size: 2017

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)											
		All companies	10-19 <sup>a</sup>	20-49	50-99	100-249	250-499	500-999	1,000-4,999	5,000-9,999	10,000-24,999	25,000 or more	
Engine, turbine, and power transmission equipment	3336	1,921	0	30	18	68	0 - 270	4	0 - 1,686	0 - 1,747	0 - 1,147	0 - 1,873	
Other machinery	other 333	5,596	0 - 227	227	0 - 438	600 - 777	109 - 383	0 - 660	0 - 1,686	0 - 1,845	0 - 1,147	0 - 3,059	
Computer and electronic products	334	69,942	99 - 460	856	829	1,430	1,628	3,168	11,825	6,358 - 8,343	10,522	i 32,662	
Communications equipment	3342	10,972	19	127	0 - 208	293	0 - 633	918 - 1,405	2,460	1,362	0 - 1,834	i 3,277 - 6,550	
Semiconductor and other electronic components	3344	27,859	35	352	270	484	923	1,037	4,825	1,954	i 8,192	i 9,786	
Navigational, measuring, electromedical, and control instruments	3345	10,089	0 - 357	305	353	501	73 - 706	94 - 488	3,459	0 - 1,982	497 - 1,719	3,051	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	2,545	0 - 150	122	i 101	226	74	72	1,151	0	497 - 900	0	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,214	0 - 313	27	0 - 253	0 - 234	0 - 377	23	0 - 1,149	0 - 1,149	0 - 1,097	2,171	i
Other measuring and controlling device	other 3345	4,329	0 - 216	157	0 - 253	40 - 276	0 - 374	0 - 392	1,158 - 2,309	0 - 833	0 - 1,222	880	
Other computer and electronic products	other 334	21,022	47	71	0 - 208	152	0 - 609	476 - 861	1,081	3,044	0 - 1,834	13,273 - 16,547	
Electrical equipment, appliances, and components	335	4,110	64	132	156	307	332	601	970	286	807	453	i
Transportation equipment	336	34,629	48	251	123	351	674	891	2,730	1,925	5,402	22,236	
Automobiles, bodies, trailers, and parts	3361-63	21,137	0 - 24	178	0 - 122	0 - 287	304	660	1,945	1,097	3,254	13,206 - 14,064	
Aerospace products and parts	3364	11,903	24	55	0 - 122	65	211	0 - 232	612	399	2,148	8,173	
Aircraft, aircraft engine, and aircraft parts	336411-13	11,473	24	46	0 - 122	62	211	0 - 232	477	314	2,009	8,173	
Guided missile, space vehicle, and related parts	336414-15, 336419	430	*	9	0 - 122	3	0	0 - 66	135	85	138	0	
Military armored vehicle, tank, and tank components	336992	4	2	*	2	0 - 3	0 - 3	0	0	0	0	0	
Other transportation	other 336	1,585	0 - 24	18	0 - 122	0 - 287	154 - 161	0 - 232	173	428	0	0 - 856	
Furniture and related products	337	419	1	8	13	44	22	16	79	220	14	0	



TABLE 26

## Domestic R&amp;D paid for and performed by the company, by industry, and company size: 2017

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10-19 <sup>a</sup>	20-49	50-99	100-249	250-499	500-999	1,000-4,999	5,000-9,999	10,000-24,999	25,000 or more
Miscellaneous manufacturing	339	15,410	0-389	489	366-652	780-858	342	695	3,038-3,230	306-1,831	4,631	2,920-3,561
Medical equipment and supplies	3391	13,348	0-279	400	363	601	221	522	2,359	0-1,523	4,631	2,921
Other miscellaneous manufacturing	3399	2,062	0-113	89	2-289	179-258	122	172	678-871	307	0	0-639
Nonmanufacturing industries	21-23, 42-81	122,881	1,411	3,455	3,204	4,593	4,288	6,498	18,115	12,083	16,812	52,422
Mining, extraction, and support activities	21	2,841	1	0-91	60	0-151	0-164	44	88	222	1,527	0-1,203
Utilities	22	281	0	7	*	1	*	6	48	10	115	94
Wholesale trade	42	503	35	88	110	138	75	41	11	1	4	0
Electronic shopping and electronic auctions	454111-12	9,318	3	4	0	26	23	24	5	379-1,481	0	6,720-8,860
Transportation and warehousing	48-49	1,116	4	1	2	78	3	605	44	0	24	356
Information	51	78,898	278-544	1,360	1,355	2,313	2,808	4,008	11,548-13,044	8,176	10,833	34,892
Publishing	511	33,276	195	678	529	830	636	876	6,466	5,806	0	17,260
Newspaper, periodical, book, and directory publishers	5111	74	0	14	2	10	39	9	0	0	0	0
Software publishers	5112	33,201	195	664	526	821	598	867	6,466	5,806	0	17,260
Telecommunications	517	3,643	6	26	0-541	0-250	0-346	36	0-1,810	0	0-3,460	0-3,814
Data processing, hosting, and related services	518	16,037	9-279	0-658	0-827	1,234-1,463	1,827	2,851	4,769	1,492	0-3,565	0-4,096
Other information	other 51	25,943	66	0-658	0-827	0-250	0-346	246	0-1,810	878	3,833-10,834	9,721-17,633
Finance and insurance	52	7,565	53	21	30	118	118	139	1,376	1,601	1,693	2,417
Real estate and rental and leasing	53	708	0-7	144	10	32	0-9	13	507	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	138	0-7	125	0-11	0-17	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	570	0	19	0-11	15-33	0-9	13	507	0	0	0
Professional, scientific, and technical services	54	18,972	764	1,682	1,535	1,561	873	1,160	2,950	515	2,602	5,330
Architectural, engineering, and related services	5413	1,561	76	207	210	260	220	83	287	22	194	*
Computer systems design and related services	5415	11,669	241	525	505	645	424	557	2,096	449	2,140	4,087

TABLE 26

**Domestic R&D paid for and performed by the company, by industry, and company size: 2017**

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)												
		All companies	10–19 <sup>a</sup>	20–49	50–99	100–249	250–499	500–999	1,000–4,999	5,000–9,999	10,000–24,999	25,000 or more		
Scientific research and development services	5417	2,817	377	800	616	400	46	122	234	7	172	43		
Biotechnology research and development	541711	795	146	220	145	32	3	0	207	0	0	43		
Physical, engineering, and life sciences (except biotechnology) research and development	541712	1,936	230	577	468	289	44	122	27	7	172	0		
Social sciences and humanities research and development	541720	86	1	3	2	79	0	0	0	0	0	0		
Other professional, scientific, and technical services	other 54	2,925	70	149	204	256	183	399	333	37	95	1,200		
Health care services	621–23	958	i	11	62	26	180	i	228	217	47	81	0	105
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,722	0–252	0–91	76	0–151	0–164	239	0–1,486	0–1,094	17	0–1,486		

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

TABLE 27

**Domestic R&D paid for and performed by the company, by type of R&D, industry, and company size: 2017**

(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	339,036	18,732	49,149	271,155
Manufacturing industries	31-33	216,155	14,016	36,658	165,480
Food	311	4,453 i	452 i	1,439 i	2,562
Beverage and tobacco products	312	968	131	235	602
Textile, apparel, and leather products	313-16	919	35	78	805
Wood products	321	170	11	38	121
Printing and related support activities	323	218	16	52	150
Chemicals	325	63,285	7,476	15,286	40,522
Pharmaceuticals and medicines	3254	55,229	6,768	13,507	34,953
Other chemicals	other 325	8,057	708	1,779	5,569
Plastics and rubber products	326	3,637	375	770	2,493
Nonmetallic mineral products	327	1,303	158 i	274 i	872 i
Primary metals	331	741	35	79	626
Fabricated metal products	332	2,099	185	333	1,581
Machinery	333	12,257	610	1,439	10,209
Computer and electronic products	334	69,942	2,024 i	9,818 i	58,100
Semiconductor and other electronic components	3344	27,859	838 i	4,276 i	22,744 i
Navigational, measuring, electromedical, and control instruments	3345	10,089	608 i	1,588	7,893
Other computer and electronic products	other 334	31,994	578	3,953	27,464
Electrical equipment, appliances, and components	335	4,110	299 i	686	3,125
Transportation equipment	336	34,629	1,532	3,825	29,271
Aerospace products and parts	3364	11,903	481	1,846	9,576
Other transportation equipment	other 336	22,726	1,051	1,979	19,695
Furniture and related products	337	419	32	77	310
Miscellaneous manufacturing	322, 324, 339	17,004	645	2,229	14,130
Nonmanufacturing industries	21-23, 42-81	122,881	4,716	12,490	105,675
Information	51	78,898	2,072	7,290	69,536
Publishing	511	33,276	1,007	2,433	29,835
Telecommunications	517	3,643	188 - 269	1,454 - 1,512	1,863 - 2,001
Data processing, hosting, and related services	518	16,037	682	1,993	13,362
Other information	other 51	25,943	114 - 195	1,351 - 1,409	24,339 - 24,476
Professional, scientific, and technical services	54	18,972	1,252	3,122	14,598
Architectural, engineering, and related services	5413	1,561	191	361	1,009
Computer systems design and related services	5415	11,669	760	1,807	9,101
Scientific research and development services	5417	2,817	204	537	2,076
Biotechnology research and development	541711	795	91	120	585
Physical, engineering, and life sciences (except biotechnology) research and development	541712	1,936	112	388	1,435
Social sciences and humanities research and development	541720	86	1	29	56
Other professional, scientific, and technical services	other 54	2,925	97	417	2,411
Other nonmanufacturing	21-23, 42-49, 52, 53, 55-81	25,011	1,391	2,079	21,541 i
All companies (number of domestic employees)	-	339,036	18,732	49,149	271,155
Small companies					
10-19 <sup>a</sup>	-	2,402	241	531	1,630
20-49	-	7,593	898	1,387	5,307
Medium companies					
50-99	-	8,070	577	1,721	5,772

TABLE 27

**Domestic R&D paid for and performed by the company, by type of R&D, industry, and company size: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
100-249	-	13,514	923	2,503	10,088
Large companies					
250-499	-	11,773	831	1,748	9,193
500-999	-	16,295	1,081	2,697	12,517
1,000-4,999	-	52,341	3,114	8,507	40,719
5,000-9,999	-	32,701	1,922	4,121	26,659
10,000-24,999	-	63,415	3,275 <sup>i</sup>	10,959 <sup>i</sup>	49,181 <sup>i</sup>
25,000 or more	-	130,931	5,870	14,973	110,088

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Business 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

TABLE 28-A

## Companies with domestic R&amp;D paid for and performed by the company, by industry, company size, and state (A-M): 2017

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total <sup>a</sup> (number)	United States	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia	Florida	Georgia	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana	
All industries	21-23, 31-33, 42-81	19,514	339,036	968	905	4,476	442	120,111	3,828	6,423	1,445	i 279	4,496	5,085	105	1,527	12,743	5,394	2,195	1,486	758	243	257	3,106	18,912	19,101	6,633	221	3,433	114	
Manufacturing industries	31-33	11,581	216,155	533	4 e	3,249	276	63,215	2,499	5,891	1,336	i 53	2,426	2,864	74 i	1,483	9,999	5,104	1,982	1,096	642	146	204	2,195	14,249	18,237	5,730	176	2,593	58	
Food	311	554	4,453	i 6	1 e	4	55	180	33	29	757	i *	e 17	31	1 e	60	773	i 82	778	i 22	26	4	3	58	14	157	356	2 e	22	1	
Beverage and tobacco products	312	70	968	* e	* e	* e	* e	58	12	3	* e	* e	15	127	* e	* e	109	* e	* e	5	13	* e	* e	3	2	3	* e	* e	1	i *	e
Textile, apparel, and leather products	313-16	219	919	6	* e	* e	4	283	10	* e	* e	0	15	95	* e	1	i 8	* e	* e	* i	* e	* e	1	* e	77	12	14	* e	2	i 1	
Wood products	321	75	170	1	* e	* e	1	18	1	* e	* e	0	*	7	* e	* e	1	1	i 11	*	* e	1	* e	* e	4	* e	45	1	* e	* e	
Paper	322	89	1,292	1	0	2	82	40	*	3	9	0	2	226	0	* e	97	1	i 2	10	21	1	11	7	24	89	9	*	1	* e	
Printing and related support activities	323	156	218	* e	* e	* e	*	46	i 7	* e	* e	* e	1	2	* e	* e	5	i 1	2	i *	e 6	* e	* e	* e	3	i 4	9	i *	e 8	* e	
Petroleum and coal products	324	64	301	* e	* e	1	* e	25	2	* e	* e	0	1	1	0	* e	38	33	0	4	17	* e	* e	* e	* e	* e	* i	3	1	3	0
Chemicals	325	1,730	63,285	114	* e	143	42	13,634	181	4,011	448	30	583	272	42	i 20	4,477	i 2,436	188	156	287	26	12	1,071	8,435	664	367	31	1,580	8	
Basic chemicals	3251	253	2,393	2 e	0	3 e	7	105	9	79	136	0	36	26	0	* e	68	13	65	3 e	17	11 e	* e	51	95	37	2	6	16	* e	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	125	612	1 e	0	* e	*	14	* e	* e	0-27	0	1	23	0	* e	12	4	4	*	19	9	4	*	7	6	7	1	*	0	
Pesticide, fertilizer, and other agricultural chemicals	3253	60	1,092	1	* e	5	i 2	51	9	i *	e 19	1	i 4	6	0-43	i 3	49	i 8	i 48	i 5	*	1 e	* e	2	i 7	i 2	44	14	i 471-648	i 2	i
Pharmaceuticals and medicines	3254	755	55,229	106	*	119	30	13,202	159	3,867	263-295	29	519	200	0-43	e 12	4,126	i 2,300-2,413	56	72	43	5	7	1,016	i 8,211	493	182	9	912	4	
Soap, cleaning compound, and toilet preparation	3256	223	2,488	* e	0	1 e	2	172	1 e	2 e	* e	0	14	11	* e	4	95	1 e	1 e	0-78	i *	e *	e 0	1	77	66	101	* e	6	* e	
Paint, coating, adhesive, and other chemicals	3255, 3259	315	1,471	5	* e	16	1 e	91	2	62	* e	0	10	6	i 0	* e	127	0-112	15	0-78	208	1	* e	1 e	37	61	30	*	0-177	i 1	
Plastics and rubber products	326	624	3,637	13	* e	224	7	127	61	41	34	0	41	17	13	2	i 83	363	23	10	47	36	i 1	e 102	101	549	81	5 e	16	1	i
Nonmetallic mineral products	327	175	1,303	4	* e	3	i *	e 30	38	* e	* e	* e	4	10	* e	* e	37	14	1 e	1	1	1 e	1	i *	e 9	9	5	2	3	* e	

TABLE 28-A

## Companies with domestic R&amp;D paid for and performed by the company, by industry, company size, and state (A-M): 2017

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total <sup>a</sup> (number)	United States	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia	Florida	Georgia	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana	
Primary metals	331	176	741	12	0	3	3	11	7	1	i	5	0	2	6	0	* e	29	60	25	1	* e	* e	* e	26	7	50	15	34	3	* e
Fabricated metal products	332	1,168	2,099	24	* e	83	2 e	241	28	81	2	* e	32	59	* e	2 e	114	101	16 i	15	16	8 e	4	10	51	99	60	3 e	49	1 e	
Machinery	333	1,662	12,257	17	* e	21	11 e	3,168	37	254	i	* e	0	88	147	1	11	1,661	300	658	115	66	27	5	179 i	194	413	518	15 i	107	2 e
Agricultural implement	33311	181	1,511	* e	0	5	2 e	35	6	1 e	* e	0	1 e	31	0	2 e	174-439	5 e	623	68 i	* e	11	0	* e	*	6	95	1 e	1 e	0	
Semiconductor machinery	333242	33	3,228	0	0	4	0	2,408	* i	0-213	i	0	0	6	0	0	* i	0	0	0	0	0	0	0	1	42	0	62 i	0	0	0
Engine, turbine, and power transmission equipment	3336	97	1,921	0-18	0	0-14	* e	0-452	0-32	42	0	0	20	14	0	0	957-1,224	123	0-36	5	*	* e	0-6	0-179	18	45	0-363	* e	0-107	* e	
Other machinery	other 333	1,352	5,596	0-18	* e	0-14	9 e	271-727	0-32	0-213	i	* e	0	61	102	1	9	264	173	0-36	42	66	15	0-6 e	0-179 i	134	361	0-363	14 i	0-107	2 e
Computer and electronic products	334	1,726	69,942	159	1	2,506	27 i	35,766	1,336	217	47	22	820	635	14	1,370	1,125	87	193	397	23	14 i	34	267	2,720	219	938	11	39	16	
Communications equipment	3342	254	10,972	101	1	84	7	5,002	267	49	2	20	327	486	13	6	642	35	11	22	7	3	3	151	383	62	90	4	22	3	
Semiconductor and other electronic components	3344	422	27,859	34	0	1,565	1 i	14,409 i	301	15	5	*	70	21	*	1,252	124	13	19 i	3 e	1	*	21	64 i	1,035	47 i	111	3	3 e	1 i	
Navigational, measuring, electromedical, and control instruments	3345	774	10,089	11	* e	833 i	19 i	3,416	288	144	38	0	115	114	0	10	264 i	34	162	165-374	14 i	10 i	9	29	727	93	337 i	2 e	13 i	12	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	109	2,545	* e	0	54	16 i	1,308	40 i	54 i	* e	0	27	19 i	0	0	107 i	11 i	4 i	0	6 i	* e	0-10	13 i	290	20 i	40	0	* e	* e	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	118	3,214	6 i	0	744 i	0	566	61	0-91 i	* e	0	65	19	0	1	0-158 i	8	0-159	158-368	1 i	0-11 i	0-10	5	150	18 i	149 i	1 e	1 i	8	
Other measuring and controlling device	other 3345	547	4,329	5	* e	36 i	3	1,541	188	0-91	38	0	22	76	0	9	0-158	16	0-159 i	6	6	0-11 e	0-10 e	12	287	55	148	1	11 i	4	
Other computer and electronic products	other 334	275	21,022	13	0	24	0	12,939	479	8	1	2	308	15	1	101	95	5	*	0-206	2 e	1	1	22	575	18	401	2 e	1 e	*	

TABLE 28-A

Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (A-M): 2017

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total <sup>a</sup> (number)	United States	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia	Florida	Georgia	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana
Electrical equipment, appliances, and components	335	709	4,110	4 e	0	22	2 e	741	29	126	3	* e	61	97 i	0	1 e	284	51	30	21	9	3 e	* e	25 i	382	549	79 i	26 i	70 i	8
Transportation equipment	336	807	34,629	135	1	112	30	4,618	488	995	3 e	1	518	970	2	5 e	532	1,146	21	322	94	22	28	275	338	15,119	397	26	635	14
Automobiles, bodies, trailers, and parts	3361-63	367	21,137	47	0	19	5 e	2,363 i	6	18	* e	0	11 e	0-157	0	1 e	283	981	11 e	24	93	1 e	1 e	47	137	14,797	67	15	0-157	1 e
Aerospace products and parts	3364	306	11,903	47	1	78	24	2,087	475	954	3 e	1	469	557	2	4	213 i	158	10 i	296	1	17	24	195 i	191	149	121	7	410-636	13
Aircraft, aircraft engine, and aircraft parts	336411-13	290	11,473	33	1	54	24	2,033	353	945	3 e	1	455	557	2	4	213 i	158	10 i	296	1	17	5-25	195 i	191	107	82 i	4	401-636	* e
Guided missile, space vehicle, and related parts	336414-15, 336419	16	430	14	*	23	*	54	122	9	0	0	14	0	*	0	0	*	0	0	0	0	0	0	0	42	40	3	0-18	13
Military armored vehicle, tank, and tank component	336992	7	4	0	0	0	0	0	0	0	0	0	* i	0	0	0	0	0	0	0	0	0	0	1 i	0	* i	2	0	0	0
Other transportation	other 336	128	1,585	41	* e	15	1 e	169	7	24	* e	0	37	255-414	* e	* e	36	7	*	3	* e	4	3	31	10	173	208	4	0-225	0
Furniture and related products	337	202	419	4	* e	2	1 i	27	28	*	* e	0	1 i	30	* e	* e	8 i	26	26	1 i	3	* e	* i	* e	37	49	26	14	6	* i
Miscellaneous	339	1,386	15,410	34	* e	122	7	4,201	202	131	28	*	225	134	1 e	11	617	402	8	16	10 e	5	102	171	1,851	252 i	2,806	5	48	6
Medical equipment and supplies	3391	713	13,348	29	* e	102	4 e	3,858	161	77	25	*	211	102	* e	2 e	489	385	4 e	5 e	7 e	1 e	101	166	1,766	233 i	2,784	5	37	2 e
Other miscellaneous manufacturing	3399	672	2,062	5	* e	20	4	343	40	55	3	0	14	31 i	* e	10	128	17	4	11 i	3	4	1 e	6	85	19	23	1 e	11	5
Nonmanufacturing industries	21-23, 42-81	7,935	122,881	435	901	1,227	166	56,896	1,329	532	110	226	2,070	2,221	31	44 e	2,745	290	214	390	116	97	54	912	4,663	865	903	45	840	57
Mining, extraction, and support activities	21	104	2,841	1 e	3 e	1 e	1 e	111 i	32	* e	* e	0	1 e	9	* e	4	2 e	3	1 e	5	2 e	8 e	* e	6	0-137	1 e	2	2 i	1 e	* e
Utilities	22	36	281	21 i	0	0	0	74	0	0	0	*	4 i	24 i	1	*	40	0	0	*	0	0	0	*	2	2	1	4 i	2	0
Wholesale trade	42	662	503	6	* e	25 i	1 e	67	5	2 e	* e	* e	16	31 i	* e	1 i	44 i	8	11	4	8	2 e	1 e	4 e	13	10	17	1 e	5 e	* e
Electronic shopping and electronic auctions	454111-12	64	9,318	* e	* e	* e	* e	8,705 i	1 i	* e	* e	* e	1 e	* e	* e	* e	9	2	* e	* e	2 i	* e	* e	* e	6 i	* e	* e	* e	* e	* e
Transportation and warehousing	48-49	80	1,116	* e	2	* i	4	41	3	*	*	* e	6	3	* e	* e	24	3	*	6	* e	* e	* e	250	76	1	*	1	*	* i
Information	51	2,486	78,898	192	872	309	126	40,072	809	347 i	24 e	82	1,226	1,073	6	22 e	1,040	185	137	75	59	29 e	18	390	3,014	397	396	18	178 i	36

TABLE 28-A

## Companies with domestic R&amp;D paid for and performed by the company, by industry, company size, and state (A–M): 2017

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total <sup>a</sup> (number)	United States	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia	Florida	Georgia	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana	
Publishing	511	1,056	33,276	67	*	158	15	13,299	288	76	13 e	17	431 i	389	3	16 e	355	105	25	7 e	17	9	12	136	1,441	232	238	2 e	22	6	
Newspaper, periodical, book, and directory publishers	5111	36	74	* e	* e	* e	* e	22	* e	* e	* e	9	1 e	* e	* e	* e	2	* e	* e	* e	* e	* e	* e	* e	16	1 e	1 i	* e	* e	* e	
Software publishers	5112	1,020	33,201	67	*	158	15	13,277	288	76	13 e	8 e	430 i	389	3	15 e	352	105	25	7 e	16	9	12	136	1,426	232	237	1 e	22	6	
Telecommunications	517	101	3,643	3	* e	23	*	274 i	75	* e	*	* e	340	195 i	*	* e	259 i	* i	* e	0-37	* e	* e	*	42	74	2	* e	* e	2	* e	
Data processing, hosting, and related services	518	1,114	16,037	121	871	102	109	6,759	301	28-133	11 e	38	414 i	398	2 e	6 e	326	75 e	63	33 e	35	16 e	5 e	193	1,119	91 e	147	7 e	147 i	30	
Other information	other 51	216	25,943	1 e	* e	25	* e	19,740	146	136-244	i	* e	27	41	90	* e	1 e	100	5 e	49	0-37 i	8	4 i	1 e	20	381	72	11	9	6	* e
Finance and insurance	52	86	7,565	5	1	423	1	1,728 i	28	36	66	* e	356	615	* e	1	861	8	13	3	2 e	1 e	1	21	52	50	3 e	* e	11	* e	
Real estate and rental and leasing	53	90	708	1 e	* e	2 e	7	305 i	8 e	2 e	* e	105	5 e	42 e	* e	* e	6 e	1 e	3	1 e	3	8	* e	2 e	2 e	3 e	6 e	1 e	1 e	* e	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	55	138 i	1 e	0	2 e	* e	23 i	4 e	2 e	* e	0	4 e	39 e	* e	* e	4 e	1 e	* e	1 e	1 e	1 e	* e	1 e	1 e	3 e	4 e	1 e	* e	* e	
Other real estate and rental and leasing	other 53	35	570	* e	* e	* e	7	282 i	3	* e	* e	105	1 e	2	* e	* e	1	* e	3	* e	2	7	* e	* e	* e	* e	1 i	* i	* e	* e	
Professional, scientific, and technical services	54	3,679	18,972	198	24	441	19	5,137	433 i	126	19	32	383	402	22	15	672	55	38	286	15	46	33	221	1,313	292	436	17	632	18	
Architectural, engineering, and related services	5413	1,124	1,561	39	3	19	1 e	218	37	13	3	3 e	48	32	6	6	76	14	9	31	3 e	22	16	24	33	75	29	7	76	8	
Computer systems design and related services	5415	1,372	11,669	106	4	191	7	3,418 i	310 i	24	13	17	190	208	12	3 e	288	28	19	248	9	7 e	16	126	752	131	336	2 e	543	1 e	
Scientific research and development services	5417	689	2,817	49 i	15	225	7 i	918	57	68	2	2 i	94	9	4	3 i	31	10	8	2	1 i	3	1 i	54	400	63	32	7	3 i	9	
Biotechnology research and development	541711	160	795	2 i	0	214	* e	236	* e	25	2	* e	5	1 i	1	1 i	10	* e	8	2	* e	1	* e	33	103	1 e	8	1	1	0	



TABLE 28-A

## Companies with domestic R&amp;D paid for and performed by the company, by industry, company size, and state (A–M): 2017

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total <sup>a</sup> (number)	United States	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia	Florida	Georgia	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana			
Physical, engineering, and life sciences (except biotechnology) research and development	541712	520	1,936	46	i 15	11	7	i 603	57	43	*	1	89	8	3	2	i 21	10	*	e *	1	i 2	e 1	i 21	297	63	24	6	2	i 9			
Social sciences and humanities research and development	541720	9	86	0	0	0	0	79	0	*	i 0	1	i 0	*	i 0	0	0	0	0	0	0	0	0	0	0	*	0	*	i 0	0	*	i	
Other professional, scientific, and technical services	other 54	493	2,925	4	2	6	2	583	29	22	1	9	e 51	153	1	e 3	277	3	e 3	5	2	e 14	1	e 17	129	23	39	1	e 9	1	e		
Health care services	621–23	108	958	i 2	*	e 19	2	450	*	e *	e *	e *	e 49	i 1	i *	e *	e 12	*	e *	*	*	e *	e *	e 3	i 53	i 47	5	*	i *	e *	e *		
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	545	1,722	8	*	e 6	6	208	8	17	*	e 6	24	22	1	e 2	i 35	25	10	11	23	2	e *	e 15	0 - 137	60	37	1	e 10	1	e		
All companies (number of domestic employees)	–	19,514	339,036	968	905	4,476	442	120,111	3,828	6,423	1,445	i 279	4,496	5,085	105	1,527	12,743	5,394	2,195	1,486	758	243	257	3,106	18,912	19,101	6,633	221	3,433	114			
Small companies																																	
10-19 <sup>b</sup>	–	3,283	2,402	26	1	e 27	e 5	e 626	50	28	e 5	e 8	e 65	e 51	e 4	8	e 79	e 28	e 9	e 9	e 12	e 11	e 5	e 69	174	63	e 61	5	e 20	e 4			
20–49	–	6,001	7,593	50	e 17	80	e 39	2,120	140	101	12	e 16	e 158	e 151	e 9	19	e 289	e 120	e 50	e 38	e 41	e 29	e 10	e 177	855	232	158	20	e 59	e 16			
Medium companies																																	
50–99	–	3,569	8,070	42	e 4	e 127	10	e 2,439	93	112	11	e 16	e 145	100	e 3	e 11	e 336	133	32	43	42	36	14	134	987	227	145	11	e 60	20			
100–249	–	2,986	13,514	125	1	e 128	27	4,721	208	183	18	28	263	170	6	24	671	142	93	64	44	22	e 8	e 140	1,099	368	278	16	e 78	10			
Large companies																																	
250–499	–	1,390	11,773	69	2	156	31	4,091	202	176	10	2	197	182	0-45	9	215	149	83	34	38	22	3	178	1,226	428	251	8	143	13			
500–999	–	887	16,295	49	2	e 141	8	e 4,883	162	56	0-299	19	243	162	12	11	699	221	116	41	88	7	e 17	240	1,963	560	330	15	72	2	e		
1,000–4,999	–	947	52,341	345	5	757	145	18,529	819	1,176	218	134	1,070	861	10	104	2,200	643	131	392	342	61	i 160	883	i 5,378	i 1,979	894	26	264	18			
5,000–9,999	–	198	32,701	134	870	337	72	13,299	814	675	0-299	5	i 419	425	*	45	706	392	45	182	38	7	2	202	963	702	710	51	288	3			
10,000–24,999	–	149	63,415	44	1	617	34	i 21,066	529	i 893	769	i 24	768	1,083	0-45	i 1,168	4,050	i 2,435	1,025	i 558	35	8	28	545	3,055	1,793	1,384	41	i 1,085	i 19			

TABLE 28-A

**Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (A–M): 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total <sup>a</sup> (number)	United States	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia	Florida	Georgia	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana		
25,000 or more	–	105	130,931	83	2	2,107	72	48,337	810	3,023	108	27	1,168	1,901	20	127	3,497	1,130	611	125	79	41	11	538	3,211	12,749	2,423	28	i	1,365	9	i

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not 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.

<sup>b</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D. 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, 2017.

TABLE 28-B

## Companies with domestic R&amp;D paid for and performed by the company, by industry, company size, and state (N-Z): 2017

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total <sup>a</sup> (number)	United States	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming	Undistributed <sup>b</sup>	
All industries	21-23, 31-33, 42-81	19,514	339,036	470	439	754	13,228	298	13,430	7,502	276	6,697	775	7,426	9,576	657	1,212	189	1,172	17,752	2,171	241	2,659	20,820	182	4,777	82	i	1,561
Manufacturing industries	31-33	11,581	216,155	188	304	517	9,971	213	6,953	4,897	142	5,641	469	6,392	8,127	619	873	161	970	10,999	1,204	166	1,474	5,046	139	3,412	65	i	898
Food	311	554	4,453	i 60	1 e	* e	278	* e	37	115	1 e	156	14	11	70	2	1 e	4	28	25	4	5	10	33	* e	98	* e	29	
Beverage and tobacco products	312	70	968	* e	* e	* e	* e	* e	245	46	* e	* e	* e	1 e	* e	* e	* e	* e	5	135	* e	* e	105	29	* e	1 i	* e	47	
Textile, apparel, and leather products	313-16	219	919	* e	* e	13	30	* e	68	i 56	i * e	78	* e	* e	4	4	68	* e	2	7	i 3	1	1 e	16	* e	21	* e	15	
Wood products	321	75	170	* e	* e	* e	2	* e	1	i 3	10	* e	* e	4	1	i 3	7	* e	2	12	1	* i	9	13	* e	3	* e	7	
Paper	322	89	1,292	3	* e	1	14	* e	9	27	0	27	6	*	44	3	40	* e	38	16	1	2	17	6	* e	392	0	8	
Printing and related support activities	323	156	218	*	* e	1	1	i *	i 11	28	* e	14	* e	3	6	* e	1	i *	i 9	1 e	1	i *	e *	4	* e	29	* e	12	
Petroleum and coal products	324	64	301	* e	1	* e	42	* e	* e	* e	0	6	16-75	16	17	* e	1	0	* e	15	* e	0	* e	* e	* e	2	0	0-37	
Chemicals	325	1,730	63,285	28	14	i 16	7,787	17	2,842	1,984	10	2,270	46	66	5,163	58	65	64	313	i 774	157	28	465	1,230	111	373	7	142	
Basic chemicals	3251	253	2,393	4	* e	2	188	i 3	e 256	i 112	i *	e 271	12	7	132	2	12	54	239	i 122	6	0	129	16	8	11	* e	22	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	125	612	* e	* e	2	i 5	0	43	7	0	280	*	7	34	2	16	0	14	61	* i	* e	1	i 2	8	6	0	0-27	
Pesticide, fertilizer, and other agricultural chemicals	3253	60	1,092	2	6	i *	0-115	* e	1	26	i 1	i 9	1 e	1	i 9	i 0	1	i 6	2	i 7	i 2	* e	10	6	i *	e 66	0	1	
Pharmaceuticals and medicines	3254	755	55,229	21	7	8	7,154	13	2,302	1,783	9	293	29	45	4,866	50	19	3	51	517	148	0-29	324	1,203	0-97	151	7	0-61	
Soap, cleaning compound, and toilet preparation	3256	223	2,488	* e	* e	1	328	i *	e 186	i 26	0	1,144	* e	* e	6	1 e	3	* e	5	37	* e	0-29	*	1 e	* e	127	0	0-61	
Paint, coating, adhesive, and other chemicals	3255, 3259	315	1,471	* e	1	3	0-115	* e	55	30	0	273	3	6	116	3	13	* e	4	31	1	0-29	e 2	1 e	0-97	11	* e	60	
Plastics and rubber products	326	624	3,637	11	3	4	e 27	* e	83	66	2	312	43	10	247	12	176	4	32	366	5	* e	28	8	e 10	120	* e	71	
Nonmetallic mineral products	327	175	1,303	* e	* e	* e	31	* e	792	i 50	i *	e 25	1 e	3	182	i *	e 5	* e	4	10	1	* e	1 e	6	* e	5	* e	12	
Primary metals	331	176	741	* e	*	5	1	* e	4	15	* e	37	*	13	114	* e	10	* e	5	16	2	1	i 11	2	1	190	* e	11	
Fabricated metal products	332	1,168	2,099	11	2	e 12	67	1 e	48	43	8	178	18	37	93	3	27	4	21	142	15	* e	18	78	1 e	118	* e	54	
Machinery	333	1,662	12,257	31	13	41	288	1 e	262	338	77	296	145	455	227	13	59	14	40	845	23	15	38	134	5 e	655	2	i 225	
Agricultural implement	33311	181	1,511	27	0	* e	* e	* e	1	e 62	21	11	1	e 5	e 2	e 0	1	7	3	7	e 1	i *	e *	1 e	1	i 45	* e	0-226	
Semiconductor machinery	333242	33	3,228	0	0	* i	10	0	0-229	0	0	6	0	0-451	14	0	0	0	*	0-680	0	0	* i	0	0	0	0	0	0-226
Engine, turbine, and power transmission equipment	3336	97	1,921	*	0-14	* e	* e	* e	34	0-277	0-57	0-281	0-145	0-451	e 11	* e	21	* e	0-38	67	* e	1	i 8	0-134	* e	110	0	0-226	

TABLE 28-B

## Companies with domestic R&amp;D paid for and performed by the company, by industry, company size, and state (N-Z): 2017

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total <sup>a</sup> (number)	United States	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming	Undistributed <sup>b</sup>	
Other machinery	other 333	1,352	5,596	4 e	0-14	40	278	1 e	0-229	0-277	0-57	0-281	0-145	0-451	200	13	36	7	0-38	89-773	22	15	29	0-134	4 e	500	2 i	0-226	
Computer and electronic products	334	1,726	69,942	27	51	316	709	182	1,165	1,411	18 i	552	37	5,371	959	67	122	61	95	7,682 i	195	62	361	739	3 e	558	2	195	
Communications equipment	3342	254	10,972	7	13	98	443	5	298	640	0-19	101	7	52	343	3	20	1	32	581	52	0-4	228	158	1	32	0-2	5-79	
Semiconductor and other electronic components	3344	422	27,859	8	2 e	147	97 i	138	405 i	373	0	78	1 e	4,994	230	35	48	33	11	1,929	44	25	10	101	* e	31	* e	1	
Navigational, measuring, electromedical, and control instruments	3345	774	10,089	11	23	47	139	33 i	256	244	0-19 i	321 i	29	212	268	23	52	24	49	403	92	35 i	115	261	* e	406	1 e	0-190	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	109	2,545	0	7 i	7 i	24 i	0	92 i	24 i	0	55 i	1	12 i	140	2	10 i	3	39	37 i	10 i	3 i	24 i	5 i	0	35 i	0	0-24	
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	118	3,214	6	5	20	34	27 i	93 i	79	0-19 i	33 i	21	98	39 i	0-22	0-43 i	6 i	1 e	191	43	0-33 i	57	39	0	10	* e	0-190	
Other measuring and controlling device	other 3345	547	4,329	5	11	19	82	6	70	140	0-19 e	233	7	102	89	0-22 i	0-43	14	10	175 i	39	0-33	33	217	* e	361	1	0-190	
Other computer and electronic products	other 334	275	21,022	1 e	13	25	30	6	206	154	0-19 e	52	* e	113	119	6	1 e	3	3 e	4,768 i	7	0-4	8 e	219	1 e	89 i	0-2 e	0-190	
Electrical equipment, appliances, and components	335	709	4,110	1 e	7	26	45	2	78	186	* e	95	9	72	372	5 i	73	3	35	143	16	3	29	48	1 e	171	52 i	13	
Transportation equipment	336	807	34,629	15	42	37	119	5	1,006	263	16 i	1,186	73	250	221	2 i	196	6	141	516	450	36 i	297	2,353	6 i	532	* e	13	
Automobiles, bodies, trailers, and parts	3361-63	367	21,137	4 e	1 e	14	6	1	309	179	2 e	427	9 e	219	86	* e	120	3 e	128	100	282	* e	0-157	71	1 e	111	* e	0-12	
Aerospace products and parts	3364	306	11,903	10	42	18	99	4	696	76	13 i	755	63	30	127	1 i	63	*	7	391	168	35 i	65	2,279	6 i	197-422	* e	2	
Aircraft, aircraft engine, and aircraft parts	336411-13	290	11,473	10	42	18	98	4 e	696	76	13 i	751	63	30	127	1 i	63	*	7	390	93	35 i	61	2,278	6 i	197-422	* e	1	
Guided missile, space vehicle, and related parts	336414-15, 336419	16	430	0	* i	0	* i	*	0	*	0	4	0	0	0	0	0	0	*	1	75	0	4	1	0	0	0	0	1
Military armored vehicle, tank, and tank component	336992	7	4	0	0	0	0	0	0	0	0	* i	0	0	0	0	1 i	0	0	0	0	0	0	0	0	0	0	0	0
Other transportation	other 336	128	1,585	2	* e	5	14	0	1 e	9	1	4	* e	1 e	8	1 i	12	3	7	25	* e	*	74-233	3 e	* e	0-225	* e	0-12	
Furniture and related products	337	202	419	* e	* e	* e	5	* e	6	29	* e	4 i	* e	4	11	* e	5	* e	9	6	10	3	11	1	* e	14	* e	11	
Miscellaneous	339	1,386	15,410	1 e	169	45	525 i	4 e	296	235	1 e	405	7-53	77	397	447 i	19	1 e	188	288	320	9	73	343	1 e	131	*	4-42	

TABLE 28-B

## Companies with domestic R&amp;D paid for and performed by the company, by industry, company size, and state (N-Z): 2017

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total <sup>a</sup> (number)	United States	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming	Undistributed <sup>b</sup>	
Medical equipment and supplies	3391	713	13,348	1 e	2	41	499 i	3 e	184	195	1 e	352	8	61	342	46	13	1 e	183	264	213	1 e	35	247	1 e	99	*	5	
Other miscellaneous manufacturing	3399	672	2,062	1 e	168	4	25	1 e	113	40 i	* e	53	0-44 e	16	55	401 i	6	1 e	5	24	107	8	38 i	96	1 e	33	* e	0-37	
Nonmanufacturing industries	21-23, 42-81	7,935	122,881	282	134	237	3,257	86	6,477	2,605	134	1,056	306	1,034	1,448	38	340	27	202	6,753	967	75	1,184	15,774	43	1,365	16	662	
Mining, extraction, and support activities	21	104	2,841	* e	5	* e	135-302	4 e	1 e	* e	3 e	2 e	67 i	* e	4 e	* e	* e	* e	1 e	2,190	11	* e	1 e	1 e	3 e	1 e	7 e	0-48	
Utilities	22	36	281	0	*	*	3	* i	10	1 i	17	34	*	2	13	0	6	0	0	1	*	0	2	6	6	*	1	2	
Wholesale trade	42	662	503	1 e	1 e	1 e	33 i	* e	25	6 e	1 e	22 i	3 i	2 e	8 e	* e	4 i	* e	14 i	36 i	14 i	* e	5	6 e	* e	7 i	* e	30	
Electronic shopping and electronic auctions	454111-12	64	9,318	* e	1 i	* e	0-167	* e	6	21	* e	1 e	* e	53	1 e	* e	3 i	* e	* e	210	69-233 i	* e	* e	67	* e	* e	* e	*	
Transportation and warehousing	48-49	80	1,116	4	35	* i	* e	* e	12	10	* e	22	* e	13	22	* e	* e	* e	17	22	* e	*	10	522	* e	* e	* e	4	
Information	51	2,486	78,898	238	44 e	145	1,684 i	50	3,726	1,371	89	535	79	736	746	15	243	16	81 e	1,670	612	29	686	14,087	25	832	4 e	26	
Publishing	511	1,056	33,276	17	19	90	258	15	399	937	85	236	17	360	339	6 e	48	9	33	627	360	21	232	11,049	18	713	2	5	
Newspaper, periodical, book, and directory publishers	5111	36	74	* e	* e	* e	1 e	* e	2 e	* e	* e	* e	* e	* e	3 i	* e	* e	* e	* e	9	* e	* e	* e	* e	* e	* e	3	* e	2
Software publishers	5112	1,020	33,201	17	19	89	258	15	397	936	85	235	17	360	336	6 e	48	9	33	618	360	21	232	11,049	18	710	2	4	
Telecommunications	517	101	3,643	* e	* e	* e	1,156 i	* e	334-465	8	* e	2	*	10	39	* e	8	* e	4	167 i	0-38	* e	84	408	* e	15	* e	0-20	
Data processing, hosting, and related services	518	1,114	16,037	201	21 e	50	220	0-36	597	332	4 e	290	12 e	253	272	8	136	7	37 e	709	216	7 e	250	795	6	85	1 e	0-20	
Other information	other 51	216	25,943	20	5	5	50	0-36	2,264-2,397	95	* e	7	50	113	96	1	52	1 e	6	167	0-38	* e	119	1,835	* e	18	* e	2	
Finance and insurance	52	86	7,565	12	1	1	282	1	1,082	385	* e	105	1 e	2	268	9	12	* e	5	400	12	* e	15	30	* e	261	* e	392	
Real estate and rental and leasing	53	90	708	5	2	* e	7 e	* e	15	3 e	* e	9	1 e	3 i	4 e	* e	2 i	* e	4 e	14 e	1 e	* e	7	109	* e	7	* e	1	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	55	138 i	* e	* e	0	6 e	* e	3 e	3 e	* e	4 e	1 e	3 i	2 e	* e	2 i	* e	4 e	12 e	1 e	* e	2 e	* e	* e	1 e	0	*	
Other real estate and rental and leasing	other 53	35	570	5	2	* e	1	* e	12	1	* e	5	* e	* e	2	* e	* e	* e	* e	2 e	* e	* e	5	109	* e	6	* e	1	
Professional, scientific, and technical services	54	3,679	18,972	15	28	87	937	30	1,556	754	23	288	149	192	313	8	52	9	68	1,917	84	45	373	498	8	133	2 e	77	
Architectural, engineering, and related services	5413	1,124	1,561	7	20	12	30	3 e	60	21	2 e	21	6 e	88	55	2 e	5 e	5	14	175	24	4	40	53	1 e	40	1 e	22	
Computer systems design and related services	5415	1,372	11,669	6	6	17	131	15	1,252	655	17	189	89	66	99	4	25	4	35	1,363	31	40	230	319	4	43	* e	17	
Scientific research and development services	5417	689	2,817	*	*	41	138	3 e	80	61	4	44	3	23	106	2 i	2 i	0	8	115	6 i	1 i	13	61	3	19	* i	8	

TABLE 28-B

## Companies with domestic R&amp;D paid for and performed by the company, by industry, company size, and state (N-Z): 2017

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total <sup>a</sup> (number)	United States	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming	Undistributed <sup>b</sup>			
Biotechnology research and development	541711	160	795	* e	* e	5	15	* e	27	24	* e	4	0	* i	27	1 i	* i	0	3	6	2 i	* i	1 e	13	* e	12	0	2			
Physical, engineering, and life sciences (except biotechnology) research and development	541712	520	1,936	* e	* e	36	121	3 e	53	35	4	40	3	23	79	1 i	2 i	0	5	109	5 i	1 i	12	48	3	7	* i	5			
Social sciences and humanities research and development	541720	9	86	0	0	1	2	0	* i	2	0	0	0	0	0	0	0	0	0	0	0	0	0	*	0	0	0	*			
Other professional, scientific, and technical services	other 54	493	2,925	2 i	2 e	16	638	8	165	16	* e	34	51	14	53	1 e	21	* e	11	264	22	*	90	65	1 e	31	* e	30			
Health care services	621-23	108	958	* e	* e	6	2	13 i	* e	2	3	* e	8	* e	14	27	i	* e	4	* e	* e	3 i	4	* e	7	51	* e	79	* e	87	
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	545	1,722	5	11	1	0-155	1 e	44	51	1 e	30	6	17	43	5	14	1	10	289	0-155 i	* e	78	398	1 e	44	2	0-48			
All companies (number of domestic employees)	-	19,514	339,036	470	439	754	13,228	298	13,430	7,502	276	6,697	775	7,426	9,576	657	1,212	189	1,172	17,752	2,171	241	2,659	20,820	182	4,777	82	i	1,561		
Small companies																															
10-19 <sup>c</sup>	-	3,283	2,402	7 e	12 e	11 e	135	9	142	40 e	3 e	51 e	11 e	44	82	0-54	13 e	2 e	19 e	125 e	33 e	2 e	56 e	78	4 e	41 e	1 e	0-54			
20-49	-	6,001	7,593	19 e	22 e	43	260	17 e	310 e	178	19	193 e	30 e	86	283	13 e	41 e	11 e	70 e	352 e	96 e	15	140 e	215	6 e	107 e	4 e	54			
Medium companies																															
50-99	-	3,569	8,070	17 e	28	68	325	15 e	335	203	8 e	151	26 e	106	272	17	28 e	12	54	327	77 e	19	148	263	10	127	5 e	97			
100-249	-	2,986	13,514	31	65	51	676	16	436	173	8	307	34	131	384	24	87	16	77	669	185	25	188	507	9	222	2 e	257			
Large companies																															
250-499	-	1,390	11,773	27	39	29	253	9	537	332	6	245	37	214	375	15	37	60	78	412	153	29	101	587	0-97 e	180	1	0-124			
500-999	-	887	16,295	26	24	157	387	2 e	445	437	21	272	28	137	320	13	120	24	60	902	109	9	292	1,454	0-97 e	424	10	82-528			
1,000-4,999	-	947	52,341	192	161	228	1,761	i	41 i	2,528	1,166	82	964	203	685	1,651	255	254	35	115	1,536	289	11	389	1,523	34	584	4	104		
5,000-9,999	-	198	32,701	32	4	40	785	11	813	i	1,421	* i	935	24	475	722	182 - 245	i	229	8	158	1,687	767	38	315	719	0-97	1,524	* i	0-449	
10,000-24,999	-	149	63,415	93	30	77	3,146	31	3,633	1,671	10	1,876	179	596	1,491	53	230	8	298	i	3,700	200	31	i	263	1,812	15	870	*	0-70	
25,000 or more	-	105	130,931	25	54	50	5,500	146	4,251	1,881	120	1,704	204	4,952	3,995	27	174	11	244	i	8,041	i	261	61	766	13,663	11	698	53	i	439

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not 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.

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

<sup>c</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D. 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, 2017.

TABLE 29

## Domestic R&amp;D paid for and performed by the company, by industry, company size, and domestic R&amp;D program size: 2017

(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	339,036	5,091	21,235	30,795	18,470	263,445
Manufacturing industries	31-33	216,155	2,810	12,428	18,393	13,198	169,326
Food	311	4,453	132	513	596	474	2,739
Beverage and tobacco products	312	968	19	57	114	157	620
Textile, apparel, and leather products	313-16	919	61	186	164	335	175
Wood products	321	170	19	54	96	0	0
Paper	322	1,292	28	99	108	62	995
Printing and related support activities	323	218	41	117	60	0	0
Petroleum and coal products	324	301	0 - 132	46 - 63	123	0 - 132	0
Chemicals	325	63,285	292	2,387	6,264	3,822	50,520
Basic chemicals	3251	2,393	57	368	742	412	814
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	612	27	195	103	0	287
Pesticide, fertilizer, and other agricultural chemicals	3253	1,092	0 - 133	75	96	0 - 249	538 - 923
Pharmaceuticals and medicines	3254	55,229	49	1,395	4,847	2,982	45,955
Soap, cleaning compound, and toilet preparation	3256	2,488	24 - 131	132	169	181	1,876 - 1,983
Paint, coating, adhesive, and other chemicals	3255, 3259	1,471	0 - 133	222	305	0 - 249	561 - 946
Plastics and rubber products	326	3,637	202	679	816	193	1,748
Nonmetallic mineral products	327	1,303	61	129	287	0	826
Primary metals	331	741	48	177	137	196	183
Fabricated metal products	332	2,099	312	968	457	362	0
Machinery	333	12,257	381 - 419	1,602	1,594	1,151 - 1,189	7,493
Agricultural implement	33311	1,511	38	111	72 - 130	0 - 1,040	191 - 1,290
Semiconductor machinery	333242	3,228	3	0 - 42	111	149	2,923 - 2,967
Engine, turbine, and power transmission equipment	3336	1,921	0 - 379	0 - 109	148	0 - 1,040	244 - 1,774
Other machinery	other 333	5,596	0 - 379	1,340 - 1,452	1,204 - 1,265	0 - 1,040	1,461 - 3,052
Computer and electronic products	334	69,942	477	1,932	2,879	2,749	61,904
Communications equipment	3342	10,972	51	360	451	739	9,372
Semiconductor and other electronic components	3344	27,859	105	578	923	794	25,460
Navigational, measuring, electromedical, and control instruments	3345	10,089	214	803	1,098	606	7,367
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	2,545	20	164	362	278	1,722
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,214	0 - 121	109	118	0 - 121	2,868



TABLE 29

## Domestic R&amp;D paid for and performed by the company, by industry, company size, and domestic R&amp;D program size: 2017

(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	4,329	72 - 195	530	619	206 - 329	2,778
Other computer and electronic products	other 334	21,022	108	191	408	611	19,705
Electrical equipment, appliances, and components	335	4,110	179	702	758	1,050	1,420 i
Transportation equipment	336	34,629	161	1,203	1,745	1,503	30,017
Automobiles, bodies, trailers, and parts	3361–63	21,137	49	742	1,148	944	18,253
Aerospace products and parts	3364	11,903	65 - 113	325 - 341	393 - 462	454 - 528	10,509 - 10,615
Aircraft, aircraft engine, and aircraft parts	336411–13	11,473	66	318	360	351	10,378
Guided missile, space vehicle, and related parts	336414–15, 336419	430	0 - 48	6 - 23	33 - 102	103 - 176	132 - 238
Military armored vehicle, tank, and tank components	336992	4	0 - 3	1 - 5	0	0	0
Other transportation	other 336	1,585	0 - 48	114 - 131	134 - 203	30 - 104	1,150 - 1,256
Furniture and related products	337	419	43	116	260	0	0
Miscellaneous manufacturing	339	15,410	176 - 348	1,442 - 1,469	1,936	970 - 1,143	10,686
Medical equipment and supplies	3391	13,348	149	1,055	1,600	796	9,748
Other miscellaneous manufacturing	3399	2,062	27 - 198	388 - 415	336	175 - 347	938
Nonmanufacturing industries	21–23, 42–81	122,881	2,281	8,807	12,402	5,272	94,119
Mining, extraction, and support activities	21	2,841	23	167	135	0	2,516
Utilities	22	281	5	23 - 47	180	48 - 71 i	0
Wholesale trade	42	503	194	309 i	0	0	0
Electronic shopping and electronic auctions	454111–12	9,318	8	31	45	0	9,234
Transportation and warehousing	48–49	1,116	13	28	309	0	767
Information	51	78,898	784 - 808	3,689	6,193	4,271 - 4,295	63,935
Publishing	511	33,276	423	1,179	1,704	1,134	28,835
Newspaper, periodical, book, and directory publishers	5111	74	17 i	21	36	0	0
Software publishers	5112	33,201	406	1,158	1,668	1,134	28,835
Data processing, hosting, and related services	518	16,037	275 - 300	2,030 - 2,057	3,958	2,506	7,241
Other information	other 51	29,586	61 - 86	454 - 481	530	630 - 656	27,859
Finance and insurance	52	7,565	4	203	655	139	6,565
Real estate and rental and leasing	53	708	132 i	58	47	104	367
Lessors of nonfinancial intangible assets (except copyrighted works)	533	138 i	90 - 133 i	0	5 - 48 i	0	0
Other real estate and rental and leasing	other 53	570	0 - 42	58	0 - 42	104	367

TABLE 29

**Domestic R&D paid for and performed by the company, by industry, company size, and domestic R&D program size: 2017**

(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
Professional, scientific, and technical services	54	18,972	933	3,549	3,722	580	10,187
Architectural, engineering, and related services	5413	1,561	258	607	631	64	*
Computer systems design and related services	5415	11,669	431	1,261	1,346	266	8,364
Scientific research and development services	5417	2,817	113	1,128	986	172	417
Biotechnology research and development	541711	795	30	299	231	0	235
Physical, engineering, and life sciences (except biotechnology) research and development	541712	1,936	82	823	754	93	182
Social sciences and humanities research and development	541720	86	1	6	0	79	0
Other professional, scientific, and technical services	other 54	2,925	130	553	760	77	1,406
Health care services	621–23	958	i 36	145	668	i 109	0
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,722	120 - 149	576 - 605	450	0	548
All companies (number of domestic employees)	–	339,036	5,091	21,235	30,795	18,470	263,445
Small companies							
10–19 <sup>a</sup>	–	2,402	906	1,376	69	52	0
20–49	–	7,593	1,974	4,072	1,547	0	0
Medium companies							
50–99	–	8,070	971 - 1,037	4,041	2,709	282 - 348	0
100–249	–	13,514	773	5,006	5,131	1,841	763
Large companies							
250–499	–	11,773	209 - 282	2,724	4,745	1,676 - 1,750	2,347
500–999	–	16,295	114	1,975	5,925	3,182	5,098
1,000–4,999	–	52,341	64	1,628	7,489	7,276	35,884
5,000–9,999	–	32,701	2	206	1,796	2,311	28,386
10,000–24,999	–	63,415	7	121	781	1,360	61,147
25,000 or more	–	130,931	1	86	604	420	129,821

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Business 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. Statistics are representative of companies located in the United States that performed or funded R&D. 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, 2017.

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: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Energy		Environmental protection	
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount
All industries	21-23, 31-33, 42-81	19,514	339,036	3,276	20,981	2,252	6,976
Manufacturing industries	31-33	11,581	216,155	2,387	16,667	1,712	6,194
Food	311	554	4,453	10	14	70	47
Chemicals	325	1,730	63,285	227	524	290	418
Basic chemicals	3251	253	2,393	85	344	107	258
Pharmaceuticals and medicines	3254	755	55,229	3	18	4	11
Other chemicals	other 325	723	5,664	140	162	179	149
Plastics and rubber products	326	624	3,637	126	235	89	145
Nonmetallic mineral products	327	175	1,303	57	173	53	166
Fabricated metal products	332	1,168	2,099	315	274	212	150
Machinery	333	1,662	12,257	458	2,066	364	995
Agricultural implement	33311	181	1,511	35	42	30	104
Semiconductor machinery	333242	33	3,228	6	86	0	0
Engine, turbine, and power transmission equipment	3336	97	1,921	68	730	51	502
Other machinery	other 333	1,352	5,596	350	1,209	283	389
Computer and electronic products	334	1,726	69,942	369	6,421	226	769
Semiconductor and other electronic components	3344	422	27,859	96	4,127	41	331
Other electronic products	other 334	1,304	42,083	273	2,294	184	439
Electrical equipment, appliances, and components	335	709	4,110	433	1,213	120	130
Transportation equipment	336	807	34,629	190	5,383	90	3,090
Automobiles, bodies, trailers, and parts	3361-63	367	21,137	77	4,459	73	3,023
Other transportation	other 336	441	13,492	113	925	17	67
Miscellaneous manufacturing	339	1,386	15,410	29	92	22	52
Other manufacturing	312-16, 321-24, 331, 337	1,050	5,029	172	272	177	232
Nonmanufacturing industries	21-23, 42-81	7,935	122,881	888	4,314	540	781
Mining, extraction, and support activities	21	104	2,841	51	1,935	38	200
Utilities	22	36	281	34	261	13	80
Wholesale trade	42	662	503	51	86	39	16
Information	51	2,486	78,898	118	908	40	124
Publishing	511	1,056	33,276	66	813	D	81
Telecommunications	517	101	3,643	D	1	D	*
Data processing, hosting, and related services	518	1,114	16,037	39	80	18	39
Other information	other 51	216	25,943	D	14	D	3

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: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Energy		Environmental protection				
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount			
Professional, scientific, and technical services	54	3,679	18,972	598	i	1,017	385	i	324	
Architectural, engineering, and related services	5413	1,124	1,561	401	i	459	i	309	i	191
Scientific research and development services	5417	689	2,817	131	i	354	53	i	113	
Biotechnology research and development	541711	160	795	3	i	*	i	D	*	
Other scientific research and development	other 5417	529	2,022	128	i	353	D		113	
Other professional, scientific, and technical services	other 54	1,865	14,594	66		204	i	23	20	
Health care services	621-23	108	958	i	D	9	0		0	
Other nonmanufacturing	23, 44-45, 48-49, 52-53, 55-56, 624, 71-72, 81	863	20,429		D	100	25		38	
All companies (number of domestic employees)	-	19,514	339,036	3,276	i	20,981	2,252	i	6,976	
Small companies										
10-19 <sup>c</sup>	-	3,283	2,402	521	i	215	i	341	i	118
20-49	-	6,001	7,593	931	i	508	i	612	i	186
Medium companies										
50-99	-	3,569	8,070	556	i	621	399	i	229	
100-249	-	2,986	13,514	514	i	935	332	i	259	
Large companies										
250-499	-	1,390	11,773	258		532	169		184	
500-999	-	887	16,295	157		822	114		250	
1,000-4,999	-	947	52,341	205		3,023	177		985	
5,000-9,999	-	198	32,701	56		1,862	i	46	541	
10,000-24,999	-	149	63,415	48		3,886	i	42	1,151	
25,000 or more	-	105	130,931	28		8,579	20		3,072	

\* = 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.

<sup>a</sup> Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not 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.

<sup>b</sup> Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not include an adjustment to the weight to account for unit nonresponse. These company count estimates reflect a new 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.

<sup>c</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D. 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, 2017.

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: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Health or medical		Defense		Agriculture	
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount
All industries	21-23, 31-33, 42-81	19,514	339,036	4,107	i 78,495	2,004	i 11,036	1,388	i 5,270
Manufacturing industries	31-33	11,581	216,155	3,034	i 73,003	1,427	i 9,746	1,209	i 5,051
Food	311	554	4,453	i 74	i 389	i 0	0	108	i 1,467
Chemicals	325	1,730	63,285	977	54,299	107	i 215	222	i 1,417
Basic chemicals	3251	253	2,393	72	i 157	i 18	i 37	83	i 90
Pharmaceuticals and medicines	3254	755	55,229	717	53,868	15	101	17	290
Other chemicals	other 325	723	5,664	189	i 274	74	i 77	i 123	i 1,037
Plastics and rubber products	326	624	3,637	140	i 364	49	i 52	70	i 515
Nonmetallic mineral products	327	175	1,303	28	i 54	i 21	i 7	D	*
Fabricated metal products	332	1,168	2,099	212	i 78	278	i 175	217	i 36
Machinery	333	1,662	12,257	210	i 184	125	i 142	250	i 1,141
Agricultural implement	33311	181	1,511	D	*	3	1	151	i 1,042
Semiconductor machinery	333242	33	3,228	D	*	3	31	i D	0-82
Engine, turbine, and power transmission equipment	3336	97	1,921	24	i 44	34	i 27	18	i 19
Other machinery	other 333	1,352	5,596	180	i 139	85	i 84	D	0-82
Computer and electronic products	334	1,726	69,942	436	i 5,159	i 467	i 4,339	i 134	i 324
Semiconductor and other electronic components	3344	422	27,859	116	i 1,289	i 130	i 2,163	i 25	42
Other electronic products	other 334	1,304	42,083	320	i 3,870	i 336	i 2,176	110	i 282
Electrical equipment, appliances, and components	335	709	4,110	140	i 173	155	i 88	12	16
Transportation equipment	336	807	34,629	26	1,021	115	4,588	147	i 73
Automobiles, bodies, trailers, and parts	3361-63	367	21,137	8	350	12	23	7	15
Other transportation	other 336	441	13,492	18	i 671	103	i 4,565	140	i 57
Miscellaneous manufacturing	339	1,386	15,410	679	11,194	24	94	i 7	11
Other manufacturing	312-16, 321-24, 331, 337	1,050	5,029	111	i 88	85	i 47	D	51
Nonmanufacturing industries	21-23, 42-81	7,935	122,881	1,073	i 5,492	577	i 1,289	i 179	i 219
Mining, extraction, and support activities	21	104	2,841	D	*	0	0	4	6
Utilities	22	36	281	0	0	0	0	3	3
Wholesale trade	42	662	503	39	i 54	i 9	i 22	i 68	i 51
Information	51	2,486	78,898	246	i 1,256	121	402	i 14	25
Publishing	511	1,056	33,276	133	i 762	82	i 304	i 7	8
Telecommunications	517	101	3,643	0	0	9	30	D	2
Data processing, hosting, and related services	518	1,114	16,037	101	483	D	49	4	10
Other information	other 51	216	25,943	12	11	D	19	D	4
Professional, scientific, and technical services	54	3,679	18,972	681	i 3,139	440	i 848	i 80	109

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: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Health or medical		Defense		Agriculture	
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount
Architectural, engineering, and related services	5413	1,124	1,561	79	19	94	69	25	17
Scientific research and development services	5417	689	2,817	427	1,672	156	158	42	84
Biotechnology research and development	541711	160	795	145	709	7	12	22	67
Other scientific research and development	other 5417	529	2,022	282	964	149	146	20	17
Other professional, scientific, and technical services	other 54	1,865	14,594	175	1,447	189	620	13	8
Health care services	621-23	108	958	74	898	D	*	D	*
Other nonmanufacturing	23, 44-45, 48-49, 52-53, 55-56, 624, 71-72, 81	863	20,429	D	145	D	18	D	26
All companies (number of domestic employees)	-	19,514	339,036	4,107	78,495	2,004	11,036	1,388	5,270
Small companies									
10-19 <sup>c</sup>	-	3,283	2,402	698	760	399	128	148	30
20-49	-	6,001	7,593	1,199	2,612	585	258	387	148
Medium companies									
50-99	-	3,569	8,070	800	3,154	374	387	200	154
100-249	-	2,986	13,514	653	5,226	294	414	257	228
Large companies									
250-499	-	1,390	11,773	268	3,503	119	236	161	200
500-999	-	887	16,295	168	3,440	74	322	75	213
1,000-4,999	-	947	52,341	212	13,915	100	1,505	110	523
5,000-9,999	-	198	32,701	44	5,475	26	1,780	22	315
10,000-24,999	-	149	63,415	40	22,995	20	1,910	16	2,151
25,000 or more	-	105	130,931	24	17,416	13	4,096	10	1,309

\* = 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.

<sup>a</sup> Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not 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.

<sup>b</sup> Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not include an adjustment to the weight to account for unit nonresponse. These company count estimates reflect a new 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.

<sup>c</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D. 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, 2017.

TABLE 32

## Domestic R&amp;D paid for and performed by the company as a percentage of domestic net sales, by industry and company size: 2017

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
All industries	21–23, 31–33, 42–81	339,036	3.5	3.7
Manufacturing industries	31–33	216,155	4.0	4.0
Food	311	4,453	0.7	0.7
Beverage and tobacco products	312	968	0.6	0.6
Textile, apparel, and leather products	313–16	919	1.1	1.2
Wood products	321	170	0.6	0.6
Paper	322	1,292	0.8	0.8
Printing and related support activities	323	218	0.5	0.5
Petroleum and coal products	324	301	0.1	0.1
Chemicals	325	63,285	7.0	7.1
Basic chemicals	3251	2,393	1.5	1.5
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	612	1.4	1.4
Pesticide, fertilizer, and other agricultural chemicals	3253	1,092	1.6	1.6
Pharmaceuticals and medicines	3254	55,229	11.8	11.9
Soap, cleaning compound, and toilet preparation	3256	2,488	2.5	2.5
Paint, coating, adhesive, and other chemicals	3255, 3259	1,471	2.2	2.3
Plastics and rubber products	326	3,637	1.9	2.0
Nonmetallic mineral products	327	1,303	2.9	3.2
Primary metals	331	741	0.8	0.9
Fabricated metal products	332	2,099	1.9	1.9
Machinery	333	12,257	3.8	3.8
Agricultural implement	33311	1,511	3.2	3.3
Semiconductor machinery	333242	3,228	16.1	16.1
Engine, turbine, and power transmission equipment	3336	1,921	5.3	5.3
Other machinery	other 333	5,596	2.5	2.5
Computer and electronic products	334	69,942	10.0	10.0
Communications equipment	3342	10,972	12.4	12.4
Semiconductor and other electronic components	3344	27,859	16.2	16.2
Navigational, measuring, electromedical, and control instruments	3345	10,089	6.0	6.0
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	2,545	11.3	11.4
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,214	4.2	4.2
Other measuring and controlling device	other 3345	4,329	6.3	6.3

TABLE 32

## Domestic R&amp;D paid for and performed by the company as a percentage of domestic net sales, by industry and company size: 2017

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
Other computer and electronic products	other 334	21,022	7.8	7.8
Electrical equipment, appliances, and components	335	4,110	3.6	3.6
Transportation equipment	336	34,629	3.0	3.1
Automobiles, bodies, trailers, and parts	3361-63	21,137	2.8	3.0
Aerospace products and parts	3364	11,903	3.4	3.4
Aircraft, aircraft engine, and aircraft parts	336411-13	11,473	3.5	3.5
Guided missile, space vehicle, and related parts	336414-15, 336419	430	2.3	2.3
Military armored vehicle, tank, and tank component	336992	4	1.3	1.4
Other transportation	other 336	1,585	2.4	2.4
Furniture and related products	337	419	1.0	1.0
Miscellaneous manufacturing	339	15,410	4.0	4.0
Medical equipment and supplies	3391	13,348	4.3	4.3
Other miscellaneous manufacturing	3399	2,062	2.6	2.7
Nonmanufacturing industries	21-23, 42-81	122,881	2.9	3.1
Mining, extraction, and support activities	21	2,841	1.1	D
Utilities	22	281	0.1	0.1
Wholesale trade	42	503	0.3	0.3
Electronic shopping and electronic auctions	454111-12	9,318	6.8	6.8
Transportation and warehousing	48-49	1,116	0.6	D
Information	51	78,898	6.6	6.7
Publishing	511	33,276	14.3	14.4
Newspaper, periodical, book, and directory publishers	5111	74	3.4	4.0
Software publishers	5112	33,201	14.4	14.5
Telecommunications	517	3,643	0.7	0.7
Data processing, hosting, and related services	518	16,037	5.3	5.3
Other information	other 51	25,943	19.3	21.2
Finance and insurance	52	7,565	1.0	1.1
Real estate and rental and leasing	53	708	6.5	7.3
Lessors of nonfinancial intangible assets (except copyrighted works)	533	138	6.7	7.3
Other real estate and rental and leasing	other 53	570	6.5	7.4
Professional, scientific, and technical services	54	18,972	4.7	4.8
Architectural, engineering, and related services	5413	1,561	1.7	1.7

TABLE 32

**Domestic R&D paid for and performed by the company as a percentage of domestic net sales, by industry and company size: 2017**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
Computer systems design and related services	5415	11,669	7.7	7.7
Scientific research and development services	5417	2,817	4.1	4.1
Biotechnology research and development	541711	795	3.0	3.0
Physical, engineering, and life sciences (except biotechnology) research and development	541712	1,936	4.7	4.7
Social sciences and humanities research and development	541720	86	6.9	6.9
Other professional, scientific, and technical services	other 54	2,925	3.4	3.4
Health care services	621-23	958	i 0.8	0.8
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,722	0.3	0.4
All companies (number of domestic employees)	-	339,036	3.5	3.7
Small companies				
10-19 <sup>c</sup>	-	2,402	10.0	11.2
20-49	-	7,593	8.8	9.4
Medium companies				
50-99	-	8,070	6.9	7.2
100-249	-	13,514	5.2	5.4
Large companies				
250-499	-	11,773	4.2	4.3
500-999	-	16,295	4.4	4.6
1,000-4,999	-	52,341	4.2	4.3
5,000-9,999	-	32,701	3.5	3.6
10,000-24,999	-	63,415	3.4	3.5
25,000 or more	-	130,931	2.9	3.1

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

NAICS = 2012 North American Industry Classification System.

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

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

<sup>c</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D, unless indicated otherwise.

**Source(s)**

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2017.

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: 2017**  
(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
All industries	21-23, 31-33, 42-81	381,739	3.9	4.1
Manufacturing industries	31-33	255,339	4.7	4.8
Food	311	4,603	0.7	0.7
Beverage and tobacco products	312	1,186	0.8	0.8
Textile, apparel, and leather products	313-16	941	1.2	1.2
Wood products	321	179	0.6	0.7
Paper	322	1,334	0.8	0.8
Printing and related support activities	323	222	0.5	0.6
Petroleum and coal products	324	364	0.2	0.2
Chemicals	325	94,580	10.5	10.5
Basic chemicals	3251	2,469 - 2,483	D	D
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	629	1.4	1.5
Pesticide, fertilizer, and other agricultural chemicals	3253	1,208	1.7	1.8
Pharmaceuticals and medicines	3254	85,983	18.4	18.5
Soap, cleaning compound, and toilet preparation	3256	2,752	2.8	2.8
Paint, coating, adhesive, and other chemicals	3255, 3259	1,526 - 1,539	D	D
Plastics and rubber products	326	3,798	2.0	2.1
Nonmetallic mineral products	327	1,323	2.9	3.2
Primary metals	331	795	0.9	0.9
Fabricated metal products	332	2,190	2.0	2.0
Machinery	333	12,739	3.9	4.0
Agricultural implement	33311	1,687 - 1,705	D	D
Semiconductor machinery	333242	3,228 - 3,250	D	D
Engine, turbine, and power transmission equipment	3336	1,972 - 1,991	D	D
Other machinery	other 333	5,810 - 5,851	D	D
Computer and electronic products	334	71,828	10.3	10.3
Communications equipment	3342	11,726	13.2	13.3
Semiconductor and other electronic components	3344	28,254	16.4	16.4
Navigational, measuring, electromedical, and control instruments	3345	10,434	6.2	6.2
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	2,643	11.8	11.8
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,345 - 3,368	D	D
Other measuring and controlling device	other 3345	4,423 - 4,447	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: 2017**  
(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
Other computer and electronic products	other 334	21,414	8.0	8.0
Electrical equipment, appliances, and components	335	4,320	3.8	3.8
Transportation equipment	336	38,056	3.2	3.3
Automobiles, bodies, trailers, and parts	3361-63	23,851	3.2	3.3
Aerospace products and parts	3364	12,573	3.6	3.6
Aircraft, aircraft engine, and aircraft parts	336411-13	12,032	3.6	3.6
Guided missile, space vehicle, and related parts	336414-15, 336419	541	2.9	2.9
Military armored vehicle, tank, and tank component	336992	5	1.6	1.4
Other transportation	other 336	1,627	2.5	2.5
Furniture and related products	337	439	1.0	1.0
Miscellaneous manufacturing	339	16,444	4.2	4.3
Medical equipment and supplies	3391	14,257	4.6	4.6
Other miscellaneous manufacturing	3399	2,187	2.8	2.8
Nonmanufacturing industries	21-23, 42-81	126,400	3.0	3.2
Mining, extraction, and support activities	21	3,141	1.3	D
Utilities	22	481	0.1	0.1
Wholesale trade	42	611	0.3	0.3
Electronic shopping and electronic auctions	454111-12	9,320	6.8	6.8
Transportation and warehousing	48-49	1,161	0.6	D
Information	51	80,711	6.8	6.8
Publishing	511	34,363	14.8	14.8
Newspaper, periodical, book, and directory publishers	5111	84	3.9	4.5
Software publishers	5112	34,279	14.9	14.9
Telecommunications	517	3,880	0.7	0.7
Data processing, hosting, and related services	518	16,276	5.4	5.4
Other information	other 51	26,193	19.5	21.2
Finance and insurance	52	7,927	1.1	1.1
Real estate and rental and leasing	53	712	6.6	7.4
Lessors of nonfinancial intangible assets (except copyrighted works)	533	141	6.8	7.4
Other real estate and rental and leasing	other 53	571	6.5	7.4
Professional, scientific, and technical services	54	19,529	4.9	4.9
Architectural, engineering, and related services	5413	1,646	1.8	1.8

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: 2017**  
(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
Computer systems design and related services	5415	11,789	7.7	7.8
Scientific research and development services	5417	3,150	4.6	4.6
Biotechnology research and development	541711	912	3.4	3.4
Physical, engineering, and life sciences (except biotechnology) research and development	541712	2,151	5.2	5.2
Social sciences and humanities research and development	541720	86	6.9	6.9
Other professional, scientific, and technical services	other 54	2,945	3.4	3.4
Health care services	621-23	991	0.9	D
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,815	0.3	0.4
All companies (number of domestic employees)	-	381,739	3.9	4.1
Small companies				
10-19 <sup>c</sup>	-	2,852	11.8	13.1
20-49	-	8,838	10.3	10.8
Medium companies				
50-99	-	9,538	8.2	8.4
100-249	-	16,561	6.4	6.6
Large companies				
250-499	-	12,962	4.6	4.8
500-999	-	18,532	5.0	5.2
1,000-4,999	-	60,698	4.9	5.0
5,000-9,999	-	35,915	3.8	3.9
10,000-24,999	-	75,231	4.1	4.2
25,000 or more	-	140,612	3.1	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.

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

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

<sup>c</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D, unless indicated otherwise. 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, 2017.

TABLE 34

## Domestic R&amp;D paid for by others and performed by the company, by type of cost, industry, and company size: 2017

(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	61,065	36,047	591	1,879	375	6,341	1,113	1,578	332	2,825	9,986
Manufacturing industries	31-33	41,072	24,363	435	1,127	226	5,076	657	1,055	304	1,200	6,627
Food	311	244	136	1	10	*	16	16	10	0	26	31
Beverage and tobacco products	312	107	67	0	3	0	8	4	9	0	9	7
Textile, apparel, and leather products	313-16	1	1	*	*	0	*	*	*	0	*	*
Wood products	321	5	3	*	*	*	1	*	*	0	*	1
Paper	322	29	11	*	3	*	10	*	1	0	1	3
Printing and related support activities	323	11	9	*	1	*	1	*	*	*	*	1
Petroleum and coal products	324	15	10	0	0-5	*	1	0-5	0-5	0	0	0-5
Chemicals	325	11,692	5,816	386	478	64	612	347	551	20	659	2,759
Basic chemicals	3251	181	121	0	0-16	6	12	5	10	*	14	0-16
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	16	7	*	0-9	*	1	*	1	*	*	0-9
Pesticide, fertilizer, and other agricultural chemicals	3253	284-383	146-174	*	68-119	*	0-19	4	0-25	*	*	0-88
Pharmaceuticals and medicines	3254	10,973	5,430	386	352	57	578	330	510	20	640	2,672
Soap, cleaning compound, and toilet preparation	3256	118-213	87	*	8	*	5	8	8	*	4	0-88
Paint, coating, adhesive, and other chemicals	3255, 3259	23	0-23	0	0-23	1	0-19	*	0-23	0	*	0-23
Plastics and rubber products	326	117	34	0	*	3	70	*	1	0	3	5
Nonmetallic mineral products	327	30	16	0	0	0	2	0	*	0	0	12
Primary metals	331	8	5	0	*	*	3	*	*	*	*	*
Fabricated metal products	332	107	60	0	*	2	35	*	*	*	0	9
Machinery	333	940	672	2	24	4	131	7	44	1	4	51
Agricultural implement	33311	59	43	0	2	*	5	*	4	0	0	5
Semiconductor machinery	333242	465	374	*	2	*	38	0	35	0	2	14
Engine, turbine, and power transmission equipment	3336	159	104	*	*	2	37	1	*	0	1	14
Other machinery	other 333	257	151	2	20	2	52	6	5	1	2	17
Computer and electronic products	334	8,633	6,067	46	306	60	726	114	222	268	97	727

TABLE 34

## Domestic R&amp;D paid for by others and performed by the company, by type of cost, industry, and company size: 2017

(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	1,715	1,348	4	34	11	141	57	31	19	11	58
Semiconductor and other electronic components	3344	2,289	1,530	31	53	21	91	42	117	7	56	341
Navigational, measuring, electromedical, and control instruments	3345	4,420	3,031	12	201	22	486	12	65	241	27	323
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	150	96	0	15	1	12	1	2	*	*	23
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	4,083	2,829	0 - 12	175	0 - 22	451	11	58	196 - 242	0 - 27	255 - 301
Other measuring and controlling device	other 3345	187	106	0 - 12	11	0 - 22	22	1	6	0 - 44	0 - 27	0 - 44
Other computer and electronic products	other 334	209	157	0	19	6	9	2	8	*	3	6
Electrical equipment, appliances, and components	335	181	101	0	1	2	16	1	16	1	1	43
Transportation equipment	336	18,663	11,176	*	293	87	3,414	167	196	14	394	2,921
Automobiles, bodies, trailers, and parts	3361-63	2,745	1,278	*	142	46	622	81	100	12	85	378
Aerospace products and parts	3364	14,480	9,200	0	109 - 126	30	2,356	56 - 87	36 - 97	*	277	2,312 - 2,417
Aircraft, aircraft engine, and aircraft parts	336411-13	13,103	8,430	0	110	29	1,882	55 - 87	34 - 97	*	277	2,188 - 2,287
Guided missile, space vehicle, and related parts	336414-15, 336419	1,377	771	0	0 - 16	1	474	*	0 - 3	0	*	112 - 133
Military armored vehicle, tank, and tank component	336992	5	0 - 6	0	0 - 5	*	0 - 5	*	0 - 1	0	0	0 - 5
Other transportation	other 336	1,433	691 - 699	0	19 - 42	11	429 - 438	0 - 29	0 - 59	2	33	120 - 231
Furniture and related products	337	3	2	0	*	*	*	*	*	*	*	1
Miscellaneous	339	285	178	0	7 - 13	3	31	0 - 5	2 - 9	0	5	47 - 57

TABLE 34

## Domestic R&amp;D paid for by others and performed by the company, by type of cost, industry, and company size: 2017

(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
Medical equipment and supplies	3391	240	147	0	8	3	25	1	3	0	5	48
Other miscellaneous manufacturing	3399	44	31	0	0-5	0	6	0-5	0-7	0	*	0-9
Nonmanufacturing industries	21-23, 42-81	19,993	11,683	155	752	148	1,265	456	522	28	1,625	i 3,359
Mining, extraction, and support activities	21	309	196	0	12	*	15	12	7	1	*	67
Utilities	22	36	i 14	i *	i 2	i *	i 9	i *	0	0	0	10
Wholesale trade	42	31	21	0	*	1	1	i *	*	i *	0	7
Electronic shopping and electronic auctions	454111-12	0	0	0	0	0	0	0	0	0	0	0
Transportation and warehousing	48-49	31	31	0	0	*	0	0	*	0	0	0
Information	51	1,354	1,116	39	35	5	17	16	14	2	30	80
Publishing	511	1,062	902	3-39	18	5	11	9	8	*	24	44-81
Newspaper, periodical, book, and directory publishers	5111	0	0	0	0	0	0	0	0	0	0	0
Software publishers	5112	1,062	902	3-39	18	5	11	9	8	*	24	44-81
Telecommunications	517	40-163	0-106	0	11	i *	1	0-8	1	1	i 0-7	0-36
Data processing, hosting, and related services	518	119	110	0-7	3	*	*	*	*	*	1	0-7
Other information	other 51	11-134	0-106	0-36	3	0	5	0-8	5	0	0-7	0-36
Finance and insurance	52	51	51	0	0	0	0	0	0	0	0	0
Real estate and rental and leasing	53	10	7	1	*	*	*	*	0	0	0	1
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	10	7	1	*	*	*	*	0	0	0	1
Professional, scientific, and technical services	54	17,951	10,100	114	700	138	1,205	414	499	24	1,584	i 3,171
Architectural, engineering, and related services	5413	1,147	714	1	40	9	106	23	9	*	48	198

TABLE 34

## Domestic R&amp;D paid for by others and performed by the company, by type of cost, industry, and company size: 2017

(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 systems design and related services	5415	1,658	1,001	*	80	3	35	15	9	3	16	495
Scientific research and development services	5417	14,504	7,949	112	513	114	1,043	359	473	21	1,507	2,412
Biotechnology research and development	541711	3,653	1,869	32	143	3	290	66	129	14	789	319
Physical, engineering, and life sciences (except biotechnology) research and development	541712	9,978	5,463	54	355	96	747	268	333	7	718	1,937
Social sciences and humanities research and development	541720	873	618	26	16	15	5	25	12	*	*	156
Other professional, scientific, and technical services	other 54	641	437	*	67	12	22	18	8	*	12	66
Health care services	621-23	144	93	2	*	3	13	8	1	1	10	13
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	76	53	0	2	*	5	4	1	0	1	10
All companies (number of domestic employees)	-	61,065	36,047	591	1,879	375	6,341	1,113	1,578	332	2,825	9,986
Small companies												
10-19 <sup>a</sup>	-	909	552	6	36	5	85	21	9	0-33	12	146-187
20-49	-	1,842	1,032	6	55	15	186	86	40	16	50	355
Medium companies												
50-99	-	2,071	1,208	36	143	14	174	75	48	6	52	314
100-249	-	3,703	2,143	61	132	21	344	124	67	7	142	662
Large companies												
250-499	-	2,331	1,514	11	101	31	145	60	52	7	65	345
500-999	-	1,576	1,010	23	56	42	129	30	56	4	42	185
1,000-4,999	-	12,771	6,596	282	506	83	1,196	284	527	17	920	2,361
5,000-9,999	-	7,497	4,435	71	300	72	350	107	264	4	598	1,296
10,000-24,999	-	10,070	6,115	90	229	29	1,490	171	274	25	426	1,220

TABLE 34

**Domestic R&D paid for by others and performed by the company, by type of cost, industry, and company size: 2017**

(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	
25,000 or more	-	18,295	i	11,441	i	4	321	63	i	2,242	i	156	i	240	209 - 250	516	i	3,058 - 3,105	i

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

TABLE 35

## Domestic R&amp;D paid for by others and performed by the company, by industry and company size: 2017

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)												
		All companies	10-19 <sup>a</sup>	20-49	50-99	100-249	250-499	500-599	1,000-4,999	5,000-9,999	10,000-24,999	25,000 or more		
All industries	21-23, 31-33, 42-81	61,065	909	1,842	2,071	3,703	2,331	1,576	12,771	7,497	10,070	18,295	i	
Manufacturing industries	31-33	41,072	197	644	625	1,394	1,076	1,190	9,411	2,045	9,080	15,409	i	
Food	311	244	0	0-53	*	86	5	3	87	0-69	3	2		
Beverage and tobacco products	312	107	0	*	0	0	107	0	0	*	0	0		
Textile, apparel, and leather products	313-16	1	0	0	*	1	0	0	0	0	0	0		
Wood products	321	5	0	0	0	0	1	i	5	*	0	0		
Paper	322	29	0	*	0	0-18	0	0	1	0	0	0-31		
Printing and related support activities	323	11	0	1	*	0	1	9	0	0	0	0		
Petroleum and coal products	324	15	0	0	0	0-16	0	0	0-16	0	2-18	0		
Chemicals	325	11,692	0-146	264	325	522	198	297	5,137	402-1,074	4,056	i	70-108	
Basic chemicals	3251	181	0-105	0-13	1	0-11	4	13	65-197	4	1	0		
Resin, synthetic rubber, fibers, and artificial synthetic fibers and filaments	3252	16	*	1	*	1	0	11	0	0	1	0		
Pesticide, fertilizer, and other agricultural chemicals	3253	284-383	0	0-13	0	1	0	0	287-418	0	0-131	i	0	
Pharmaceuticals and medicines	3254	10,973	0-146	251	324	511	191	272	4,651	341-1,070	3,897	i	69-108	
Soap, cleaning compound, and toilet preparation	3256	118-213	0	1	0	1	0	0	0	0	0-159	0		
Paint, coating, adhesive, and other chemicals	3255, 3259	23	*	0-13	*	0-11	3	i	0	1	0-57	0-57	*	
Plastics and rubber products	326	117	*	9	3	22	6	19	55	0	2	1		
Nonmetallic mineral products	327	30	i	0-7	0-10	i	5	5	3	0	10	i	0	
Primary metals	331	8	0	0-9	i	2	*	1	0	*	1	0-9	0	
Fabricated metal products	332	107	0-51	0-51	0-22	48	6	*	9	1	0	0		
Machinery	333	940	0-146	62	41	81	59	48	524	0-160	i	3	1	
Agricultural implement	33311	59	i	0	*	i	0-42	0-53	0	0	9	0-53	i	0
Semiconductor machinery	333242	465	0	*	*	0-81	*	0	293-487	0	0	0	0	

TABLE 35

## Domestic R&amp;D paid for by others and performed by the company, by industry and company size: 2017

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10-19 <sup>a</sup>	20-49	50-99	100-249	250-499	500-599	1,000-4,999	5,000-9,999	10,000-24,999	25,000 or more
Engine, turbine, and power transmission equipment	3336	159	0-146	4	0	1	0-60	0	0-166	0-160	0	*
Other machinery	other 333	257	0-146	58	0-42	0-81	0-60	48	0-175	0	3	0
Computer and electronic products	334	8,633	47-193	176	84	429	348	584	1,941	20-405	1,965	2,824
Communications equipment	3342	1,715	i 0	*	0-14	63	0-129	0-92	575	i 0	494-1,091	i 0
Semiconductor and other electronic components	3344	2,289	13	115	35	253	211	489	918	21	234	0
Navigational, measuring, electromedical, and control instruments	3345	4,420	34-181	60	37	110	9-138	4-96	329	0-385	543-1,141	2,824
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	150	35	7	4	48	10	5	35	0	6	0
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	4,083	0-146	40	0-34	0-63	0-129	0	111-295	0-385	537-1,135	2,824
Other measuring and controlling device	other 3345	187	0-146	13	0-34	0-63	0-129	0-92	0-182	0	0	0
Other computer and electronic products	other 334	209	*	1	0-14	3	0-96	0-92	119	0	0-96	0
Electrical equipment, appliances, and components	335	181	*	36	83	5	4	6	46	0	0	0
Transportation equipment	336	18,663	i 5	2	53	167	309	177	1,522	951	3,017	12,459
Automobiles, bodies, trailers, and parts	3361-63	2,745	*	1	0-53	0-65	308	100	1,427	171	i 538	84-327
Aerospace products and parts	3364	14,480	i 5	1	0-53	103	0	0-78	i 95	777	2,478	10,939
Aircraft, aircraft engine, and aircraft parts	336411-13	13,103	i *	*	0-53	103	0	0-78	i 69	101	1,836	10,939
Guided missile, space vehicle, and related parts	336414-15, 336419	1,377	4	1	0-32	0	0	0-32	26	i 675	642	0
Military armored vehicle, tank, and tank components	336992	5	0	0	1	0-5	0-2	0	0	0	0	0
Other transportation	other 336	1,433	0	0	0	0-65	0-2	0-78	0	3	0	1,192-1,435
Furniture and related products	337	3	0	2	1	*	0	0	0	0	0	0
Miscellaneous manufacturing	339	285	0-83	39	10-33	15-34	29	43	64-85	0-53	i 20	18
Medical equipment and supplies	3391	240	0-53	39	11	16	20	36	65	0-53	i 20	18
Other miscellaneous manufacturing	3399	44	0-32	*	0-22	0-18	9	7	0-20	0	0	0



TABLE 35

## Domestic R&amp;D paid for by others and performed by the company, by industry and company size: 2017

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10–19 <sup>a</sup>	20–49	50–99	100–249	250–499	500–599	1,000–4,999	5,000–9,999	10,000–24,999	25,000 or more
Nonmanufacturing industries	21–23, 42–81	19,993	712	1,198	1,447	2,308	1,255	386	3,360	5,452	990	2,886
Mining, extraction, and support activities	21	309	*	1	9	0	0	0	3	0	295	0
Utilities	22	36	i	0	4	0	0	0	0	1	* i	32 i
Wholesale trade	42	31		2 i	5	1 i	12	10	0	0	0	0
Electronic shopping and electronic auctions	454111–12	0	0	0	0	0	0	0	0	0	0	0
Transportation and warehousing	48–49	31	*	0	0	0	0	28	1	0	1	0
Information	51	1,354	54 - 66	86	39	159	48	30	74 - 113	17	586	242
Publishing	511	1,062	55	29	21	12	15	27	75	0	586	242
Newspaper, periodical, book, and directory publishers	5111	0	0	0	0	0	0	0	0	0	0	0
Software publishers	5112	1,062	55	29	21	12	15	27	75	0	586	242
Telecommunications	517	40 - 163	0	43	0 - 19	0 - 123	1	0	0 - 39	0	0	0
Data processing, hosting, and related services	518	119	0 - 12	14	0 - 19	0 - 59	32	1	0	17	0	0
Other information	other 51	11 - 134	0	0	0	0 - 134	0	1	0 - 39	0	0	0
Finance and insurance	52	51	0	0	0	*	0	0	0	0	0	51
Real estate and rental and leasing	53	10	0	0	0	0	0	0	10	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	10	0	0	0	0	0	0	10	0	0	0
Professional, scientific, and technical services	54	17,951	642	1,087	1,359	2,127	1,164	285	3,231	5,390	106	2,559
Architectural, engineering, and related services	5413	1,147	88	73	171	233	109	43	1	0	42	387
Computer systems design and related services	5415	1,658	91	94	326	175	33	2	506	2	63	365
Scientific research and development services	5417	14,504	423	826	745	1,623	827	179	2,690	5,385	1	1,805
Biotechnology research and development	541711	3,653	86	152	145	53	137	0	1,275	0	0	1,805
Physical, engineering, and life sciences (except biotechnology) research and development	541712	9,978	334	663	597	1,543	690	179	1,144	4,827	1	0
Social sciences and humanities research and development	541720	873	4	10	3	28	0	0	270	558	0	0
Other professional, scientific, and technical services	other 54	641	39	94	117	96	195	62	34	3	0	2
Health care services	621–23	144	4	3	35	8	31	39	5	17	0	1
Other nonmanufacturing	23, 44–45 (excluding 454111–12),	76	0 - 12	13	4	2	3	3	0 - 39	27	0	0

TABLE 35

**Domestic R&D paid for by others and performed by the company, by industry and company size: 2017**

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)													
		All companies	10-19 <sup>a</sup>	20-49	50-99	100-249	250-499	500-599	1,000-4,999	5,000-9,999	10,000-24,999	25,000 or more			
	55-56, 624, 71-72, 81														

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

TABLE 36

## Domestic R&amp;D paid for by others and performed by the company, by type of R&amp;D, industry, and company size: 2017

(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	61,065	6,097	12,984	41,984
Manufacturing industries	31-33	41,072	4,608	7,040	29,425
Food	311	244	14	79	151
Beverage and tobacco products	312	107	11	21	75
Textile, apparel, and leather products	313-16	1	*	1	1
Wood products	321	5	*	1	4
Printing and related support activities	323	11	1	*	10
Chemicals	325	11,692	2,717	1,735	7,241
Pharmaceuticals and medicines	3254	10,973	2,594	1,383	6,997
Other chemicals	other 325	719	123	352	244
Plastics and rubber products	326	117	*	1	115
Nonmetallic mineral products	327	30	i 3	7	21
Primary metals	331	8	1	1	7
Fabricated metal products	332	107	2	14	91
Machinery	333	940	29	83	828
Computer and electronic products	334	8,633	519	i 1,376	6,737
Semiconductor and other electronic components	3344	2,289	85	443	1,761
Navigational, measuring, electromedical, and control instruments	3345	4,420	118	519	3,783
Other computer and electronic products	other 334	1,924	i 317	i 414	i 1,193
Electrical equipment, appliances, and components	335	181	*	22	159
Transportation equipment	336	18,663	i 1,292	i 3,664	13,707
Aerospace products and parts	3364	14,480	i 1,135	i 1,936	11,409
Other transportation equipment	other 336	4,183	157	1,728	2,297
Furniture and related products	337	3	0	*	3
Miscellaneous manufacturing	322, 324, 339	329	18	34	277
Nonmanufacturing industries	21-23, 42-81	19,993	1,489	5,944	12,560
Information	51	1,354	170	336	847
Publishing	511	1,062	88	268	706
Telecommunications	517	40 - 163	0 - 79	0 - 57	0 - 39
Data processing, hosting, and related services	518	119	4	12	103
Other information	other 51	11 - 134	0 - 79	0 - 57	0 - 39
Professional, scientific, and technical services	54	17,951	1,239	5,462	11,250
Architectural, engineering, and related services	5413	1,147	70	607	470
Computer systems design and related services	5415	1,658	139	435	1,084
Scientific research and development services	5417	14,504	974	4,277	9,253
Biotechnology research and development	541711	3,653	424	134	3,096
Physical, engineering, and life sciences (except biotechnology) research and development	541712	9,978	481	3,555	5,942
Social sciences and humanities research and development	541720	873	69	i 589	215
Other professional, scientific, and technical services	other 54	641	56	142	443
Other nonmanufacturing	21-23, 42-49, 52, 53, 55-81	688	80	i 146	463
All companies (number of domestic employees)	-	61,065	6,097	12,984	41,984
Small companies					
10-19 <sup>a</sup>	-	909	69	183	657
20-49	-	1,842	151	420	1,270
Medium companies					
50-99	-	2,071	161	567	1,343
100-249	-	3,703	502	1,128	2,072

TABLE 36

**Domestic R&D paid for by others and performed by the company, by type of R&D, industry, and company size: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
Large companies					
250–499	–	2,331	128	377	1,825
500–999	–	1,576	115	235	1,226
1,000–4,999	–	12,771	2,100	3,601	7,070
5,000–9,999	–	7,497	222	1,973	5,302
10,000–24,999	–	10,070	1,153	1,836	7,081
25,000 or more	–	18,295	i 1,496	i 2,664	i 14,135

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

TABLE 37

## Domestic R&amp;D paid for by others and performed by the company, by source of funds, industry, and company size: 2017

(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	61,065	17,494	15,426	2,978	24,277	i	121		7	70	i	24	i	521	i	147			
Manufacturing industries	31-33	41,072	6,229	13,315	2,119	18,889	i	27		3	50	i	22	i	293	i	126			
Food	311	244	6	i	232	4		1		0	0		0		1		0			
Beverage and tobacco products	312	107	*		107	*		0		0	0		0		0		0			
Textile, apparel, and leather products	313-16	1	1		0	*	i	*	i	0	0		0		0		0			
Wood products	321	5	*	i	5	*	i	*	i	0	0		0		0		0			
Paper	322	29	28		1	*	i	*	i	*	i		0		0		*	i		
Printing and related support activities	323	11	2	i	8	1	i	0-2	i	*	i		0		0-2	i	0-2	i		
Petroleum and coal products	324	15	4		10	0		0		0	0		0		0		0			
Chemicals	325	11,692	2,696		7,115	1,592		205		0-26	0-4		3		0-23		0-26	31-60		
Basic chemicals	3251	181	6		129-169	0-39		6		0	0		0		0		*	i	0	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	16	2		13	*	i	*	i	0	0		0		0		0		*	i
Pesticide, fertilizer, and other agricultural chemicals	3253	284-383	0-5	i	231-383	0-39	i	0-14		*	i		0		0-4	i	0-4	i		
Pharmaceuticals and medicines	3254	10,973	2,685		6,465	1,554		186		0-25	0-4		3		0-23		0-25	31-60		
Soap, cleaning compound, and toilet preparation	3256	118-213	1	i	111-212	*	i	*	i	*	i		0		*	i	0-4	i		
Paint, coating, adhesive, and other chemicals	3255, 3259	23	0-5		0-24	*	i	0-14		0	0		0		0-4		0			
Plastics and rubber products	326	117	102		11	*		1		0	0		0		3		0			
Nonmetallic mineral products	327	30	i	15	i	0-14		0-14	i	2	i	0-14	i		0		*	i	0-14	i
Primary metals	331	8	0-4	i	0-2	i		*	i	5	i	0		0	0-2		0-4	i	0-2	i
Fabricated metal products	332	107	37	i	4	*	i	59	i	0	0		0-9	i	0		0-9	i	*	i

TABLE 37

## Domestic R&amp;D paid for by others and performed by the company, by source of funds, industry, and company size: 2017

(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													
Machinery	333	940	130	i	621	19	i	170	1	i	0	*	0	0	*	i			
Agricultural implement	33311	59	i	*	50	6	i	3	0	0	0	0	0	0	0	0			
Semiconductor machinery	333242	465	4	i	449	5	i	7	0	0	0	0	0	0	0	0			
Engine, turbine, and power transmission equipment	3336	159	0 - 76		9	*	i	75 - 151	0	0	0	0	0	0	0	0			
Other machinery	other 333	257	49 - 127	i	113	8		7 - 86	i	1	i	0	*	0	0	*	i		
Computer and electronic products	334	8,633	1,043 - 1,358		2,889	326 - 352		3,937	0 - 27		0 - 4	0 - 48	i	0 - 23	i	7 - 290	39 - 94		
Communications equipment	3342	1,715	i	0 - 283	i	628		805	i	0		0 - 4	0	0	0	0 - 283	i	*	i
Semiconductor and other electronic components	3344	2,289	218		1,754	214		80	*		0	*	0 - 23	i	1	0 - 24			
Navigational, measuring, electromedical, and control instruments	3345	4,420	826		418	109		2,963	0 - 27		0	0 - 48	i	*	6 - 91	14 - 79			
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	150	18		92	6		27	0		0	0	0	0	7	0			
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	4,083	697 - 809		193 - 327	0 - 104		2,880	0 - 27		0	0 - 48	i	*	0 - 84	14 - 79			
Other measuring and controlling device	other 3345	187	0 - 110		0 - 132	0 - 104		56	0		0	0	0	0	0	0	0		
Other computer and electronic products	other 334	209	0 - 32		89	0 - 30		89	*		0	0	0	0	1	0			
Electrical equipment, appliances, and components	335	181	65		77	*	i	38	0		0	0	0	0	1	i	0		
Transportation equipment	336	18,663	i	1,701 - 2,013	i	2,073		146	14,433	i	0 - 27	0 - 4	i	0 - 48	0	0 - 283	i	0 - 55	i
Automobiles, bodies, trailers, and parts	3361-63	2,745	0 - 804		0 - 2,074	0 - 147		0 - 2,745	0 - 27		0 - 4	0	0	0	0 - 283	0 - 55			
Aerospace products and parts	3364	14,480	i	1,209	i	0 - 2,012		0 - 147	11,259 - 13,070	i	0	0 - 4	i	0 - 48	0	0 - 283	i	0 - 55	i
Aircraft, aircraft engine, and aircraft parts	336411-13	13,103	i	1,185 - 1,210	i	0 - 2,012		0 - 147	9,905 - 11,715	i	0	0 - 4	i	0 - 48	0	0 - 283	i	0 - 55	i

TABLE 37

## Domestic R&amp;D paid for by others and performed by the company, by source of funds, industry, and company size: 2017

(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
Guided missile, space vehicle, and related parts	336414-15, 336419	1,377	0 - 23	0	*	1,355	0	0	0 - 23	0	0	0
Military armored vehicle, tank, and tank component	336992	5	0 - 4	0	0	2	0 - 4	0	0	0	0	0
Other transportation	other 336	1,433	0 - 804	0 - 1,434	0 - 147	i 0 - 1,434	0	0	0	0	0	0
Furniture and related products	337	3	2	*	*	i 1	i 0	0	0	0	0	* i
Miscellaneous	339	285	63 - 103	138 - 169	9	27 - 42	0 - 27	0	0	0	*	i 0
Medical equipment and supplies	3391	240	64	132	8	7 - 38	0 - 27	0	0	0	*	i 0
Other miscellaneous manufacturing	3399	44	0 - 38	6 - 37	1	i 0 - 35	*	i 0	0	0	0	0
Nonmanufacturing industries	21-23, 42-81	19,993	11,265	i 2,111	859	5,388	95	4	19	2	228	21 i
Mining, extraction, and support activities	21	309	89	6	213	0	0	0	0	0	0	0
Utilities	22	36	i 4	4	0	27	i *	i 0	0	0	1	*
Wholesale trade	42	31	8	i 22	i 1	i 0	0	0	0	0	*	i 0
Electronic shopping and electronic auctions	454111-12	0	0	0	0	0	0	0	0	0	0	0
Transportation and warehousing	48-49	31	30	0	0	0	1	0	0	0	0	0
Information	51	1,354	117	1,047	91	98	0	0	0	0	0	1
Publishing	511	1,062	66	843	90	62	0	0	0	0	0	1
Newspaper, periodical, book, and directory publishers	5111	0	0	0	0	0	0	0	0	0	0	0
Software publishers	5112	1,062	66	843	90	62	0	0	0	0	0	1
Telecommunications	517	40 - 163	0 - 17	21 - 158	0	0 - 3	i 0	0	0	0	0	0
Data processing, hosting, and related services	518	119	36	48	*	35	0	0	0	0	0	0
Other information	other 51	11 - 134	0 - 17	0 - 134	*	i 0 - 3	i 0	0	0	0	0	* i





TABLE 37

**Domestic R&D paid for by others and performed by the company, by source of funds, industry, and company size: 2017**

(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			
10-19 <sup>a</sup>	-	909	0 - 286 i	59	0 - 54	485	25	2	3	*	i	0 - 286	0 - 54		
20-49	-	1,842	632	434	97	605	15	1	3	21	i	30	5		
Medium companies															
50-99	-	2,071	668	494	105	659	6	1	2	1		89	47		
100-249	-	3,703	866	1,426	98	1,241	14	*	15	1		28	15 i		
Large companies															
250-499	-	2,331	834	668	195	592	20	1	0 - 21	*		0 - 21	3		
500-999	-	1,576	311	795	243	221	1	*	2	1		1 i	1 i		
1,000-4,999	-	12,771	2,724	7,446	1,085	1,461	30	2	*	i	*	18	6		
5,000-9,999	-	7,497	4,938 i	909	102	1,525	8	0	0 - 17	*		0 - 17	* i		
10,000-24,999	-	10,070	2,627 i	2,987	930	3,514	*	0	2	0		9	0		
25,000 or more	-	18,295 i	3,603 - 3,899	209	64 - 127	13,976	i	3	1	i	1 - 46	i	0	21 - 350 i	12 - 74

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Business 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

TABLE 38

## Companies with domestic R&amp;D paid for by others and performed by the company in energy and environmental protection application areas, by industry and company size: 2017

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Energy		Environmental protection	
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount
All industries	21-23, 31-33, 42-81	3,180	61,065	520	2,333	207	949
Manufacturing industries	31-33	1,603	41,072	279	1,506	118	325
Food	311	35	244	D	1	3	14
Chemicals	325	357	11,692	14	46	10	41
Basic chemicals	3251	37	181	8	11 i	6	38
Pharmaceuticals and medicines	3254	277	10,973	D	0 - 36	D	2
Other chemicals	other 325	43	538	D	0 - 36	D	1 i
Plastics and rubber products	326	60	117	86	8 i	3 i	* i
Nonmetallic mineral products	327	33	30 i	D	5 i	D	6 i
Fabricated metal products	332	135	107	34	2	35	2
Machinery	333	224	940	15	105	11	38
Agricultural implement	33311	7	59 i	D	2	0	0
Semiconductor machinery	333242	12	465	D	0 - 25	D	0 - 21
Engine, turbine, and power transmission equipment	3336	32	159	4	80	3	18
Other machinery	other 333	173	257	D	0 - 25	D	0 - 21
Computer and electronic products	334	313	8,633	62 i	854	25 i	129
Semiconductor and other electronic components	3344	121	2,289	32 i	254 i	D	* i
Other electronic products	other 334	192	6,344	30 i	599	D	129
Electrical equipment, appliances, and components	335	67	181	25 i	54	3	4
Transportation equipment	336	161	18,663 i	29	417	20	89
Automobiles, bodies, trailers, and parts	3361-63	88	2,745	19	260	D	89
Other transportation	other 336	73	15,918 i	10	157 i	D	*
Miscellaneous manufacturing	339	156	285	7 i	8 i	D	2 i
Other manufacturing	312-16, 321-24, 331, 337	63	181	D	6	3	1
Nonmanufacturing industries	21-23, 42-81	1,578	19,993	241	827 i	89	624
Mining, extraction, and support activities	21	36	309	5	280 i	3	14
Utilities	22	5	36 i	4	32 i	D	29 i
Wholesale trade	42	65	31	0	0	0	0
Information	51	170	1,354	D	157	D	2
Publishing	511	97	1,062	D	157	D	2
Telecommunications	517	D	40 - 163	0	0	0	0
Data processing, hosting, and related services	518	62	119	0	0	0	0
Other information	other 51	D	11 - 134	0	0	0	0
Professional, scientific, and technical services	54	1,154	17,951	228	357 i	78	553

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: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Energy		Environmental protection				
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount			
Architectural, engineering, and related services	5413	273	1,147	72	i	170	i	28	i	488
Scientific research and development services	5417	617	14,504	127	i	168		40		46
Biotechnology research and development	541711	111	3,653	D		2		3		2
Other scientific research and development	other 5417	507	10,851	D		167		37		44
Other professional, scientific, and technical services	other 54	264	2,299	29		18		10		19
Health care services	621-23	86	144	0		0		0		0
Other nonmanufacturing	23, 44-45, 48-49, 52-53, 55-56, 624, 71-72, 81	61	169	D		1		5		26
All companies (number of domestic employees)	-	3,180	61,065	520		2,333		207		949
Small companies										
10-19 <sup>c</sup>	-	742	909	81	i	60		34		63
20-49	-	935	1,842	152	i	113		44	i	54
Medium companies										
50-99	-	533	2,071	83		79		50		36
100-249	-	399	3,703	46		94		20		40
Large companies										
250-499	-	190	2,331	74		57		13		32
500-999	-	111	1,576	15		16		8		18
1,000-4,999	-	145	12,771	27		306	i	15		82
5,000-9,999	-	36	7,497	9		76		4		23
10,000-24,999	-	53	10,070	21		527	i	11		49
25,000 or more	-	36	18,295	i	13	1,004		8		552

\* = 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.

<sup>a</sup> Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not 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.

<sup>b</sup> Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not include an adjustment to the weight to account for unit nonresponse. These company count estimates reflect a new 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.

<sup>c</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D. 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, 2017.

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: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Health or medical		Defense		Agriculture		
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	
All industries	21-23, 31-33, 42-81	3,180	61,065	947	22,171	914	20,054	i	210	516
Manufacturing industries	31-33	1,603	41,072	448	10,955	244	15,518	i	78	399
Food	311	35	244	3	55	0	0		5	49
Chemicals	325	357	11,692	244	10,252	i	23	80	8	286
Basic chemicals	3251	37	181	D	2		D	3	D	0 - 181
Pharmaceuticals and medicines	3254	277	10,973	237	10,249	i	17	69	D	50
Other chemicals	other 325	43	538	D	1	i	D	8	i	D
Plastics and rubber products	326	60	117	15	25	i	11	i	1	i
Nonmetallic mineral products	327	33	30	i	D	1	i	3	4	0
Fabricated metal products	332	135	107	5	1	i	7	31	D	0 - 19
Machinery	333	224	940	7	6	i	10	141	D	0 - 19
Agricultural implement	33311	7	59	i	0	0	0	0	D	0 - 19
Semiconductor machinery	333242	12	465	D	1		0	0	0	0
Engine, turbine, and power transmission equipment	3336	32	159		0	0	4	138	D	*
Other machinery	other 333	173	257	D	5	i	6	3	i	D
Computer and electronic products	334	313	8,633	53	274	i	97	2,301	11	41
Semiconductor and other electronic components	3344	121	2,289	24	144	i	26	108	4	12
Other electronic products	other 334	192	6,344	30	130		71	2,193	7	29
Electrical equipment, appliances, and components	335	67	181	4	5	i	35	79	D	4
Transportation equipment	336	161	18,663	i	6	28	35	12,856	i	3
Automobiles, bodies, trailers, and parts	3361-63	88	2,745		3	4	7	39	i	D
Other transportation	other 336	73	15,918	i	3	24	28	12,817	i	D
Miscellaneous manufacturing	339	156	285	105	227	i	20	22	i	D
Other manufacturing	312-16, 321-24, 331, 337	63	181	D	81		3	2	D	*
Nonmanufacturing industries	21-23, 42-81	1,578	19,993	499	11,216	670	4,536	132	117	
Mining, extraction, and support activities	21	36	309	0	0	0	0	0	D	*
Utilities	22	5	36	i	0	0	0	0	0	0
Wholesale trade	42	65	31	D	2	0	0	0	0	0
Information	51	170	1,354	5	10	D	76	D	4	
Publishing	511	97	1,062	D	5	17	36	D	4	
Telecommunications	517	D	40 - 163	0	0	D	1	i	0	0
Data processing, hosting, and related services	518	62	119	D	5	3	38	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: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Health or medical		Defense		Agriculture	
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount
Other information	other 51	D	11 - 134	0	0	0	0	0	0
Professional, scientific, and technical services	54	1,154	17,951	461	11,113	646	4,460	D	113
Architectural, engineering, and related services	5413	273	1,147	29	57	143	656	64	57
Scientific research and development services	5417	617	14,504	379	10,709	325	2,719	35	54
Biotechnology research and development	541711	111	3,653	99	3,171	22	69	10	28
Other scientific research and development	other 5417	507	10,851	280	7,538	302	2,650	25	26
Other professional, scientific, and technical services	other 54	264	2,299	53	347	178	1,084	D	3
Health care services	621-23	86	144	29	87	0	0	0	0
Other nonmanufacturing	23, 44-45, 48-49, 52-53, 55-56, 624, 71-72, 81	61	169	D	4	D	1	0	0
All companies (number of domestic employees)	-	3,180	61,065	947	22,171	914	20,054	210	516
Small companies									
10-19 <sup>c</sup>	-	742	909	203	302	244	366	46	22
20-49	-	935	1,842	337	917	282	499	57	28
Medium companies									
50-99	-	533	2,071	142	778	149	716	59	42
100-249	-	399	3,703	95	1,053	111	1,301	20	51
Large companies									
250-499	-	190	2,331	51	934	34	512	3	2
500-999	-	111	1,576	42	476	20	169	5	2
1,000-4,999	-	145	12,771	42	6,597	33	1,387	10	236
5,000-9,999	-	36	7,497	10	5,777	13	971	D	13
10,000-24,999	-	53	10,070	13	3,746	15	2,091	D	78
25,000 or more	-	36	18,295	11	1,590	13	12,042	3	42

\* = 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.

<sup>a</sup> Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not 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.

<sup>b</sup> Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not include an adjustment to the weight to account for unit nonresponse. These company count estimates reflect a new 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.

<sup>c</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D. 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, 2017.

TABLE 40

## Domestic R&amp;D paid for by others and performed by the company as a percentage of domestic net sales, by industry and company size: 2017

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
All industries	21-23, 31-33, 42-81	61,065	0.6	0.7
Manufacturing industries	31-33	41,072	0.8	0.8
Food	311	244	*	*
Beverage and tobacco products	312	107	0.1	0.1
Textile, apparel, and leather products	313-16	1	*	*
Wood products	321	5	*	*
Paper	322	29	*	*
Printing and related support activities	323	11	*	*
Petroleum and coal products	324	15	*	*
Chemicals	325	11,692	1.3	1.3
Basic chemicals	3251	181	0.1	0.1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	16	*	*
Pesticide, fertilizer, and other agricultural chemicals	3253	284 - 383	D	D
Pharmaceuticals and medicines	3254	10,973	2.4	2.4
Soap, cleaning compound, and toilet preparation	3256	118 - 213	D	D
Paint, coating, adhesive, and other chemicals	3255, 3259	23	*	*
Plastics and rubber products	326	117	0.1	0.1
Nonmetallic mineral products	327	30	i 0.1	0.1
Primary metals	331	8	*	*
Fabricated metal products	332	107	0.1	0.1
Machinery	333	940	0.3	0.3
Agricultural implement	33311	59	i 0.1	0.1
Semiconductor machinery	333242	465	2.3	2.3
Engine, turbine, and power transmission equipment	3336	159	0.4	0.4
Other machinery	other 333	257	0.1	0.1
Computer and electronic products	334	8,633	1.2	1.2
Communications equipment	3342	1,715	i 1.9	1.9
Semiconductor and other electronic components	3344	2,289	1.3	1.3
Navigational, measuring, electromedical, and control instruments	3345	4,420	2.6	2.6
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	150	0.7	0.7
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	4,083	5.3	5.3
Other measuring and controlling device	other 3345	187	0.3	0.3



TABLE 40

## Domestic R&amp;D paid for by others and performed by the company as a percentage of domestic net sales, by industry and company size: 2017

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)		Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
Other computer and electronic products	other 334	209		0.1	0.1
Electrical equipment, appliances, and components	335	181		0.2	0.2
Transportation equipment	336	18,663	i	1.6	1.7
Automobiles, bodies, trailers, and parts	3361-63	2,745		0.4	0.4
Aerospace products and parts	3364	14,480	i	4.1	4.1
Aircraft, aircraft engine, and aircraft parts	336411-13	13,103	i	4.0	4.0
Guided missile, space vehicle, and related parts	336414-15, 336419	1,377		7.3	7.3
Military armored vehicle, tank, and tank component	336992	5		1.5	1.6
Other transportation	other 336	1,433		2.2	2.2
Furniture and related products	337	3		*	*
Miscellaneous manufacturing	339	285		0.1	0.1
Medical equipment and supplies	3391	240		0.1	0.1
Other miscellaneous manufacturing	3399	44		0.1	0.1
Nonmanufacturing industries	21-23, 42-81	19,993		0.5	0.5
Mining, extraction, and support activities	21	309		0.1	D
Utilities	22	36	i	*	*
Wholesale trade	42	31		*	*
Electronic shopping and electronic auctions	454111-12	0		0.0	0.0
Transportation and warehousing	48-49	31		*	D
Information	51	1,354		0.1	0.1
Publishing	511	1,062		0.5	0.5
Newspaper, periodical, book, and directory publishers	5111	0		0.0	0.0
Software publishers	5112	1,062		0.5	0.5
Telecommunications	517	40 - 163		D	D
Data processing, hosting, and related services	518	119		*	*
Other information	other 51	11 - 134		D	D
Finance and insurance	52	51		*	*
Real estate and rental and leasing	53	10		0.1	0.1
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0		0.0	0.0
Other real estate and rental and leasing	other 53	10		0.1	0.1
Professional, scientific, and technical services	54	17,951		4.5	4.5
Architectural, engineering, and related services	5413	1,147		1.2	1.2

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: 2017**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
Computer systems design and related services	5415	1,658	1.1	1.1
Scientific research and development services	5417	14,504	21.0	21.0
Biotechnology research and development	541711	3,653	13.6	13.6
Physical, engineering, and life sciences (except biotechnology) research and development	541712	9,978	24.3	24.4
Social sciences and humanities research and development	541720	873	70.2	70.2
Other professional, scientific, and technical services	other 54	641	0.7	0.7
Health care services	621-23	144	0.1	0.1
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	76	*	*
All companies (number of domestic employees)	-	61,065	0.6	0.7
Small companies				
10-19 <sup>c</sup>	-	909	3.8	4.2
20-49	-	1,842	2.1	2.3
Medium companies				
50-99	-	2,071	1.8	1.8
100-249	-	3,703	1.4	1.5
Large companies				
250-499	-	2,331	0.8	0.9
500-999	-	1,576	0.4	0.4
1,000-4,999	-	12,771	1.0	1.0
5,000-9,999	-	7,497	0.8	0.8
10,000-24,999	-	10,070	0.5	0.6
25,000 or more	-	18,295	i 0.4	0.4

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

NAICS = 2012 North American Industry Classification System.

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

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

<sup>c</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D, unless indicated otherwise. 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, 2017.

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: 2017**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
All industries	21-23, 31-33, 42-81	70,854	0.7	0.8
Manufacturing industries	31-33	48,691	0.9	0.9
Food	311	252	*	*
Beverage and tobacco products	312	107	0.1	0.1
Textile, apparel, and leather products	313-16	1	*	*
Wood products	321	5	*	*
Paper	322	30	*	*
Printing and related support activities	323	11	*	*
Petroleum and coal products	324	17	*	*
Chemicals	325	16,451	1.8	1.8
Basic chemicals	3251	180 - 217	D	D
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	16	*	*
Pesticide, fertilizer, and other agricultural chemicals	3253	284 - 418	D	D
Pharmaceuticals and medicines	3254	15,697	3.4	3.4
Soap, cleaning compound, and toilet preparation	3256	118 - 249	D	D
Paint, coating, adhesive, and other chemicals	3255, 3259	23 - 60	D	D
Plastics and rubber products	326	129	0.1	0.1
Nonmetallic mineral products	327	30	0.1	0.1
Primary metals	331	10	*	*
Fabricated metal products	332	112	0.1	0.1
Machinery	333	974	0.3	0.3
Agricultural implement	33311	58 - 62	i D	D
Semiconductor machinery	333242	465 - 487	D	D
Engine, turbine, and power transmission equipment	3336	169	0.5	0.5
Other machinery	other 333	256 - 283	D	D
Computer and electronic products	334	8,798	1.3	1.3
Communications equipment	3342	1,727	i 1.9	2.0
Semiconductor and other electronic components	3344	2,309	1.3	1.3
Navigational, measuring, electromedical, and control instruments	3345	4,546	2.7	2.7
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	152 - 162	D	D
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	4,190 - 4,200	D	D
Other measuring and controlling device	other 3345	193	0.3	0.3

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: 2017**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)		Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
Other computer and electronic products	other 334	216		0.1	0.1
Electrical equipment, appliances, and components	335	188		0.2	0.2
Transportation equipment	336	21,251	i	1.8	1.9
Automobiles, bodies, trailers, and parts	3361-63	2,869		0.4	0.4
Aerospace products and parts	3364	16,940	i	4.8	4.8
Aircraft, aircraft engine, and aircraft parts	336411-13	15,563	i	4.7	4.7
Guided missile, space vehicle, and related parts	336414-15, 336419	1,378		7.3	7.3
Military armored vehicle, tank, and tank component	336992	5		1.5	1.6
Other transportation	other 336	1,437		2.2	2.2
Furniture and related products	337	3		*	*
Miscellaneous manufacturing	339	319		0.1	0.1
Medical equipment and supplies	3391	273		0.1	0.1
Other miscellaneous manufacturing	3399	46		0.1	0.1
Nonmanufacturing industries	21-23, 42-81	22,163		0.5	0.6
Mining, extraction, and support activities	21	308 - 315		D	D
Utilities	22	81	i	*	*
Wholesale trade	42	42		*	*
Electronic shopping and electronic auctions	454111-12	0		0.0	0.0
Transportation and warehousing	48-49	31		*	D
Information	51	1,437		0.1	0.1
Publishing	511	1,142		0.5	0.5
Newspaper, periodical, book, and directory publishers	5111	*		*	0.0
Software publishers	5112	1,142		0.5	0.5
Telecommunications	517	42 - 165		D	D
Data processing, hosting, and related services	518	120		*	*
Other information	other 51	11 - 134		D	D
Finance and insurance	52	51		*	*
Real estate and rental and leasing	53	11		0.1	0.1
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0		0.0	0.0
Other real estate and rental and leasing	other 53	11		0.1	0.1
Professional, scientific, and technical services	54	19,943		5.0	5.0
Architectural, engineering, and related services	5413	1,462		1.6	1.6

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: 2017**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percent of domestic sales of R&D performers or funders <sup>a</sup>	Percent of domestic sales of R&D performers <sup>b</sup>
Computer systems design and related services	5415	1,695	1.1	1.1
Scientific research and development services	5417	16,035	23.2	23.2
Biotechnology research and development	541711	3,699	13.8	13.8
Physical, engineering, and life sciences (except biotechnology) research and development	541712	11,306	27.5	27.5
Social sciences and humanities research and development	541720	1,030	82.8	82.8
Other professional, scientific, and technical services	other 54	751	0.9	0.9
Health care services	621-23	143 - 150	i D	D
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	111	*	*
All companies (number of domestic employees)	-	70,854	0.7	0.8
Small companies				
10-19 <sup>c</sup>	-	1,036	4.3	4.8
20-49	-	2,156	2.5	2.7
Medium companies				
50-99	-	2,493	2.1	2.2
100-249	-	4,681	1.8	1.9
Large companies				
250-499	-	2,647	0.9	1.0
500-999	-	1,822	0.5	0.5
1,000-4,999	-	14,705	1.2	1.2
5,000-9,999	-	8,637	0.9	1.0
10,000-24,999	-	11,753	0.6	0.7
25,000 or more	-	20,924	i 0.5	0.5

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

NAICS = 2012 North American Industry Classification System.

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

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

<sup>c</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D, unless indicated otherwise. 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, 2017.

TABLE 42

**Domestic R&D paid for by other companies and performed by the company, by funders' business activity: 2017**

(Millions of U.S. dollars)

Funders' business activity <sup>a</sup>	Business code <sup>b</sup>	Amount
All business activities	21100-81000	35,897
Oil and gas extraction	21100	0 - 1,454 i
Mining	21200	1 i
Support activities for mining, including oil and gas	21300	240
Utilities	22100	4
Construction	23000	18
Food manufacturing	31100	212
Beverage manufacturing	31210	113
Tobacco manufacturing	31220	*
Textile, apparel, and leather products manufacturing	31990	1
Wood products manufacturing	32100	5
Paper manufacturing	32200	1
Printing and related support activities	32300	10
Petroleum refineries	32401	6
Asphalt paving, roofing, and saturated materials manufacturing	32402	0
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	10
Basic chemicals manufacturing	32510	70
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	3 i
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	0 - 1,454 i
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing	32541	14,352
In vitro diagnostic substances manufacturing	32542	22
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	5,888
Soap, cleaning compound, and toilet preparations manufacturing	32591	189
Paint, adhesive, and other chemical manufacturing	32592	17
Plastics and rubber products manufacturing	32600	32
Clay and glass products manufacturing	32710	2 i
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	8 i
Primary metal manufacturing	33100	1 i
Fabricated metal products manufacturing	33200	33 i
Agricultural machinery and equipment manufacturing	33311	57 i
Construction machinery manufacturing	33312	1 i
Mining, oil, and gas field machinery and equipment manufacturing	33319	14
Semiconductor machinery manufacturing	33321	416
Industrial machinery manufacturing (except semiconductor machinery)	33322	40
Photographic and photocopying equipment manufacturing	33331	8 i
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	6
Digital cameras manufacturing	33333	6 i
Engine, turbine, and power transmission equipment manufacturing	33360	130
Metalworking and other general purpose machinery manufacturing	33390	37 i
Computers and peripheral equipment manufacturing and magnetic and optical media	33412	88
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	0
Radio, television, and wireless communication equipment manufacturing	33422	866 i
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	35
Audio and video equipment manufacturing	33430	3
Semiconductor and other electronic components manufacturing	33440	2,540
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	98
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	818
Measuring and control instruments manufacturing (not listed elsewhere)	33459	39
Electrical equipment, appliances, and components manufacturing	33500	448
Motor vehicles manufacturing	33610	2,852
Motor vehicle body and trailer manufacturing	33620	0



TABLE 42

**Domestic R&D paid for by other companies and performed by the company, by funders' business activity: 2017**

(Millions of U.S. dollars)

Funders' business activity <sup>a</sup>	Business code <sup>b</sup>	Amount
Motor vehicle parts manufacturing	33630	0 - 1,454
Aircraft manufacturing	33641	39
Aircraft engine and engine parts manufacturing	33642	73
Other aircraft parts and auxiliary equipment manufacturing	33643	537 i
Guided missiles, space vehicles, and related parts manufacturing	33644	0 - 1,454 i
Railroad rolling stock manufacturing	33651	0 - 1,454
Ship and boat building	33660	*
Motorcycle, bicycle, and parts manufacturing	33691	0 - 1,454
Military armored vehicle, tank, and tank components manufacturing	33692	3
All other transportation equipment manufacturing	33699	0 - 1,454
Furniture and related products manufacturing	33700	1
Medical equipment and supplies manufacturing	33910	486
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	68
Merchant wholesalers, durable goods	42300	9 i
Merchant wholesalers, nondurable goods	42400	3 i
Wholesale electronic markets and agents and brokers (business to business)	42500	15
Retail trade (except electronic shopping and electronic auctions)	44000	32 i
Electronic shopping and electronic auctions	45411	0
Transportation	48000	19
Couriers, messengers, and express delivery services	49200	0
Warehousing and storage	49300	*
Newspaper, periodical, book, and directory publishers (except Internet)	51110	0
Software publishers (except Internet)	51120	763
Motion picture and sound recording (except Internet)	51200	0
Broadcasting (except Internet)	51500	0
Wired telecommunications carriers	51710	0 - 1,454
Wireless telecommunications carriers (except satellite)	51720	15 i
Satellite telecommunications	51740	4 i
Other telecommunications (not listed elsewhere)	51790	22
Data processing, hosting, and related services	51800	7 i
Cloud computing applications and Internet-based software services	51801	50
Other information services, including Internet publishing, broadcasting, and Web search portals	51910	0 - 1,454
Finance: banking and credit intermediation	52200	0
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	6
Insurance carriers and related activities	52400	0
Real estate	53100	19
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	0
Architectural, engineering, and related services	54130	97
Specialized design services	54140	39 i
Computer systems design and related services	54150	531 i
Management, scientific, and technical consulting services	54160	3
Research and development services in social sciences and humanities	54172	21
Research and development services in biotechnology	54173	140
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	981
Advertising and related services	54180	4
Professional, scientific, and technical services (not listed elsewhere)	54190	220
Management of companies and enterprises	55100	6
Administrative and support services	56100	1 i
Waste management and remediation services	56200	0

TABLE 42

**Domestic R&D paid for by other companies and performed by the company, by funders' business activity: 2017**

(Millions of U.S. dollars)

Funders' business activity <sup>a</sup>	Business code <sup>b</sup>	Amount	
Offices of physicians	62110	71	i
Medical and diagnostic laboratories	62150	0	
Other ambulatory health care services (ambulance, dental, home health care)	62199	0	
Hospitals and nursing care facilities	62200	1	
Social assistance services	62400	*	
Arts, entertainment, and recreation	71000	8	
Accommodation and food services	72000	0	
Other services (not listed elsewhere)	81000	134	
Undistributed	-	316	i

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

NAICS = 2012 North American Industry Classification System.

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

<sup>b</sup> Business codes and descriptions are based on 2012 NAICS 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

TABLE 43

## Domestic R&amp;D paid for by the U.S. federal government and performed by the company, by type of R&amp;D, industry, and company size: 2017

(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	24,277 i	1,783 i	5,037 i	17,457 i
Manufacturing industries	31-33	18,889 i	1,404 i	2,675 i	14,810 i
Food	311	1	*	*	1
Beverage and tobacco products	312	0	0	0	0
Textile, apparel, and leather products	313-16	* i	0	* i	* i
Wood products	321	* i	0	* i	0
Printing and related support activities	323	0 - 2 i	0 - 2 i	0 - 1 i	* i
Chemicals	325	205	15	28	162
Pharmaceuticals and medicines	3254	186	10	22	154
Other chemicals	other 325	19	5 i	6	8
Plastics and rubber products	326	1	*	*	1
Nonmetallic mineral products	327	2 i	* i	1 i	2
Primary metals	331	5 i	* i	* i	5 i
Fabricated metal products	332	59 i	* i	10 i	49 i
Machinery	333	170	5	11 i	154
Computer and electronic products	334	3,937	255 i	599	3,084
Semiconductor and other electronic components	3344	80	1 i	23	56 i
Navigational, measuring, electromedical, and control instruments	3345	2,963	75	393	2,495
Other computer and electronic products	other 334	894 i	179 i	182 i	532 i
Electrical equipment, appliances, and components	335	38	* i	1 i	37
Transportation equipment	336	14,433 i	1,125 i	2,015 i	11,293 i
Aerospace products and parts	3364	11,260 - 13,070 i	967 - 1,126 i	286 - 1,937 i	10,007 i
Other transportation equipment	other 336	1,363 - 3,172	0 - 158	78 - 1,729	1,286
Furniture and related products	337	1 i	0	* i	1 i
Miscellaneous manufacturing	322, 324, 339	28 - 42	0 - 7	3 - 14	24
Nonmanufacturing industries	21-23, 42-81	5,388	379	2,362	2,647
Information	51	98	5	12 i	81
Publishing	511	62	4	7	51
Telecommunications	517	0 - 3 i	0	0 - 3 i	0
Data processing, hosting, and related services	518	35	1 i	4 i	29
Other information	other 51	0 - 3 i	0	0 - 3 i	0
Professional, scientific, and technical services	54	5,256	373	2,349	2,535
Architectural, engineering, and related services	5413	788	48	479	261
Computer systems design and related services	5415	995	10	288	698
Scientific research and development services	5417	3,200	291 i	1,505 i	1,405
Biotechnology research and development	541711	113	3 i	64	45

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: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
Physical, engineering, and life sciences (except biotechnology) research and development	541712	2,258	222	881	1,155
Social sciences and humanities research and development	541720	830	66	560	204
Other professional, scientific, and technical services	other 54	272	24	77	171
Other nonmanufacturing	21-23, 42-49, 52, 53, 55-81	35	2	2	31
All companies (number of domestic employees)	-	24,277	1,783	5,037	17,457
Small companies					
10-19 <sup>a</sup>	-	485	35	94	356
20-49	-	605	39	187	379
Medium companies					
50-99	-	659	34	261	364
100-249	-	1,241	143	393	704
Large companies					
250-499	-	592	52	118	422
500-999	-	221	31	60	130
1,000-4,999	-	1,461	37	564	860
5,000-9,999	-	1,525	191	538	796
10,000-24,999	-	3,514	281	479	2,755
25,000 or more	-	13,976	941	2,343	10,692

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

TABLE 44

## Domestic R&amp;D paid for by the U.S. federal government and performed by the company, by funding agency, industry, and company size: 2017

(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	24,277	16,632	570	4,298	665	52	53	1	10-46	1,959-2,000
Manufacturing industries	31-33	18,889	13,745	209	3,857	112	22	8	*	1-36	896-937
Food	311	1	*	1	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
Wood products	321	*	*	0	0	0	0	0	0	0	0
Paper	322	*	0	0	0	*	0	0	0	0	0
Printing and related support activities	323	0-2	*	*	0	0-2	0	0	0	0	0
Petroleum and coal products	324	0	0	0	0	0	0	0	0	0	0
Chemicals	325	205	65	3-80	0	60	0-21	0	0	2	0-77
Basic chemicals	3251	6	0	3-7	0	0-3	0	0	0	0	0
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	*	*	0	0	*	0	0	0	0	0
Pesticide, fertilizer, and other agricultural chemicals	3253	0-14	0-14	*	0	0-3	0	0	0	0-3	0
Pharmaceuticals and medicines	3254	186	36-66	0-77	0	58	0-21	0	0	0-3	0-77
Soap, cleaning compound, and toilet preparation	3256	*	0	*	0	*	0	0	0	0	0
Paint, coating, adhesive, and other chemicals	3255, 3259	0-14	0-14	0-14	0	0-3	0	0	0	0	0
Plastics and rubber products	326	1	*	1	0	*	0	0	0	0	0
Nonmetallic mineral products	327	2	0-2	0-2	0	1	0	0-2	0	0	0
Primary metals	331	5	1	2	2	*	0	0	0	0	0
Fabricated metal products	332	59	0-60	0	0-60	0	0	0	0	0	0
Machinery	333	170	31-107	48-130	0-86	0	0	0-9	0	0	0-92
Agricultural implement	33311	3	*	3	0	0	0	0	0	0	0
Semiconductor machinery	333242	7	0	0-8	0	0	0	0	0	0	0-8
Engine, turbine, and power transmission equipment	3336	75-151	30-106	46	0	0	0	0	0	0	0
Other machinery	other 333	7-86	*	0-82	0-86	0	0	0-9	0	0	0-86
Computer and electronic products	334	3,937	3,392	75	358	20-53	*	0-9	0	0-34	59-80
Communications equipment	3342	805	595	0-21	191	0-21	0	0	0	0	0

TABLE 44

## Domestic R&amp;D paid for by the U.S. federal government and performed by the company, by funding agency, industry, and company size: 2017

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	DOD	DOE	NASA	NIH	DHS	DOT	EPA	NSF	All other agencies
Semiconductor and other electronic components	3344	80	51	23	0-8	0	0	0	0	0-8	0-8
Navigational, measuring, electromedical, and control instruments	3345	2,963	2,705	25	140	20-26	*	0-9	0	0	59-72
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	27	4	*	1	21	0	0	0	0	0
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	2,880	2,675	*	135	0	0	0-9	0	0	59-72
Other measuring and controlling device	other 3345	56	26	24	4	0-4	*	0-4	0	0	0
Other computer and electronic products	other 334	89	41	5-29	18-29	0-26	*	0-9	0	0-26	*
Electrical equipment, appliances, and components	335	38	26	0-13	0-13	0-13	0	0	0	0	0
Transportation equipment	336	14,433	10,121	0-82	3,335-3,498	0-32	1-23	0-9	0	0	668-877
Automobiles, bodies, trailers, and parts	3361-63	0-2,745	0-1,431	0-82	0-1,922	0	0-21	0-9	0	0	0-877
Aerospace products and parts	3364	11,259-13,070	8,690	0-82	1,576-3,498	0-32	2	0	0	0	0-877
Aircraft, aircraft engine, and aircraft parts	336411-13	9,905-11,715	8,336	0-82	575-2,497	0-32	2	0	0	0	0-877
Guided missile, space vehicle, and related parts	336414-15, 336419	1,355	353	0	1,001	0	0	0	0	0	0
Military armored vehicle, tank, and tank component	336992	2	2	0	0	0	*	0	0	0	0
Other transportation	other 336	0-1,434	0-1,431	0	0-1,434	0	0	0	0	0	0
Furniture and related products	337	1	0	*	1	*	0	0	0	0	0
Miscellaneous	339	27-42	0-42	0-42	0	0-32	0	0	0	0	0-38
Medical equipment and supplies	3391	7-38	0-38	0-38	0	0-32	0	0	0	0	0-38
Other miscellaneous manufacturing	3399	0-35	0-35	0-35	0	0-32	0	0	0	0	0
Nonmanufacturing industries	21-23, 42-81	5,388	2,887	360	441	553	30	44	1	9	1,064
Mining, extraction, and support activities	21	0	0	0	0	0	0	0	0	0	0
Utilities	22	27	0	27	0	0	0	0	0	0	*
Wholesale trade	42	0	0	0	0	0	0	0	0	0	0
Electronic shopping and electronic auctions	454111-12	0	0	0	0	0	0	0	0	0	0
Transportation and warehousing	48-49	0	0	0	0	0	0	0	0	0	0
Information	51	98	54	19	*	0	0	0	0	0	24



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: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	DOD	DOE	NASA	NIH	DHS	DOT	EPA	NSF	All other agencies
250-499	-	592	364	21 i	135	57	0-18	0-13 i	0	0	0-18
500-999	-	221	166	9 i	1 i	35	*	*	0	0	11
1,000-4,999	-	1,461	564	30 i	156 i	0-30 i	0-35	0-13 i	0	0-38	593-713
5,000-9,999	-	1,525	298	71	624	240	0-35	21	1	0	231-274
10,000-24,999	-	3,514	2,601	67	810 i	3	*	0-13	0	*	16-36 i
25,000 or more	-	13,976 i	10,734 i	105	2,269 i	0-30	0-35	0-13	0	0	788-870 i

\* = 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.

<sup>a</sup> 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.



TABLE 45

## Domestic R&amp;D paid for by sources located outside the United States and performed by the company, by source of funds, industry, and company size: 2017

(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	Company's parent	Unaffiliated companies			
All industries	21-23, 31-33, 42-81	37,822	19,240	15,426	2,978	7	24	i 147
Manufacturing industries	31-33	30,596	15,012	13,315	2,119	3	22	i 126
Food	311	324	88	232	4	0	0	0
Beverage and tobacco products	312	115	8	107	*	0	0	0
Textile, apparel, and leather products	313-16	1	1	0	* i	0	0	0
Wood products	321	5	0	5	* i	0	0	0
Paper	322	3	1	1	* i	0	0	* i
Printing and related support activities	323	8 - 10	0	8	1 i	0	0	0 - 2 i
Petroleum and coal products	324	11	*	10	0	0	0	0
Chemicals	325	12,008	3,243	7,115	1,592	0 - 4	0 - 23	31 - 60
Basic chemicals	3251	194	25	129 - 169	0 - 39	0	0	0
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	15	1	13	* i	0	0	* i
Pesticide, fertilizer, and other agricultural chemicals	3253	266 - 385	1	231 - 383	0 - 39	i 0	0	0 - 4 i
Pharmaceuticals and medicines	3254	11,280	3,202	6,465	1,554	0 - 4	0 - 23	31 - 60
Soap, cleaning compound, and toilet preparation	3256	119 - 220	6	111 - 212	* i	0	0	0 - 4 i
Paint, coating, adhesive, and other chemicals	3255, 3259	7 - 32	7	0 - 24	* i	0	0	0
Plastics and rubber products	326	59	47	11	*	0	0	0
Nonmetallic mineral products	327	13 - 29	14	0 - 14	0 - 14	i 0	0	0 - 14 i
Primary metals	331	2 i	1	0 - 2	* i	0	0 - 2	0 - 2 i
Fabricated metal products	332	6	2	4	* i	0	0	* i
Machinery	333	657	18	621	19	i 0	0	* i
Agricultural implement	33311	58 i	2	50	6	i 0	0	0
Semiconductor machinery	333242	454	0	449	5	i 0	0	0
Engine, turbine, and power transmission equipment	3336	9	0	9	*	i 0	0	0
Other machinery	other 333	137	16	113	8	0	0	* i
Computer and electronic products	334	14,267	10,960	2,889	326 - 352	0 - 4	0 - 23	i 39 - 94

TABLE 45

## Domestic R&amp;D paid for by sources located outside the United States and performed by the company, by source of funds, industry, and company size: 2017

(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	Company's parent	Unaffiliated companies			
Communications equipment	3342	3,794	3,131 - 3,167	628	0 - 30	0 - 4	0	* i
Semiconductor and other electronic components	3344	3,088	1,098	1,754	214	0	0 - 23	i 0 - 24
Navigational, measuring, electromedical, and control instruments	3345	622 - 687	82	418	109	0	*	14 - 79
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	104	6	92	6	0	0	0
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	417	0 - 77	i 193 - 327	0 - 104	0	*	14 - 79
Other measuring and controlling device	other 3345	100 - 167	0 - 77	0 - 132	0 - 104	0	0	0
Other computer and electronic products	other 334	6,700 - 6,765	6,611 - 6,650	89	0 - 30	0	0	0
Electrical equipment, appliances, and components	335	248	171	77	*	i 0	0	0
Transportation equipment	336	2,387 - 2,443	170	2,073	146	0 - 4	i 0	0 - 55
Automobiles, bodies, trailers, and parts	3361-63	26 - 2,443	26 - 171	0 - 2,074	0 - 147	0 - 4	0	0 - 55
Aerospace products and parts	3364	0 - 2,158	0 - 145	0 - 2,012	0 - 147	0 - 4	i 0	0 - 55
Aircraft, aircraft engine, and aircraft parts	336411-13	0 - 2,158	0 - 145	0 - 2,012	0 - 147	0 - 4	i 0	0 - 55
Guided missile, space vehicle, and related parts	336414-15, 336419	*	0	0	*	0	0	0
Military armored vehicle, tank, and tank component	336992	0	0	0	0	0	0	0
Other transportation	other 336	0 - 1,434	0	0 - 1,434	0 - 147	i 0	0	0
Furniture and related products	337	8	8	*	*	i 0	0	* i
Miscellaneous manufacturing	339	425 - 458	279	138 - 169	9	0	0	0
Medical equipment and supplies	3391	406	265	132	8	0	0	0
Other miscellaneous manufacturing	3399	20 - 52	14	6 - 37	1	i 0	0	0
Nonmanufacturing industries	21-23, 42-81	7,226	4,229	2,111	859	4	2	21
Mining, extraction, and support activities	21	834	615	6	213	0	0	0
Utilities	22	4	*	4	0	0	0	*
Wholesale trade	42	27	i 5	i 22	i 1	i 0	0	0
Electronic shopping and electronic auctions	454111-12	0	0	0	0	0	0	0
Transportation and warehousing	48-49	0	0	0	0	0	0	0
Information	51	4,467	3,328	1,047	91	0	0	1
Publishing	511	1,702	767	843	90	0	0	1
Newspaper, periodical, book, and directory publishers	5111	0	0	0	0	0	0	0

TABLE 45

## Domestic R&amp;D paid for by sources located outside the United States and performed by the company, by source of funds, industry, and company size: 2017

(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	Company's parent	Unaffiliated companies				
Software publishers	5112	1,702	767	843	90	0	0	1	
Telecommunications	517	24 - 162	4	21 - 158	0	0	0	0	
Data processing, hosting, and related services	518	236	188	48	*	0	0	0	
Other information	other 51	2,367 - 2,503	2,368	0 - 134	*	i	0	* i	
Finance and insurance	52	36	36	0	0	0	0	0	
Real estate and rental and leasing	53	10	0	10	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	10	0	10	0	0	0	0	
Professional, scientific, and technical services	54	1,772	216	1,001	529	4	2	20 i	
Architectural, engineering, and related services	5413	68	11	45	12	*	0	0	
Computer systems design and related services	5415	346	143	177	24	1	0	0	
Scientific research and development services	5417	1,231	49	685	475	i	3	2	16 i
Biotechnology research and development	541711	317	0	104	210		2	0	1
Physical, engineering, and life sciences (except biotechnology) research and development	541712	914	49	582	266	i	1	2	15 i
Social sciences and humanities research and development	541720	0	0	0	0	0	0	0	0
Other professional, scientific, and technical services	other 54	126	12	93	17	0	0	0	3
Health care services	621-23	33 i	23	0	10	i	0	0	0
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	43	6	22	15	0	0	0	0
All companies (number of domestic employees)	-	37,822	19,240	15,426	2,978	7	24	i	147
Small companies									
10-19 <sup>a</sup>	-	171	58	59	0 - 54	2	*	i	0 - 54
20-49	-	693	135	434	97	1	21	i	5
Medium companies									
50-99	-	766	120	494	105	1	i	1	47
100-249	-	1,734	195	1,426	98	*	i	1	15 i
Large companies									
250-499	-	1,205	338	668	195	1	*		3
500-999	-	1,738	698	795	243	*		1	1 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: 2017**

(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	Company's parent	Unaffiliated companies			
1,000–4,999	–	11,280	2,741	7,446	1,085	2	*	6
5,000–9,999	–	2,270	1,258	909	102	0	*	* i
10,000–24,999	–	6,741	2,824	2,987	930	0	0	0
25,000 or more	–	11,222	10,873	209	64 - 127	1	0	12 - 74

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D. 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, 2017.

TABLE 46

## Domestic R&amp;D paid for by the company's foreign subsidiaries and performed by the company, by type of R&amp;D, industry, and company size: 2017

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research <sup>a</sup>	Applied research <sup>a</sup>	Development <sup>a</sup>
All industries	21-23, 31-33, 42-81	19,240	799	1,838	16,603
Manufacturing industries	31-33	15,012	551	1,453	13,008
Food	311	88	9	2	77
Beverage and tobacco products	312	8	1	2	5
Textile, apparel, and leather products	313-16	1	*	0	1
Wood products	321	0	0	0	0
Printing and related support activities	323	0	0	0	0
Chemicals	325	3,243	427	381	2,434
Pharmaceuticals and medicines	3254	3,202	426	373	2,404
Other chemicals	other 325	40	2	8	30
Plastics and rubber products	326	47	* i	1 i	46
Nonmetallic mineral products	327	14	*	6	8
Primary metals	331	1	*	*	1
Fabricated metal products	332	2	0	*	2
Machinery	333	18	1 i	11	5 i
Computer and electronic products	334	10,960	62	968	9,930
Semiconductor and other electronic components	3344	1,098	44	121	932
Navigational, measuring, electromedical, and control instruments	3345	82	1	15	67
Other computer and electronic products	other 334	9,780	16	833	8,931
Electrical equipment, appliances, and components	335	171	37 i	32 i	102
Transportation equipment	336	170	10	27	134
Aerospace products and parts	3364	0 - 145	0 - 11	*	0 - 135
Other transportation equipment	other 336	26 - 171	0 - 11	26	0 - 135
Furniture and related products	337	8	0	5	2
Miscellaneous manufacturing	322, 324, 339	281	2	17	262
Nonmanufacturing industries	21-23, 42-81	4,229	248	386 i	3,595
Information	51	3,328	27	323 i	2,977
Publishing	511	767	10	304 i	453
Telecommunications	517	4	0	4	0
Data processing, hosting, and related services	518	188	0 - 18	0 - 17	154 - 189
Other information	other 51	2,368	0 - 18	0 - 17	2,334 - 2,369
Professional, scientific, and technical services	54	216	15	19 i	183
Architectural, engineering, and related services	5413	11	*	3	8
Computer systems design and related services	5415	143	9	10	124
Scientific research and development services	5417	49	1	6 i	42
Biotechnology research and development	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: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research <sup>a</sup>	Applied research <sup>a</sup>	Development <sup>a</sup>
Physical, engineering, and life sciences (except biotechnology) research and development	541712	49	1	6 i	42
Social sciences and humanities research and development	541720	0	0	0	0
Other professional, scientific, and technical services	other 54	12	3	*	8
Other nonmanufacturing	21-23, 42-49, 52, 53, 55-81	685	206	44	435
All companies (number of domestic employees)	-	19,240	799	1,838	16,603
Small companies					
10-19 <sup>b</sup>	-	58	0 - 17	0 - 17 i	42
20-49	-	135	0 - 18	0 - 18	118
Medium companies					
50-99	-	120	2	24	94
100-249	-	195	6 i	34	154 i
Large companies					
250-499	-	338	41	42	254
500-999	-	698	78 i	100	520
1,000-4,999	-	2,741	75	529 i	2,137
5,000-9,999	-	1,258 i	1	83 i	1,175 i
10,000-24,999	-	2,824	215	60	2,549
25,000 or more	-	10,873	342 - 385	927 - 970	9,560

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

NAICS = 2012 North American Industry Classification System.

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

<sup>b</sup> 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

TABLE 47

## Domestic R&amp;D paid for by the company and performed by others, by type of performer, industry, and company size: 2017

(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	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	42,704	36,081	1,727	i 3,444	88	i 10	498	588	267
Manufacturing industries	31-33	39,185	33,218	1,704	i 3,086	65	i 3	422	465	220
Food	311	150	119	0	11	0	0	8	8	4
Beverage and tobacco products	312	218	170	0	39	0	0	3	5	* i
Textile, apparel, and leather products	313-16	22	21	0	1	i 0	0	* i	0-2	i 0-2
Wood products	321	9	8	0	0	0-2	*	0-2	*	0
Paper	322	42	39	*	i 1	i 0	0	1	0-3	0-3
Printing and related support activities	323	4	4	i 0	0	0	0	0	*	0
Petroleum and coal products	324	63	33	*	i 2	* i	0	1	26	2
Chemicals	325	31,294	27,809	223	2,606	4	* i	237	250	164
Basic chemicals	3251	77-90	63	*	i 6	0	0	5	i 0-10	i 5
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	17	12	*	i 1	i 0	0	1	3	*
Pesticide, fertilizer, and other agricultural chemicals	3253	116	90	i 1	i 12	i *	i *	10	i 0-6	i 0-4
Pharmaceuticals and medicines	3254	30,755	27,361	216	2,572	4	* i	215	231	154
Soap, cleaning compound, and toilet preparation	3256	264	247	*	i 5	i *	i *	* i	8	3
Paint, coating, adhesive, and other chemicals	3255, 3259	55-68	36	5	i 10	i *	i *	6	i 0-10	i 0-4
Plastics and rubber products	326	160	86	17	i 27	0-7	1	16	10	0-7
Nonmetallic mineral products	327	19	14	*	i 3	i 0	0	* i	*	2
Primary metals	331	54	50	1	i *	i 0-4	0	1	i 0-4	i *
Fabricated metal products	332	91	78	3	i 3	i *	i *	1	i 3	i 2
Machinery	333	482	417	10	i 37	*	* i	7	i 0-14	0-14
Agricultural implement	33311	176-193	170	0	3	0	0	5	i 0	0-14
Semiconductor machinery	333242	0-22	1	0	0-21	0	0	* i	* i	0
Engine, turbine, and power transmission equipment	3336	51-69	49	i *	i 3	0	0	1	0-14	* i
Other machinery	other 333	215-254	197	10	i 8-33	*	* i	1	i 0-14	i *

TABLE 47

## Domestic R&amp;D paid for by the company and performed by others, by type of performer, industry, and company size: 2017

(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	U.S. universities, colleges, and academic researchers	All other	
				Company's parent	Other				In the United States	Outside the United States
Computer and electronic products	334	1,886	1,044	541	i 138	0 - 20	*	i 72	74	i 0 - 20
Communications equipment	3342	754	i 181	485 - 541	i 32	*	i *	i 2	i 0 - 32	i 0 - 20
Semiconductor and other electronic components	3344	394	331	0 - 21	i 42	0 - 20	0	2	0 - 21	i 0
Navigational, measuring, electromedical, and control instruments	3345	345	278	*	i 24	*	i 0	0 - 2	43	0 - 2
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	97	52	0	5	*	0	*	39	*
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	131 - 154	i 132	i *	i 0 - 20	*	i 0	0 - 2	*	0 - 2
Other measuring and controlling device	other 3345	95 - 117	93	0	0 - 20	0	0	0 - 2	i 3	i 0 - 2
Other computer and electronic products	other 334	392	255	0 - 34	i 40	0 - 20	i *	i 64 - 70	0 - 32	i 0 - 20
Electrical equipment, appliances, and components	335	210	191	i 0	16	0	0	2	i 1	i 0
Transportation equipment	336	3,427	2,239	899	i 142	26 - 60	i 2	39	41	2 - 36
Automobiles, bodies, trailers, and parts	3361-63	2,714	1,680	871	i 108	3	2	33	0 - 21	i 0 - 21
Aerospace products and parts	3364	670	519	27	i 31	22 - 57	i 0	6	i 19 - 42	0 - 36
Aircraft, aircraft engine, and aircraft parts	336411-13	559	427	27	i 31	22 - 57	i 0	5	i 0 - 23	0 - 36
Guided missile, space vehicle, and related parts	336414-15, 336419	111	91	*	i *	0	0	*	19	0
Military armored vehicle, tank, and tank components	336992	1	*	i *	i *	0	0	*	i *	i *
Other transportation	other 336	43	39	*	i 3	0	0	*	*	0
Furniture and related products	337	19	16	*	i 3	*	i 0	*	i *	i *
Miscellaneous manufacturing	339	1,034	880	9	57	3	*	33 - 38	36	13 - 18
Medical equipment and supplies	3391	909	762	9	53	3	*	34	35	14
Other miscellaneous manufacturing	3399	125	118	*	i 5	*	i *	0 - 3	i 1	i 0 - 3
Nonmanufacturing industries	21-23, 42-81	3,519	2,863	23	357	23	7	76	123	47



TABLE 47

## Domestic R&amp;D paid for by the company and performed by others, by type of performer, industry, and company size: 2017

(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	U.S. universities, colleges, and academic researchers	All other							
				Company's parent	Other				In the United States	Outside the United States						
Mining, extraction, and support activities	21	300	180		0	24	i	7		0	38	42 - 50	1 - 8			
Utilities	22	200	132		0	8		*		7	3	51	*			
Wholesale trade	42	108	104	i	*	i	2	i	0	0	2	i	*	0		
Electronic shopping and electronic auctions	454111-12	3	3		0	0		0		0	0	0	0			
Transportation and warehousing	48-49	44	44		0	0		0		0	0	0	0			
Information	51	1,814	1,590		0	173		0		0	5	11	34			
Publishing	511	1,088	975		0	66		0		0	5	10	32			
Newspaper, periodical, book, and directory publishers	5111	10	6	i	0	*	i	0		0	*	i	1	i	2	i
Software publishers	5112	1,078	968		0	66		0		0	4	10	30			
Telecommunications	517	237	234		0	3		0		0	*	0	0			
Data processing, hosting, and related services	518	239	137		0	99		0		0	*	0	2			
Other information	other 51	250	245		0	5		0		0	*	i	1	*	i	
Finance and insurance	52	362	256		21	79		0		0	4	3	0			
Real estate and rental and leasing	53	4	4	i	0	0		0		0	0	0	0			
Lessors of nonfinancial intangible assets (except copyrighted works)	533	2	2	i	0	0		0		0	0	0	0			
Other real estate and rental and leasing	other 53	1	1	i	0	0		0		0	0	0	0			
Professional, scientific, and technical services	54	557	426		2	72		17		*	i	24	11	7	i	
Architectural, engineering, and related services	5413	85	78		*	i	3	2	i	0	1	i	*	i	*	i
Computer systems design and related services	5415	120	88	i	*	i	19	i	4	i	*	i	3	i	5	i
Scientific research and development services	5417	332	244		1	45		11		*	22	8	1			
Biotechnology research and development	541711	117	90		1	5		1		0	19	1	0			
Physical, engineering, and life sciences (except biotechnology) research and development	541712	216	154		0	40		10		*	4	7	1			
Social sciences and humanities research and development	541720	*	*	i	*	i	*	i	*	i	0	*	i	*	i	
Other professional, scientific, and technical services	other 54	20	15		*	i	4	*	i	0	*	i	*	i	*	i
Health care services	621-23	34	33	i	0	*		0		0	*	i	0	*		
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	93	91		0	1		0		0	1	0 - 2	0 - 2			

TABLE 47

## Domestic R&amp;D paid for by the company and performed by others, by type of performer, industry, and company size: 2017

(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	U.S. universities, colleges, and academic researchers	All other	
				Company's parent	Other				In the United States	Outside the United States
All companies (number of domestic employees)	-	42,704	36,081	1,727	i 3,444	88	i 10	498	588	267
Small companies										
10-19 <sup>a</sup>	-	449	356	0 - 16	i 62	2	i *	i 16	0 - 16	i 0 - 14
20-49	-	1,245	989	12	i 141	5	i *	46	33	18
Medium companies										
50-99	-	1,468	1,234	0 - 18	i 162	3	*	i 28	26	0 - 14
100-249	-	3,048	2,473	20	350	10	*	i 49	12	133
Large companies										
250-499	-	1,189	1,018	16	85	1	i *	i 15	i 45	8
500-999	-	2,237	1,206	31	850	1	i *	i 58	51	39
1,000-4,999	-	8,357	8,020	56	82	2	1	86	99	12
5,000-9,999	-	3,213	2,552	519 - 549	i 81	1	0	13	18 - 43	2
10,000-24,999	-	11,816	10,194	266	1,128	5	i 6	47	i 143	27
25,000 or more	-	9,681	8,041	780	i 501	58	i 3	139	141	19

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Business 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. Statistics are representative of companies located in the United States that performed or funded R&D. 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, 2017.

TABLE 48

## Domestic R&amp;D performance by performer and source of funds, by industry and company size: 2017

(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	400,100	339,036	61,065	52,492	42,704	9,789 i
Manufacturing industries	31-33	257,227	216,155	41,072	46,803	39,185	7,619 i
Food	311	4,697 i	4,453 i	244	157	150	7
Beverage and tobacco products	312	1,076	968	107	218	218	0
Textile, apparel, and leather products	313-16	920	919	1	22	22	*
Wood products	321	175	170	5	9	9	0
Paper	322	1,322	1,292	29	43	42	1
Printing and related support activities	323	229	218	11	4	4	*
Petroleum and coal products	324	316	301	15	65	63	2
Chemicals	325	74,977	63,285	11,692	36,053	31,294	4,759
Basic chemicals	3251	2,574	2,393	181	77 - 126	77 - 90	0 - 36
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	628	612	16	17	17	*
Pesticide, fertilizer, and other agricultural chemicals	3253	1,376 - 1,475	1,092	284 - 383	115 - 153	116	0 - 36
Pharmaceuticals and medicines	3254	66,202	55,229	10,973	35,478	30,755	4,723
Soap, cleaning compound, and toilet preparation	3256	2,605 - 2,701	2,488	118 - 213	263 - 301	264	0 - 36
Paint, coating, adhesive, and other chemicals	3255, 3259	1,495	1,471	23	55 - 104	55 - 68	0 - 36
Plastics and rubber products	326	3,754	3,637	117	173	160	13
Nonmetallic mineral products	327	1,334	1,303	30 i	20	19	*
Primary metals	331	749	741	8	56	54	2
Fabricated metal products	332	2,206	2,099	107	96	91	5
Machinery	333	13,197	12,257	940	516	482	34
Agricultural implement	33311	1,570	1,511	59 i	176 - 196	176 - 193	0 - 3 i
Semiconductor machinery	333242	3,694	3,228	465	21	0 - 22	0 - 21
Engine, turbine, and power transmission equipment	3336	2,080	1,921	159	61 - 80	51 - 69	10
Other machinery	other 333	5,853	5,596	257	219 - 259	215 - 254	0 - 25
Computer and electronic products	334	78,575	69,942	8,633	2,051	1,886	166
Communications equipment	3342	12,687	10,972	1,715 i	766 i	754 i	12 i
Semiconductor and other electronic components	3344	30,148	27,859	2,289	414	394	20
Navigational, measuring, electromedical, and control instruments	3345	14,509	10,089	4,420	471	345	126
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	2,696	2,545	150	98 - 109	97	1 - 12

TABLE 48

## Domestic R&amp;D performance by performer and source of funds, by industry and company size: 2017

(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
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	7,297	3,214	4,083	239 - 271	131 - 154 i	107 - 118
Other measuring and controlling device	other 3345	4,516	4,329	187	100 - 124	95 - 117	6
Other computer and electronic products	other 334	21,231	21,022	209	399	392	7
Electrical equipment, appliances, and components	335	4,291	4,110	181	217	210	7
Transportation equipment	336	53,292	34,629	18,663 i	6,015 i	3,427	2,588 i
Automobiles, bodies, trailers, and parts	3361-63	23,881	21,137	2,745	2,838	2,714	124
Aerospace products and parts	3364	26,383	11,903	14,480 i	3,130 i	670	2,460 i
Aircraft, aircraft engine, and aircraft parts	336411-13	24,576 i	11,473	13,103 i	3,018 i	559	2,460 i
Guided missile, space vehicle, and related parts	336414-15, 336419	1,807	430	1,377	112	111	1
Military armored vehicle, tank, and tank component	336992	9	4	5	1	1	0
Other transportation	other 336	3,018	1,585	1,433	46	43	3
Furniture and related products	337	422	419	3	20	19	*
Miscellaneous manufacturing	339	15,695	15,410	285	1,069	1,034	35
Medical equipment and supplies	3391	13,589	13,348	240	942	909	33
Other miscellaneous manufacturing	3399	2,106	2,062	44	127	125	2
Nonmanufacturing industries	21-23, 42-81	142,874	122,881	19,993	5,689	3,519	2,170
Mining, extraction, and support activities	21	3,150	2,841	309	299 - 307	300	0 - 6
Utilities	22	317	281	36 i	244	200	45
Wholesale trade	42	534	503	31	119	108	11
Electronic shopping and electronic auctions	454111-12	9,318	9,318	0	3	3	0
Transportation and warehousing	48-49	1,147	1,116	31	45	44	*
Information	51	80,252	78,898	1,354	1,897	1,814	83
Publishing	511	34,338	33,276	1,062	1,167	1,088	80
Newspaper, periodical, book, and directory publishers	5111	74	74	0	10	10	*
Software publishers	5112	34,264	33,201	1,062	1,157	1,078	80
Telecommunications	517	3,682 - 3,806	3,643	40 - 163	239	237	3
Data processing, hosting, and related services	518	16,155	16,037	119	240	239	1
Other information	other 51	25,954 - 26,077	25,943	11 - 134	250	250	0
Finance and insurance	52	7,616	7,565	51	362	362	0
Real estate and rental and leasing	53	718	708	10	5 i	4 i	1
Lessors of nonfinancial intangible assets (except copyrighted works)	533	138 i	138 i	0	2 i	2 i	0

TABLE 48

**Domestic R&D performance by performer and source of funds, by industry and company size: 2017**

(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 real estate and rental and leasing	other 53	579	570	10	2	1	1
Professional, scientific, and technical services	54	36,922	18,972	17,951	2,549	557	1,992
Architectural, engineering, and related services	5413	2,708	1,561	1,147	400	85	315
Computer systems design and related services	5415	13,327	11,669	1,658	157	120	37
Scientific research and development services	5417	17,321	2,817	14,504	1,863	332	1,531 i
Biotechnology research and development	541711	4,449	795	3,653	162	117	46
Physical, engineering, and life sciences (except biotechnology) research and development	541712	11,913	1,936	9,978	1,544 i	216	1,328 i
Social sciences and humanities research and development	541720	959	86	873	157	*	157
Other professional, scientific, and technical services	other 54	3,566	2,925	641	129	20	109
Health care services	621-23	1,101	958 i	144	33 - 40 i	34 i	0 - 6
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,799	1,722	76	128	93	35
All companies (number of domestic employees)	-	400,100	339,036	61,065	52,492	42,704	9,789 i
Small companies							
10-19 <sup>a</sup>	-	3,311	2,402	909	576	449	127
20-49	-	9,435	7,593	1,842	1,559	1,245	314
Medium companies							
50-99	-	10,141	8,070	2,071	1,890	1,468	422
100-249	-	17,216	13,514	3,703	4,026	3,048	978
Large companies							
250-499	-	14,103	11,773	2,331	1,506	1,189	317
500-999	-	17,871	16,295	1,576	2,483	2,237	246
1,000-4,999	-	65,112	52,341	12,771	10,291	8,357	1,933 i
5,000-9,999	-	40,198	32,701	7,497	4,353	3,213	1,140 i
10,000-24,999	-	73,485	63,415	10,070	13,499 i	11,816	1,683 i
25,000 or more	-	149,227	130,931	18,295 i	12,310	9,681	2,629 i

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

TABLE 49

## Domestic R&amp;D performance by source of funds and performer, by industry and company size: 2017

(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 or passed-through R&D costs)	R&D performed by the company								
							Total	Paid for by the U.S. government	Paid for by non-U.S. government sources						
All industries	21-23, 31-33, 42-81	381,739	42,704	339,036	70,854	9,789	i	61,065	24,277	i	36,787				
Manufacturing industries	31-33	255,339	39,185	216,155	48,691	7,619	i	41,072	18,889	i	22,183				
Food	311	4,603	i	150	4,453	i	252	7	244	1	243				
Beverage and tobacco products	312	1,186		218	968		107	0	107	0	107				
Textile, apparel, and leather products	313-16	941		22	919		1	*	1	*	i	1			
Wood products	321	179		9	170		5	0	5	*	i	5			
Paper	322	1,334		42	1,292		30	1	29	*	i	29			
Printing and related support activities	323	222		4	218		11	*	11	0 - 2	i	9 - 12			
Petroleum and coal products	324	364		63	301		17	2	15	0		15			
Chemicals	325	94,580		31,294	63,285		16,451	4,759	11,692	205		11,487			
Basic chemicals	3251	2,469 - 2,483		77 - 90	2,393		180 - 217	0 - 36	181	6		174			
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	629		17	612		16	*	16	*	i	16			
Pesticide, fertilizer, and other agricultural chemicals	3253	1,208		116	1,092		284 - 418	0 - 36	284 - 383	0 - 14		271 - 383			
Pharmaceuticals and medicines	3254	85,983		30,755	55,229		15,697	4,723	10,973	186		10,788			
Soap, cleaning compound, and toilet preparation	3256	2,752		264	2,488		118 - 249	0 - 36	118 - 213	*	i	117 - 213			
Paint, coating, adhesive, and other chemicals	3255, 3259	1,526 - 1,539		55 - 68	1,471		23 - 60	0 - 36	23	0 - 14		9 - 24			
Plastics and rubber products	326	3,798		160	3,637		129	13	117	1		116			
Nonmetallic mineral products	327	1,323		19	1,303		30	*	30	i	2	i	28	i	
Primary metals	331	795		54	741		10	2	8	5	i	3	i		
Fabricated metal products	332	2,190		91	2,099		112	5	107	59	i	48	i		
Machinery	333	12,739		482	12,257		974	34	940	170		770			
Agricultural implement	33311	1,687 - 1,705		176 - 193	1,511		58 - 62	i	0 - 3	i	59	i	3	56	i
Semiconductor machinery	333242	3,228 - 3,250		0 - 22	3,228		465 - 487		0 - 21		465	7	i	458	

TABLE 49

## Domestic R&amp;D performance by source of funds and performer, by industry and company size: 2017

(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 or passed-through R&D costs)	R&D performed by the company		
							Total	Paid for by the U.S. government	Paid for by non-U.S. government sources
Engine, turbine, and power transmission equipment	3336	1,972 - 1,991	51 - 69	1,921	169	10	159	75 - 151	8 - 84
Other machinery	other 333	5,810 - 5,851	215 - 254	5,596	256 - 283	0 - 25	257	7 - 86	i 170 - 249
Computer and electronic products	334	71,828	1,886	69,942	8,798	166	8,633	3,937	4,695
Communications equipment	3342	11,726	754	i 10,972	1,727	i 12	i 1,715	i 805	i 910
Semiconductor and other electronic components	3344	28,254	394	27,859	2,309	20	2,289	80	2,209
Navigational, measuring, electromedical, and control instruments	3345	10,434	345	10,089	4,546	126	4,420	2,963	1,456
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	2,643	97	2,545	152 - 162	1 - 12	150	27	123
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	3,345 - 3,368	131 - 154	i 3,214	4,190 - 4,200	107 - 118	4,083	2,880	1,203
Other measuring and controlling device	other 3345	4,423 - 4,447	95 - 117	4,329	193	6	187	56	131
Other computer and electronic products	other 334	21,414	392	21,022	216	7	209	89	120
Electrical equipment, appliances, and components	335	4,320	210	4,110	188	7	181	38	143
Transportation equipment	336	38,056	3,427	34,629	21,251	i 2,588	i 18,663	i 14,433	i 4,230
Automobiles, bodies, trailers, and parts	3361-63	23,851	2,714	21,137	2,869	124	2,745	0 - 2,745	0 - 2,745
Aerospace products and parts	3364	12,573	670	11,903	16,940	i 2,460	i 14,480	i 11,259 - 13,070	i 1,410 - 3,221
Aircraft, aircraft engine, and aircraft parts	336411-13	12,032	559	11,473	15,563	i 2,460	i 13,103	i 9,905 - 11,715	i 1,388 - 3,198
Guided missile, space vehicle, and related parts	336414-15, 336419	541	111	430	1,378	1	1,377	1,355	23
Military armored vehicle, tank, and tank component	336992	5	1	4	5	0	5	2	3
Other transportation	other 336	1,627	43	1,585	1,437	3	1,433	0 - 1,434	0 - 1,434
Furniture and related products	337	439	19	419	3	*	3	1	i 2
Miscellaneous manufacturing	339	16,444	1,034	15,410	319	35	285	27 - 42	242 - 258
Medical equipment and supplies	3391	14,257	909	13,348	273	33	240	7 - 38	202 - 233



TABLE 49

## Domestic R&amp;D performance by source of funds and performer, by industry and company size: 2017

(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 or 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 miscellaneous manufacturing	3399	2,187	125	2,062	46	2	44	0 - 35	10 - 45
Nonmanufacturing industries	21-23, 42-81	126,400	3,519	122,881	22,163	2,170	19,993	5,388	14,604
Mining, extraction, and support activities	21	3,141	300	2,841	308 - 315	0 - 6	309	0	309
Utilities	22	481	200	281	81	45	36	27	9
Wholesale trade	42	611	108	503	42	11	31	0	31
Electronic shopping and electronic auctions	454111-12	9,320	3	9,318	0	0	0	0	0
Transportation and warehousing	48-49	1,161	44	1,116	31	*	31	0	31
Information	51	80,711	1,814	78,898	1,437	83	1,354	98	1,256
Publishing	511	34,363	1,088	33,276	1,142	80	1,062	62	1,001
Newspaper, periodical, book, and directory publishers	5111	84	10	74	*	*	0	0	0
Software publishers	5112	34,279	1,078	33,201	1,142	80	1,062	62	1,001
Telecommunications	517	3,880	237	3,643	42 - 165	3	40 - 163	0 - 3	37 - 163
Data processing, hosting, and related services	518	16,276	239	16,037	120	1	119	35	84
Other information	other 51	26,193	250	25,943	11 - 134	0	11 - 134	0 - 3	9 - 134
Finance and insurance	52	7,927	362	7,565	51	0	51	0	51
Real estate and rental and leasing	53	712	4	708	11	1	10	0	10
Lessors of nonfinancial intangible assets (except copyrighted works)	533	141	2	138	0	0	0	0	0
Other real estate and rental and leasing	other 53	571	1	570	11	1	10	0	10
Professional, scientific, and technical services	54	19,529	557	18,972	19,943	1,992	17,951	5,256	12,695
Architectural, engineering, and related services	5413	1,646	85	1,561	1,462	315	1,147	788	359
Computer systems design and related services	5415	11,789	120	11,669	1,695	37	1,658	995	663
Scientific research and development services	5417	3,150	332	2,817	16,035	1,531	14,504	3,200	11,304
Biotechnology research and development	541711	912	117	795	3,699	46	3,653	113	3,540
Physical, engineering, and life sciences (except biotechnology) research and development	541712	2,151	216	1,936	11,306	1,328	9,978	2,258	7,720

TABLE 49

## Domestic R&amp;D performance by source of funds and performer, by industry and company size: 2017

(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 or 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
Social sciences and humanities research and development	541720	86	*	86	1,030	157	873	830	43
Other professional, scientific, and technical services	other 54	2,945	20	2,925	751	109	641	272	369
Health care services	621-23	991	34 i	958 i	143 - 150 i	0 - 6	144	5 i	139 i
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,815	93	1,722	111	35	76	2	74
All companies (number of domestic employees)	-	381,739	42,704	339,036	70,854	9,789 i	61,065	24,277 i	36,787
Small companies									
10-19 <sup>a</sup>	-	2,852	449	2,402	1,036	127	909	485	424
20-49	-	8,838	1,245	7,593	2,156	314	1,842	605	1,237
Medium companies									
50-99	-	9,538	1,468	8,070	2,493	422	2,071	659	1,413
100-249	-	16,561	3,048	13,514	4,681	978	3,703	1,241	2,462
Large companies									
250-499	-	12,962	1,189	11,773	2,647	317	2,331	592	1,739
500-999	-	18,532	2,237	16,295	1,822	246	1,576	221	1,355
1,000-4,999	-	60,698	8,357	52,341	14,705	1,933 i	12,771	1,461	11,311
5,000-9,999	-	35,915	3,213	32,701	8,637	1,140 i	7,497	1,525	5,972
10,000-24,999	-	75,231	11,816	63,415	11,753	1,683 i	10,070	3,514	6,556
25,000 or more	-	140,612	9,681	130,931	20,924 i	2,629 i	18,295 i	13,976 i	4,320

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Business 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

TABLE 50

**R&D paid for by the company and others and performed by the company outside of the United States, by selected location: 2017**

(Millions of U.S. dollars)

Location	Total	Paid for by the company	Paid for by others
Total	87,528	78,689	8,839
Puerto Rico <sup>a</sup>	437	391	46
Canada	5,375	4,842	533
Latin America and Other Western Hemisphere	4,367	4,000	367
Argentina	353	242	111
Brazil	1,526	1,415	111
Chile	119	96	23
Mexico	900	812	88
Other Latin American and Western Hemisphere locations	1,470	1,435	35
Africa	318	222	96
South Africa	186	97	89
Other African locations	132	125	7
Asia and Pacific	27,781	25,937	1,844
Australia	1,844	1,700	144
China	7,188	6,817	372
Hong Kong	423	397	25
India	7,726	7,500	227
Indonesia	42	40	2
Japan	3,588	3,035	552
Malaysia	789	777	12
New Zealand	134	108	27
Singapore	2,192	1,946	246
South Korea	1,413	1,292	121
Taiwan	1,166	1,085	81
Thailand	343	327	16
Other Asia and Pacific locations	932	914	19
Europe	43,036	37,240	5,797
Austria	724	667	57
Belgium	2,230	2,001	229
Czechia	378	321	57
Denmark	636	585	51
Finland	549	504	45
France	3,227	2,753	474
Germany	8,511	8,028	483
Hungary	216	158	58
Ireland	3,302	3,207	95
Italy	1,291	1,051	240
Luxembourg	205	205	0
Netherlands	1,775	1,472	303
Norway	447	440	7
Poland	767	608	159
Russia	380	270	109
Spain	864	676	188
Sweden	1,312	1,253	59
Switzerland	3,703	3,157	546
Turkey	98	76	22
United Kingdom	10,487	8,246	2,241
Other European locations	1,933	1,561	372
Middle East	4,551	4,456	95

TABLE 50

**R&D paid for by the company and others and performed by the company outside of the United States, by selected location: 2017**

(Millions of U.S. dollars)

Location	Total	Paid for by the company	Paid for by others
Israel	4,318	4,233	86
Other Middle Eastern locations	233	224	9
Undistributed	1,663	1,601	61

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

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

**Note(s)**

Detail may not add to total because of rounding. Country detail was not collected from companies reporting less than \$1 million of R&D paid for by the company or reporting less than \$1 million of R&D paid for by others. Statistics are representative of companies located in the United States that performed or funded R&D.

**Source(s)**

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2017.

TABLE 51-A

## R&amp;D paid for by the company and others and performed by the company outside of the United States, by selected location, industry, and company size: 2017 (part A)

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside the United States	Puerto Rico <sup>a</sup>	Canada	Austria	Belgium	Czechia	Denmark	Finland	France	Germany	Hungary	Ireland	Italy	Luxembourg	Netherlands	Norway	Poland	Russia	Spain	Sweden	Switzerland	Turkey	United Kingdom	Other European locations																					
All industries	21-23, 31-33, 42-81	87,528	437	5,375	724	2,230	378	636	549	3,227	8,511	216	3,302	1,291	205	1,775	447	767	380	864	1,312	3,703	98	10,487	1,933																					
Manufacturing industries	31-33	57,270	418	2,962	641	1,915	158	484	341	2,246	6,948	81	1,617	1,013	190	1,205	362	467	202	549	684	2,494	58	5,544	973																					
Food	311	865	0	33	2	2	1	0	0	43	45	*	1	6	0	21	21	11	2	3	2	11	1	73	51																					
Chemicals	325	14,450	75	522	409	1,588	35	104	41	558	958	27	829	214	164	511	38	84	73	213	170	1,275	42	2,059	440																					
Pharmaceuticals and medicines	3254	11,976	33	456	405	1,444	32	93	35	429	565	24	827	196	3	316	34	76	65	194	166	1,208	37	1,808	394																					
Other chemicals	other 325	2,474	41	67	4	144	3	11	6	129	394	3	2	18	161	194	3	9	7	19	4	67	5	251	46																					
Plastics and rubber products	326	902	0-34	41	1	25	1	2	2	53	142	4	2	30	2	38	0	4	2	23	2	49	0	27	6																					
Nonmetallic mineral products	327	181	0	6	0	2	*	1	i	0	12	i	22	i	0	0	0	3	i	3	i	6	0	0	1	2																				
Fabricated metal products	332	166	0	7	2	2	*	0	0	2	23	0	0	3	0	3	0	*	*	2	*	10	0	43	*																					
Machinery	333	3,266	0	100	53	33	8	24	73	i	208	630	1	12	77	0	68	109	i	15	2	22	91	112	*	286	40																			
Computer and electronic products	334	22,648	263-344	1,546	102	115	81	259	183	600	1,969	14	571	213	15	209	162	208	72	166	234	392	1	1,497	237																					
Electrical equipment, appliances, and components	335	1,867	0	262	i	30	i	11	1	0	4	i	55	263	3	i	0	106	0	23	i	11	26	5	5	*	68	3	126	i	62	i														
Transportation equipment	336	8,822	0-81	i	283	21	64	i	0-35	0-58	0-41	538	2,443	31	7	296	0-11	179	i	0-24	104	4	94	124	71	0-8	1,108	55																		
Miscellaneous manufacturing	339	2,787	0-81	47-159	19	45	0-35	i	40	0-41	128	410	*	188	34	0-11	i	146	0-24	8	i	31	14	56	182	6	204	19																		
Other manufacturing	312-16, 321-24, 331, 337	1,315	0	0-110	4	27	0-35	0-58	0-41	48	42	*	7	31	0-11	7	*	4	8	1	5	323	0-8	119	61																					
Nonmanufacturing industries	21-23, 42-81	30,258	18	2,413	83	i	314	219	152	209	981	1,563	136	1,685	i	278	i	15	i	570	85	300	178	315	i	628	1,209	41	4,944	960	i															
Wholesale trade	42	37	i	0	0	0	0	0	0	0	1	i	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																		
Information	51	14,646	0-18	1,356	36	119	106	111	163	371	468	60	632	56	9	218	70	139	61	122	557	692	3	2,271	498																					
Telecommunications	517	94	0	0-46	0	0	0	2	0	*	3	0	4	0	1	0-46	*	i	0	0	1	1	i	*	0	17	0-46																			
Data processing, hosting, and related services	518	2,272	0-18	164	17	3	2	10	5	i	46	79	35	253	21	*	56	*	68	21	17	12	19	0	369	163	i																			
Other information	other 51	12,281	0-18	1,145-1,193	19	i	116	104	99	158	325	385	25	375	35	8	115-163	69	71	40	104	544	672	3	1,885	288-336																				
Professional, scientific, and technical services	54	11,064	0-18	i	793	44	i	170	i	110	29	i	44	556	760	67	i	241	198	i	0	266	i	12	149	i	113	i	165	i	52	i	497	28	i	2,201	i	413	i							
Architectural, engineering, and related services	5413	53	0	10	0	0	0	*	0	*	7	0	0	*	0	13	0	0	0	*	0	0	5	*	*																					
Scientific research and development services	5417	7,124	1	i	372	39	i	167	i	47	i	27	i	38	418	i	396	55	i	72	i	159	i	0	220	i	7	121	i	108	i	152	i	43	i	418	22	i	1,823	i	369	i				
Biotechnology research and development	541711	1,996	0	56	3	45	15	8	5	68	135	17	5	45	0	30	5	44	24	55	11	390	6	512	73																					
Data processing, hosting, and related services	other 5417	5,128	1	i	317	35	i	121	i	32	i	19	i	33	i	350	i	261	i	38	i	67	i	113	i	0	190	i	2	i	77	i	83	i	97	i	32	i	28	i	16	i	1,311	i	296	i
Other professional, scientific, and technical services	other 54	3,888	0-18	411	6	3	63	1	6	137	357	12	169	39	0	34	6	28	6	13	9	79	2	378	44																					
Other nonmanufacturing	21-23, 44-45, 48-49, 52-53, 55-56, 621-24, 71-72, 81	4,511	0-18	264	i	3	i	25	4	13	1	i	53	i	329	i	8	812	i	25	i	6	i	85	i	3	i	12	i	4	i	28	i	19	20	9	472	i	49							
All companies (number of domestic employees)	-	87,528	437	5,375	724	2,230	378	636	549	3,227	8,511	216	3,302	1,291	205	1,775	447	767	380	864	1,312	3,703	98	10,487	1,933																					

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: 2017 (part A)**  
 (Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside the United States	Puerto Rico <sup>a</sup>	Canada	Austria	Belgium	Czechia	Denmark	Finland	France	Germany	Hungary	Ireland	Italy	Luxembourg	Netherlands	Norway	Poland	Russia	Spain	Sweden	Switzerland	Turkey	United Kingdom	Other European locations
Small companies																									
10-19 <sup>b</sup>	-	136	2	26	7	0	2	0	0	3	11	*	0	* i	0	*	1	2	*	0	2	7	0	5 i	5
20-49	-	577	0	29	1	4	*	1	0	6	10	1	3	4	0	2	0	4	3	1	1	2	0	26	7
Medium companies																									
50-99	-	482	0 - 18	30	3	*	4	1	*	40	21	4	9 i	7	0	11	0	*	3	3	2	18	*	76	12
100-249	-	1,380	2	72	1	11	3	10	*	45	65	*	29	39	*	30	1	9	5	4	4	342	2	141	26
Large companies																									
Puerto Rico <sup>a</sup>	-	2,272	*	151	14	6	5	5	5 i	62	91	2	26 i	15	*	58	5	3	11	19	4	91	5	421	95
500-999	-	2,516	0	216	3	7	6	38	10	95	168	17	89	19	3	39	17	36	48	14	100	45	1	348	106
1,000-4,999	-	15,143	6 - 31	1,818 i	36	233	54	247	146	638	1,407	80	319	187	19	355	46	163	48	177	443	635	8	1,352	449 i
5,000-9,999	-	14,230	14	740	112	157 i	141 i	89	57 i	599	912	55 i	690	228	5 i	256 i	15	203 i	81 i	227	300	214	29 i	1,823 i	388 i
10,000-24,999	-	14,505	321	533	390	416	25	34	37	614	1,657	15	255	288	157	379	138	87	51	247	136	328	26	2,135	349
25,000 or more	-	36,287	70	1,761	156	1,395	136	210	294	1,126	4,170	41	1,882	502	21	645	225	260	130	173	319	2,021	27	4,161	496

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

NAICS = 2012 North American Industry Classification System.

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

<sup>b</sup> 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

TABLE 51-B

## R&amp;D paid for by the company and others and performed by the company outside of the United States, by selected location, industry, and company size: 2017 (part B)

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside the 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 Asia and Pacific locations	Israel	Other Middle Eastern locations	South Africa	Other African locations	Undistributed
All industries	21-23, 31-33, 42-81	87,528	353	1,526	119	900	1,470	1,844	7,188	423	7,726	42	3,588	789	134	2,192	1,413	1,166	343	932	4,318	233	186	132	1,663
Manufacturing industries	31-33	57,270	201	1,170	69	728	1,388	1,154	5,166	185	3,822	36	2,491	766	62	1,661	1,171	872	263	484	2,996	168	69	79	718
Food	311	865	5	96	5	22	10	37	150	*	7	3	2	*	2	20	4	*	6	13	*	*	1	0	154
Chemicals	325	14,450	130	289	37	135	247	242	802	46	339	8	905	11	11	219	77	75	23	51	165	75	43	20	74
Pharmaceuticals and medicines	3254	11,976	98	173	22	82	223	228	570	29	283	2	841	5	10	124	71	70	12	22	152	71	32	17	2
Other chemicals	other 325	2,474	32	116	15	53	24	14	232	17	55	6	64	6	1	95	6	6	10	29	13	4	11	3	72
Plastics and rubber products	326	902	27	72	1	23	10	5	126	8	8	1	62	1	2	2	54	13	5	2	0	10	*	1	0-34
Nonmetallic mineral products	327	181	0	0	0	5	0	*	11	0	1	0	35	0	*	0	40	8	0	1	20	0	0	0	*
Fabricated metal products	332	166	1	1	*	3	*	2	7	0	4	*	41	*	0	1	2	*	1	*	0	1	*	0	3
Machinery	333	3,266	2	96	1	13	1	31	296	4	168	*	105	12	9	72	147	44	1	11	228	4	2	*	54
Computer and electronic products	334	22,648	19	53	1	126	990	105	2,265	79	2,789	10	926	734	31	1,208	202	671	180	312	2,372	20	8	*	355-436
Electrical equipment, appliances, and components	335	1,867	*	113	1	32	7	5	385	20	55	0	82	*	0	2	31	20	2	36	5	3	1	0	*
Transportation equipment	336	8,822	6	397	*	320	16	596	699	*	345	*	112	1	0	4	563	17	20	6	61	1	0-17	0-60	0-81
Miscellaneous manufacturing	339	2,787	0-15	27	21	17	66	127	260	22	91	1	184	5	6	87	26	13	1	11	145	6	0-17	0-60	0-81
Other manufacturing	312-16, 321-24, 331, 337	1,315	0-15	28	2	30	40	4	165	7	16	14	38	1	1	44	24	11	23	40	*	47	0-17	*	0-81
Nonmanufacturing industries	21-23, 42-81	30,258	152	356	50	173	82	690	2,022	237	3,904	5	1,096	24	72	532	242	295	80	448	1,322	66	117	53	945
Wholesale trade	42	37	0	0	0	0	0	0	*	27	0	0	1	0	0	0	*	0	0	*	0	0	0	0	1
Information	51	14,646	43	107	24	63	38	308	1,154	134	2,646	1	254	9	37	165	73	163	5	370	727	17	15-30	23-39	116-139
Telecommunications	517	94	*	3	*	3	0-9	*	2	*	15	0	0	0	0-20	0-46	3	0	0	0	0	0	0	0	0-46
Data processing, hosting, and related services	518	2,272	23	12	*	2	30	57	104	4	348	*	25	2	18	17	3	8	*	13	103	8	16	0	79-138
Other information	other 51	12,281	20	92	23	58	0-9	250	1,048	130	2,283	1	229	7	0-20	101-149	67	155	5	357	624	9	0-15	23-39	0-60
Professional, scientific, and technical services	54	11,064	108	148	25	84	37	216	652	49	670	4	570	11	18	205	116	127	17	66	507	15	88	10	394-416
Architectural, engineering, and related services	5413	53	0	*	0	4	0	*	1	*	*	0	*	0	0	3	0	*	0	*	0	7	0	0	1
Scientific research and development services	5417	7,124	107	104	23	65	32	135	292	24	207	2	500	10	16	179	115	46	16	17	62	7	84	6	1
Biotechnology research and development	541711	1,996	15	18	7	29	12	56	93	5	42	*	63	2	7	13	33	14	3	3	18	*	8	0	*
Data processing, hosting, and related services	other 5417	5,128	92	85	15	37	19	78	200	20	165	2	437	9	9	166	82	32	13	14	44	7	76	6	1
Other professional, scientific, and technical services	other 54	3,888	1	44	2	15	5	81	359	24	463	2	69	*	2	23	1	81	1	49	445	*	4	4	391-415
Other nonmanufacturing	21-23, 44-45, 48-49, 52-53, 55-56, 621-24, 71-72, 81	4,511	1	101	2	26	7	166	216	27	588	*	272	3	17	161	53	4	58	12	88	34	0-15	3-21	388-435



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: 2017 (part B)**  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside the 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 Asia and Pacific locations	Israel	Other Middle Eastern locations	South Africa	Other African locations	Undistributed	
All companies (number of domestic employees)	-	87,528	353	1,526	119	900	1,470 i	1,844	7,188	423	7,726	42	3,588	789	134	2,192	1,413	1,166	343	932 i	4,318	233	186	132	1,663 i	
Small companies																										
10-19 <sup>a</sup>	-	136	0	0	0-5	0	0-6	1	17	*	6	0	*	0	*	*	14	1	0	*	8	*	0	0	13	
20-49	-	577	*	5	0-5	2	0-6	16	94	*	50	*	19	*	0	1	3	27	1	4	46	0	0	0	201 i	
Medium companies																										
50-99	-	482	4	16	0	1	*	2	62	1	63	*	3	*	*	4	3	7	*	6	60	*	3	0	0-18	
100-249	-	1,380	1	8	1 i	9	13	12	168	22	58	14	11	*	2	53	11 i	82	2	13	28	8	10	0	13 i	
Large companies																										
250-499	-	2,272	13	9	1	32	45	11	235	31	179	0	80	4	2 i	143	142	69	1	63	105	10	2	0	2	
500-999	-	2,516	35	15	2	37	15	52	198	16	105	3	86	26	*	77	17	64	8	6	78	*	1	1	243 i	
1,000-4,999	-	15,143	22	147	11	106	48	307 i	1,346	107	1,839	6	342	60	40	265	121	209	88	441 i	487	5	0-58	3-66	155-183 i	
5,000-9,999	-	14,230	100 i	125 i	22 i	65 i	955 i	180	795	31 i	1,325	2 i	908 i	308 i	27	420 i	196	105 i	169	164	426	29	82 i	6 i	455 i	
10,000-24,999	-	14,505	95	395	39	162	172	172	1,001	34	1,007	4	755	13	38	738	137	257	14	116	254	43	0-58	0-59	404 i	
25,000 or more	-	36,287	81	805	42	486	220	1,091	3,272	179	3,096	12	1,384	377	25	492	767	345	61	119	2,826	137	34	61	154 i	

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

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: 2017**  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Domestic R&D				
			Total	Structures	Equipment	Capitalized software	All other
All industries	21-23, 31-33, 42-81	587,332	31,885	3,541	14,898	8,539	4,907
Manufacturing industries	31-33	237,691	15,659	2,662	9,265	1,611	2,122
Food	311	19,410	552	140	377	26	9
Beverage and tobacco products	312	10,247	132	52	63	13	3
Textile, apparel, and leather products	313-16	2,508	109	43	31	29	6
Wood products	321	1,184	12	1	11	*	*
Paper	322	8,314	123	3	117	*	3
Printing and related support activities	323	1,975	19	*	7	11	1
Petroleum and coal products	324	8,601	235	68	164	*	3
Chemicals	325	41,932	5,394	1,788	2,250	469	887
Basic chemicals	3251	12,939	224	15	193	2	15
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,603	83	6	38	*	38
Pesticide, fertilizer, and other agricultural chemicals	3253	3,421	199	133	51	*	15
Pharmaceuticals and medicines	3254	16,211	4,394	1,565	1,641	399	789
Soap, cleaning compound, and toilet preparation	3256	4,633	158	8	119	4	27
Paint, coating, adhesive, and other chemicals	3255, 3259	3,124	336	61	209	63	3
Plastics and rubber products	326	13,162	318	18	236	4	61
Nonmetallic mineral products	327	3,249	74	11	35	1	28
Primary metals	331	3,441	93	*	21	1	70
Fabricated metal products	332	5,919	189	14	129	8	37
Machinery	333	11,707	866	90	548	101	127
Agricultural implement	33311	1,810	50	4	28	1	17
Semiconductor machinery	333242	733	338	63	224	23	27
Engine, turbine, and power transmission equipment	3336	1,193	91	5	65	6	15
Other machinery	other 333	7,971	388	18	231	71	68
Computer and electronic products	334	30,411	4,590	224	3,529	527	310
Communications equipment	3342	2,920	843	32	653	59	99
Semiconductor and other electronic components	3344	13,312	2,173	126	1,763	212	73
Navigational, measuring, electromedical, and control instruments	3345	7,018	571	46	277	147	101
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	1,029	109	9	80	16	4
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	2,138	302	11	106	120	65
Other measuring and controlling device	other 3345	3,852	160	26	91	11	32
Other computer and electronic products	other 334	7,161	1,004	20	837	109	38
Electrical equipment, appliances, and components	335	3,067	227	7	130	15	76

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: 2017**  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Domestic R&D				
			Total	Structures	Equipment	Capitalized software	All other
Transportation equipment	336	60,636	1,791	158	1,141	222	271
Automobiles, bodies, trailers, and parts	3361-63	46,164	1,177	103	759	143	173
Aerospace products and parts	3364	11,396	522	39	340	77	67
Aircraft, aircraft engine, and aircraft parts	336411-13	10,426	513	38	338	77	60
Guided missile, space vehicle, and related parts	336414-15, 336419	969	9	1	2	*	7
Military armored vehicle, tank, and tank component	336992	11	*	0	*	*	*
Other transportation	other 336	3,066	92	16	42	2	31
Furniture and related products	337	1,574	48	17	23	*	8
Miscellaneous	339	10,354	888	28	452	184	224
Medical equipment and supplies	3391	7,689	747	24	361	178	184
Other miscellaneous manufacturing	3399	2,665	141	4	91	6	40
Nonmanufacturing industries	21-23, 42-81	349,640	16,226	879	5,633	6,928	2,785
Mining, extraction, and support activities	21	28,701	409	7	196	102	104
Utilities	22	104,854	97	i 2	i 9	i 12	i 75
Wholesale trade	42	4,597	i 47	4	18	10	16
Electronic shopping and electronic auctions	454111-12	17,663	i 122 - 811	0 - 90	i 82	i 41	i 0 - 599
Transportation and warehousing	48-49	19,816	344	i 13	183	i 107	41
Information	51	117,469	7,730	555	3,637	2,739	800
Publishing	511	18,330	1,132	113	714	210	95
Newspaper, periodical, book, and directory publishers	5111	114	4	0	*	1	3
Software publishers	5112	18,215	1,128	113	714	209	92
Telecommunications	517	71,766	3,189	312 - 429	850	1,443	466 - 583
Data processing, hosting, and related services	518	7,938	1,556	15	559	859	124
Other information	other 51	19,435	1,854	0 - 115	1,514	227	0 - 115
Finance and insurance	52	20,670	2,753	25	i 426	1,758	544
Real estate and rental and leasing	53	2,460	35	0	3	i 32	*
Lessors of nonfinancial intangible assets (except copyrighted works)	533	47	i 3	i 0	3	i 0	0
Other real estate and rental and leasing	other 53	2,412	33	0	*	32	*
Professional, scientific, and technical services	54	13,853	3,072	187	881	1,402	602
Architectural, engineering, and related services	5413	3,040	71	10	38	8	15
Computer systems design and related services	5415	6,156	2,020	97	552	1,128	243
Scientific research and development services	5417	2,593	717	79	260	60	318
Biotechnology research and development	541711	739	209	26	50	3	130

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: 2017**  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Domestic R&D				
			Total	Structures	Equipment	Capitalized software	All other
Physical, engineering, and life sciences (except biotechnology) research and development	541712	1,845	499	52	203	55	189
Social sciences and humanities research and development	541720	10	9	1	6	2	*
Other professional, scientific, and technical services	other 54	2,064	264	1	32	206	26
Health care services	621-23	3,638	i 242	i 1	i 168	i 64	i 9
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	15,919	691 - 1,380	0 - 90	i 31	i 661	0 - 599
All companies (number of domestic employees)	-	587,332	31,885	3,541	14,898	8,539	4,907
Small companies							
10-19 <sup>a</sup>	-	1,642	319	13	133	64	109
20-49	-	6,837	924	43	413	104	364
Medium companies							
50-99	-	7,618	855	200	391	180	84
100-249	-	12,045	1,989	136	1,265	237	351
Large companies							
250-499	-	10,452	1,109	78	549	252	231
500-999	-	21,640	1,705	207	572	428	497
1,000-4,999	-	61,271	4,733	589	2,021	1,376	747
5,000-9,999	-	68,790	4,019	667	1,371	1,157	823
10,000-24,999	-	124,057	5,790	688	2,553	1,558	991
25,000 or more	-	272,980	10,442	919	5,630	3,182	710

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D. The "undistributed" column shown in prior years is no longer necessary because of processing improvements implemented beginning in 2015. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

#### Source(s)

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2017.

TABLE 53

## Worldwide, domestic, and foreign total and R&amp;D employment, by industry and company size: 2017

(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	30,450	2,349	7.7	19,893	1,609	8.1	10,557	740	7.0
Manufacturing industries	31-33	17,235	1,352	7.8	9,919	916	9.2	7,316	436	6.0
Food	311	1,845	35	1.9	1,273	23	1.8	572	12	2.1
Beverage and tobacco products	312	868	7	0.8	453	4	1.0	415	3	0.7
Textile, apparel, and leather products	313-16	407	8	2.0	273	7	2.5	133	1	0.8
Wood products	321	83	3	3.9	78	3	4.2	5	*	0.2
Paper	322	395	12	3.1	244	8	3.2	151	4	2.9
Printing and related support activities	323	243	3	1.2	171	3	1.7	72	*	0.1
Petroleum and coal products	324	76	3	3.9	66	2	3.5	9	1	6.7
Chemicals	325	2,211	245	11.1	1,234	174	14.1	977	70	7.2
Basic chemicals	3251	311	23	7.4	184	16	8.6	127	7	5.5
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	134	7	5.0	66	4	6.0	68	3	4.0
Pesticide, fertilizer, and other agricultural chemicals	3253	84	7	8.5	54	5	9.6	30	2	6.5
Pharmaceuticals and medicines	3254	889	170	19.1	518	127	24.6	371	43	11.6
Soap, cleaning compound, and toilet preparation	3256	474	18	3.7	238	12	4.9	236	6	2.5
Paint, coating, adhesive, and other chemicals	3255, 3259	320	20	6.3	174	11	6.2	146	9	6.5
Plastics and rubber products	326	695	35	5.0	494	28	5.7	201	7	3.3
Nonmetallic mineral products	327	185	8	4.5	122	7	5.5	62	2	2.5
Primary metals	331	303	10	3.4	198	8	4.0	105	2	2.2
Fabricated metal products	332	488	31	6.3	358	26	7.4	130	4	3.1
Machinery	333	1,555	120	7.7	839	85	10.1	716	35	4.9
Agricultural implement	33311	147	14	9.6	91	9	9.9	55	5	9.1
Semiconductor machinery	333242	79	16	20.6	31	10	32.1	47	6	13.1
Engine, turbine, and power transmission equipment	3336	164	16	9.6	92	11	11.4	72	5	7.2
Other machinery	other 333	1,166	74	6.3	624	55	8.8	542	19	3.5
Computer and electronic products	334	2,555	419	16.4	1,200	258	21.5	1,355	160	11.8
Communications equipment	3342	274	75	27.2	156	45	28.6	118	30	25.4
Semiconductor and other electronic components	3344	703	148	21.1	276	88	31.8	427	60	14.2
Navigational, measuring, electromedical, and control instruments	3345	874	101	11.5	480	69	14.4	393	32	8.0
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	148	20	13.5	78	13	16.7	69	7	9.8
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	319	39	12.1	210	33	15.6	109	6	5.5
Other measuring and controlling device	other 3345	407	42	10.3	192	23	12.1	215	19	8.7

TABLE 53

## Worldwide, domestic, and foreign total and R&amp;D employment, by industry and company size: 2017

(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
Other computer and electronic products	other 334	705	95	13.5	287	57	19.7	417	38	9.2
Electrical equipment, appliances, and components	335	858	60	7.0	291	29	10.1	566	31	5.4
Transportation equipment	336	3,063	253	8.3	1,771	172	9.7	1,292	81	6.3
Automobiles, bodies, trailers, and parts	3361-63	1,745	131	7.5	852	92	10.8	893	40	4.5
Aerospace products and parts	3364	1,063	107	10.1	710	67	9.5	353	40	11.3
Aircraft, aircraft engine, and aircraft parts	336411-13	1,007	95	9.4	667	55	8.3	340	40	11.7
Guided missile, space vehicle, and related parts	336414-15, 336419	56	12	21.7	44	12	27.9	12	*	*
Military armored vehicle, tank, and tank components	336992	1	*	6.0	1	*	6.0	0	0	NA
Other transportation	other 336	254	14	5.7	208	13	6.1	46	2	3.6
Furniture and related products	337	198	5	2.7	167	5	3.0	31	*	0.9
Miscellaneous manufacturing	339	1,210	95	7.9	687	73	10.6	523	22	4.2
Medical equipment and supplies	3391	901	72	8.0	475	53	11.2	425	19	4.4
Other miscellaneous manufacturing	3399	309	23	7.4	212	20	9.4	97	3 i	3.3
Nonmanufacturing industries	21-23, 42-81	13,215	997	7.5	9,974	693	7.0	3,241	303	9.4
Mining, extraction, and support activities	21	423	15	3.6	212	13	6.0	211	3 i	1.3
Utilities	22	476	3	0.6	464	3	0.6	13	*	0.8
Wholesale trade	42	372 i	10	2.6	282 i	8	3.0	90 i	1	1.3
Electronic shopping and electronic auctions	454111-12	441	71	16.0	291	41	14.1	150	30	19.8
Transportation and warehousing	48-49	1,418	7	0.5	1,127	7	0.6	291	*	*
Information	51	2,618	438	16.7	1,945	305	15.7	672	133	19.7
Publishing	511	953	224	23.5	581	135	23.2	372	90	24.1
Newspaper, periodical, book, and directory publishers	5111	9	1	7.2	9	1	6.9	*	*	19.0
Software publishers	5112	944	224	23.7	572	134	23.4	371	90	24.1
Telecommunications	517	842	32	3.8	775	31	4.0	68	1	1.7
Data processing, hosting, and related services	518	556	110	19.9	390	81	20.8	165	29	17.7
Other information	other 51	267	72	26.8	199	59	29.6	68	13	18.7
Finance and insurance	52	1,531	47	3.0	1,211	36	3.0	320	10	3.2
Real estate and rental and leasing	53	43	7	16.6	38	7	18.0	5	*	4.7
Lessors of nonfinancial intangible assets (except copyrighted works)	533	13 i	3 i	20.8	12 i	3 i	22.1	1 i	* i	6.3
Other real estate and rental and leasing	other 53	30	4	14.7	26	4	16.1	4	*	4.2
Professional, scientific, and technical services	54	2,413	358	14.8	1,330	235	17.7	1,083	123	11.3
Architectural, engineering, and related services	5413	397	46	11.5	301	45	14.9	96	1	0.6
Computer systems design and related services	5415	1,041	130	12.5	456	78	17.1	585	52	8.8
Scientific research and development services	5417	387	148	38.3	283	86	30.5	104	62	59.8

TABLE 53

**Worldwide, domestic, and foreign total and R&D employment, by industry and company size: 2017**

(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	
Biotechnology research and development	541711	141	32	22.6	122	19	15.6	19	13	68.3	
Physical, engineering, and life sciences (except biotechnology) research and development	541712	232	106	45.5	148	57	38.4	85	49	57.9	
Social sciences and humanities research and development	541720	14	11	78.1	14	11	78.1	*	*	83.0	
Other professional, scientific, and technical services	other 54	587	34	5.8	289	25	8.7	298	i	9	2.9
Health care services	621-23	573	7	1.2	565	6	1.1	7	*	5.9	
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	2,907	35	1.2	2,508	32	1.3	399		4	0.9
All companies (number of domestic employees)	-	30,450	2,349	7.7	19,893	1,609	8.1	10,557	740	7.0	
Small companies											
10-19 <sup>a</sup>	-	98	28	28.1	73	26	35.3	25	2	7.4	
20-49	-	329	85	25.8	285	78	27.3	44	7	16.2	
Medium companies											
50-99	-	400	80	20.1	366	74	20.3	34	6	17.6	
100-249	-	962	129	13.4	669	111	16.5	293	18	6.2	
Large companies											
250-499	-	954	116	12.2	686	87	12.6	268	29	10.9	
500-999	-	1,151	120	10.4	849	90	10.6	302	30	10.0	
1,000-4,999	-	4,380	411	9.4	2,668	275	10.3	1,712	136	7.9	
5,000-9,999	-	3,313	310	9.3	1,710	185	10.8	1,604	125	7.8	
10,000-24,999	-	5,124	367	7.2	3,007	248	8.2	2,116	119	5.6	
25,000 or more	-	13,739	704	5.1	9,581	437	4.6	4,158	267	6.4	

\* = amount &lt; 500 employees or less than 0.05%; i = &gt; 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; NA = not available.

NAICS = 2012 North American Industry Classification System.

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

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&amp;D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded R&amp;D.

**Source(s)**

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2017.

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: 2017**

(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	487,628	400,100	87,528	2,349	1,609	740	208	249	118
Manufacturing industries	31-33	314,496	257,227	57,270	1,352	916	436	233	281	131
Food	311	5,563	4,697	865	35	23	12	159	206	71
Beverage and tobacco products	312	1,743	1,076	667	7	4	3	237	246	223
Textile, apparel, and leather products	313-16	1,080	920	160	8	7	1	136	134	147
Wood products	321	176	175	1	3	3	*	54	54	42
Paper	322	1,580	1,322	259	12	8	4	129	170	59
Printing and related support activities	323	235	229	5	3	3	*	78	77	133
Petroleum and coal products	324	370	316	54	3	2	1	126	137	85
Chemicals	325	89,427	74,977	14,450	245	174	70	366	430	206
Basic chemicals	3251	3,133	2,574	560	23	16	7	137	162	80
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	949	628	321	7	4	3	142	158	119
Pesticide, fertilizer, and other agricultural chemicals	3253	1,761 - 1,875	1,376 - 1,475	384 - 401	7	5	2	D	D	D
Pharmaceuticals and medicines	3254	78,178	66,202	11,976	170	127	43	460	521	279
Soap, cleaning compound, and toilet preparation	3256	3,383 - 3,479	2,605 - 2,701	778	18	12	6	D	D	132
Paint, coating, adhesive, and other chemicals	3255, 3259	1,910 - 1,927	1,495	415 - 432	20	11	9	D	139	D
Plastics and rubber products	326	4,656	3,754	902	35	28	7	134	133	134
Nonmetallic mineral products	327	1,515	1,334	181	8	7	2	183	199	115
Primary metals	331	879	749	130	10	8	2	86	94	57
Fabricated metal products	332	2,371	2,206	166	31	26	4	78	83	41
Machinery	333	16,463	13,197	3,266	120	85	35	137	156	92
Agricultural implement	33311	2,137	1,570	567	14	9	5	152	174	113
Semiconductor machinery	333242	4,479	3,694	786	16	10	6	277	371	127
Engine, turbine, and power transmission equipment	3336	2,397 - 2,540	2,080	317 - 460	16	11	5	D	198	D
Other machinery	other 333	7,306 - 7,451	5,853	1,453 - 1,597	74	55	19	D	106	D
Computer and electronic products	334	101,223	78,575	22,648	419	258	160	242	304	141
Communications equipment	3342	15,819	12,687	3,132	75	45	30	212	284	104



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: 2017**

(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
Semiconductor and other electronic components	3344	41,046	30,148	10,898	148	88	60	277	343	180
Navigational, measuring, electromedical, and control instruments	3345	18,350	14,509	3,842	101	69	32	182	210	122
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,773	2,696	1,078	20	13	7	190	207	158
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	8,257	7,297	960	39	33	6	214	224	161
Other measuring and controlling device	other 3345	6,320	4,516	1,804	42	23	19	150	194	96
Other computer and electronic products	other 334	26,007	21,231	4,776	95	57	38	274	374	124
Electrical equipment, appliances, and components	335	6,158	4,291	1,867	60	29	31	102	146	61
Transportation equipment	336	62,114	53,292	8,822	253	172	81	245	311	108
Automobiles, bodies, trailers, and parts	3361-63	30,478	23,881	6,597	131	92	40	232	260	166
Aerospace products and parts	3364	28,436	26,383	2,053	107	67	40	265	393	51
Aircraft, aircraft engine, and aircraft parts	336411-13	26,626	24,576	2,050	95	55	40	280	447	51
Guided missile, space vehicle, and related parts	336414-15, 336419	1,810	1,807	3	12	12	*	149	148	815
Military armored vehicle, tank, and tank component	336992	9	9	0	*	*	0	168	168	0
Other transportation	other 336	3,190	3,018	173	14	13	2	222	238	103
Furniture and related products	337	462	422	40	5	5	*	88	85	141
Miscellaneous manufacturing	339	18,482	15,695	2,787	95	73	22	194	214	127
Medical equipment and supplies	3391	16,079	13,589	2,490	72	53	19	223	255	133
Other miscellaneous manufacturing	3399	2,403	2,106	297	23	20	3	104	106	93
Nonmanufacturing industries	21-23, 42-81	173,132	142,874	30,258	997	693	303	174	206	100
Mining, extraction, and support activities	21	3,479 - 3,486	3,150	329 - 337	15	13	3	D	249	D
Utilities	22	327	317	9	3	3	*	120	121	91
Wholesale trade	42	571	534	37	10	8	1	60	63	32
Electronic shopping and electronic auctions	454111-12	11,873 - 12,096	9,318	2,555 - 2,779	71	41	30	D	227	D
Transportation and warehousing	48-49	1,155	1,147	7	7	7	*	169	169	333
Information	51	94,898	80,252	14,646	438	305	133	217	263	110
Publishing	511	43,169	34,338	8,831	224	135	90	193	255	99
Newspaper, periodical, book, and directory publishers	5111	81	74	7	1	1	*	120	118	141
Software publishers	5112	43,088	34,264	8,824	224	134	90	193	256	99

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: 2017**

(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
Telecommunications	517	3,776 - 3,900	3,682 - 3,806	94	32	31	1	D	D	82
Data processing, hosting, and related services	518	18,427	16,155	2,272	110	81	29	167	199	78
Other information	other 51	29,403 - 29,527	25,954 - 26,077	3,450	72	59	13	D	D	271
Finance and insurance	52	8,581	7,616	965	47	36	10	184	209	95
Real estate and rental and leasing	53	909	718	191	7	7	*	128	104	888
Lessors of nonfinancial intangible assets (except copyrighted works)	533	311	138	173	3	3	*	115	52	2,661
Other real estate and rental and leasing	other 53	597	579	18	4	4	*	136	136	119
Professional, scientific, and technical services	54	47,987	36,922	11,064	358	235	123	134	157	90
Architectural, engineering, and related services	5413	2,761	2,708	53	46	45	1	61	60	86
Computer systems design and related services	5415	16,824	13,327	3,498	130	78	52	130	170	68
Scientific research and development services	5417	24,445	17,321	7,124	148	86	62	165	200	115
Biotechnology research and development	541711	6,444	4,449	1,996	32	19	13	202	234	155
Physical, engineering, and life sciences (except biotechnology) research and development	541712	17,038	11,913	5,125	106	57	49	161	210	104
Social sciences and humanities research and development	541720	963	959	4	11	11	*	90	89	287
Other professional, scientific, and technical services	other 54	3,957	3,566	390	34	25	9	116	141	45
Health care services	621-23	1,325 - 1,332	1,101	224 - 231	7	6	*	D	170	D
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,798 - 2,016	1,799	0 - 217	35	32	4	D	56	D
All companies (number of domestic employees)	-	487,628	400,100	87,528	2,349	1,609	740	208	249	118
Small companies										
10-19 <sup>a</sup>	-	3,447	3,311	136	28	26	2	125	129	73
20-49	-	10,011	9,435	577	85	78	7	118	121	81
Medium companies										
50-99	-	10,623	10,141	482	80	74	6	132	136	80
100-249	-	18,596	17,216	1,380	129	111	18	144	156	76
Large companies										
250-499	-	16,376	14,103	2,272	116	87	29	141	163	77

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: 2017**

(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
500–999	–	20,387	17,871	2,516	120	90	30	170	199	83
1,000–4,999	–	80,255	65,112	15,143	411	275	136	195	237	111
5,000–9,999	–	54,428	40,198	14,230	310	185	125	176	218	114
10,000–24,999	–	87,990	73,485	14,505	367	248	119	240	296	122
25,000 or more	–	185,514	149,227	36,287	704	437	267	264	341	136

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

TABLE 55

## Worldwide, domestic, and foreign R&amp;D employment, by sex, industry, and company size: 2017

(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	2,349	1,703	646	1,609	1,186	423	740	517	223
Manufacturing industries	31-33	1,352	1,018	334	916	693	223	436	325	111
Food	311	35	20	15	23	13	9	12	6	6
Beverage and tobacco products	312	7	4	3	4	3	2	3	2	1
Textile, apparel, and leather products	313-16	8	4	4	7	4	3	1	1	*
Wood products	321	3	3	*	3	3	*	*	*	0
Paper	322	12	9	3	8	6	2	4	3	1
Printing and related support activities	323	3	2	1	3	2	1	*	*	*
Petroleum and coal products	324	3	2	1	2	2	*	1	*	*
Chemicals	325	245	132	113	174	95	79	70	37	34
Basic chemicals	3251	23	16	7	16	11	5	7	5	2
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	7	5	1	4	3	1	3	2	1
Pesticide, fertilizer, and other agricultural chemicals	3253	7	5	3	5	3	2	2	1	1
Pharmaceuticals and medicines	3254	170	82	88	127	64	63	43	18	25
Soap, cleaning compound, and toilet preparation	3256	18	9	9	12	6	6	6	3	3
Paint, coating, adhesive, and other chemicals	3255, 3259	20	15	5	11	8	3	9	7	2
Plastics and rubber products	326	35	27	8	28	22	6	7	5	2
Nonmetallic mineral products	327	8	7	1	7	6	1	2	1	*
Primary metals	331	10	9	1	8	7	1	2	2	*
Fabricated metal products	332	31	27	4	26	24	3	4	3	1
Machinery	333	120	105	15	85	75	10	35	30	5
Agricultural implement	33311	14	13	1	9	8	1	5	4	1
Semiconductor machinery	333242	16	14	2	10	9	1	6	5	1
Engine, turbine, and power transmission equipment	3336	16	14	2	11	9	1	5	5	1
Other machinery	other 333	74	65	9	55	49	6	19	16	3
Computer and electronic products	334	419	337	82	258	210	48	160	127	34
Communications equipment	3342	75	61	13	45	37	8	30	24	6
Semiconductor and other electronic components	3344	148	121	28	88	72	16	60	49	12
Navigational, measuring, electromedical, and control instruments	3345	101	77	23	69	54	15	32	23	8
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	20	13	7	13	9	4	7	5	2
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	39	32	7	33	27	6	6	5	1
Other measuring and controlling device	other 3345	42	32	10	23	18	5	19	14	5
Other computer and electronic products	other 334	95	78	18	57	47	10	38	30	8
Electrical equipment, appliances, and components	335	60	49	11	29	25	5	31	24	7
Transportation equipment	336	253	210	43	172	141	31	81	69	13

TABLE 55

## Worldwide, domestic, and foreign R&amp;D employment, by sex, industry, and company size: 2017

(Thousands)

Industry and company size	NAICS code	Worldwide			Domestic			Foreign		
		Total	Male	Female	Total	Male	Female	Total	Male	Female
Automobiles, bodies, trailers, and parts	3361-63	131	107	25	92	75	17	40	32	8
Aerospace products and parts	3364	107	92	15	67	57	10	40	36	4
Aircraft, aircraft engine, and aircraft parts	336411-13	95	82	13	55	47	8	40	36	4
Guided missile, space vehicle, and related parts	336414-15, 336419	12	10	2	12	10	2	*	*	0
Military armored vehicle, tank, and tank components	336992	*	*	*	*	*	*	0	0	0
Other transportation	other 336	14	10	4	13	9	4	2	1	*
Furniture and related products	337	5	4	1	5	4	1	*	*	*
Miscellaneous manufacturing	339	95	67	28	73	52	21	22	15	7
Medical equipment and supplies	3391	72	49	23	53	36	17	19	13	6
Other miscellaneous manufacturing	3399	23	18	5	20	15	4	3 i	2 i	1
Nonmanufacturing industries	21-23, 42-81	997	685	312	693	494	200	303	191	112
Mining, extraction, and support activities	21	15	12 i	3 i	13	10 i	2 i	3 i	2 i	1 i
Utilities	22	3	2	1	3	2	1	*	*	*
Wholesale trade	42	10	7	2	8	7	2	1	1	* i
Electronic shopping and electronic auctions	454111-12	71	42	28	41	25	16	30	18	12
Transportation and warehousing	48-49	7	5	2	7	5	2	*	*	*
Information	51	438	328	110	305	231	74	133	97	36
Publishing	511	224	164	60	135	100	35	90	64	26
Newspaper, periodical, book, and directory publishers	5111	1	*	*	1	*	*	*	*	*
Software publishers	5112	224	164	60	134	100	34	90	64	26
Telecommunications	517	32	24 i	7	31	24 i	7	1	1	*
Data processing, hosting, and related services	518	110	83	28	81	61	20	29	22	8
Other information	other 51	72	57	15	59	46	12	13	11	2
Finance and insurance	52	47	28	18	36	22	14	10	6	4
Real estate and rental and leasing	53	7	5 i	2 i	7	5 i	2 i	*	*	*
Lessors of nonfinancial intangible assets (except copyrighted works)	533	3 i	2 i	1 i	3 i	2 i	1 i	* i	* i	* i
Other real estate and rental and leasing	other 53	4	3	1	4	3	1	*	*	*
Professional, scientific, and technical services	54	358	224	134	235	158	76	123	65	58
Architectural, engineering, and related services	5413	46	36	10	45	35	9	1	*	*
Computer systems design and related services	5415	130	100	30	78	61	17	52	39	13
Scientific research and development services	5417	148	62	86	86	43	43	62	19	43
Biotechnology research and development	541711	32	12	20	19	8	11	13	4	9
Physical, engineering, and life sciences (except biotechnology) research and development	541712	106	45	60	57	30	27	49	16	34
Social sciences and humanities research and development	541720	11	5 i	5 i	11	5 i	5 i	*	* i	* i
Other professional, scientific, and technical services	other 54	34	25	9 i	25	18	7	9	7 i	2 i

TABLE 55

## Worldwide, domestic, and foreign R&amp;D employment, by sex, industry, and company size: 2017

(Thousands)

Industry and company size	NAICS code	Worldwide			Domestic			Foreign		
		Total	Male	Female	Total	Male	Female	Total	Male	Female
Health care services	621-23	7	3	4	6	3	4	*	*	*
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	35	29	7	32	26	6	4	3	1
All companies (number of domestic employees)	-	2,349	1,703	646	1,609	1,186	423	740	517	223
Small companies										
10-19 <sup>a</sup>	-	28	22	5	26	21	5	2	1	*
20-49	-	85	66	19	78	61	17	7	5	2
Medium companies										
50-99	-	80	64	17	74	59	15	6	5	1
100-249	-	129	100	28	111	87	23	18	13	5
Large companies										
250-499	-	116	88	28	87	66	20	29	22	7
500-999	-	120	92	28	90	69	21	30	23	7
1,000-4,999	-	411	301	109	275	203	72	136	98	38
5,000-9,999	-	310	200	110	185	125	60	125	75	50
10,000-24,999	-	367	257	110	248	177	71	119	80	39
25,000 or more	-	704	512	192	437	318	119	267	195	72

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D.

**Source(s)**

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2017.

TABLE 56

## Worldwide total employment, R&amp;D employment, and level of education of researchers, by occupation, industry, and company size: 2017

(Thousands)

Industry and company size	NAICS code	Total employment	Total	Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
All industries	21-23, 31-33, 42-81	30,450	2,349	1,629	147	496	224
Manufacturing industries	31-33	17,235	1,352	984	98	232	137
Food	311	1,845	35	22	2 i	8	5
Beverage and tobacco products	312	868	7	5	1	2	1
Textile, apparel, and leather products	313-16	407	8	3	*	3	2
Wood products	321	83	3	1	*	2	1
Paper	322	395	12	9	1	2	1
Printing and related support activities	323	243	3	1	*	1	1
Petroleum and coal products	324	76	3	2	*	1	*
Chemicals	325	2,211	245	164	38	44	36
Basic chemicals	3251	311	23	13	4	7	3
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	134	7	4	1	2	*
Pesticide, fertilizer, and other agricultural chemicals	3253	84	7	5	1 i	2	*
Pharmaceuticals and medicines	3254	889	170	114	29	27	29
Soap, cleaning compound, and toilet preparation	3256	474	18	14	2	2	2
Paint, coating, adhesive, and other chemicals	3255, 3259	320	20	13	1	5	2
Plastics and rubber products	326	695	35	19	3	12	4
Nonmetallic mineral products	327	185	8	5	1 i	2	1
Primary metals	331	303	10	5	*	3	3
Fabricated metal products	332	488	31	15	1	11	4
Machinery	333	1,555	120	85	6	25	10
Agricultural implement	33311	147	14	10	*	3	1
Semiconductor machinery	333242	79	16	14	2	2	*
Engine, turbine, and power transmission equipment	3336	164	16	13	*	2	1
Other machinery	other 333	1,166	74	48	2 i	19	7
Computer and electronic products	334	2,555	419	343	28 i	44 i	32 i
Communications equipment	3342	274	75	61	2 i	7	7
Semiconductor and other electronic components	3344	703	148	131 i	12 i	11 i	6 i
Navigational, measuring, electromedical, and control instruments	3345	874	101	78	8	15 i	7 i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	148	20	14 i	2 i	5 i	1 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	319	39	31 i	2	5 i	3 i
Other measuring and controlling device	other 3345	407	42	33	4	6	3
Other computer and electronic products	other 334	705	95	73	5 i	10 i	12 i

TABLE 56

## Worldwide total employment, R&amp;D employment, and level of education of researchers, by occupation, industry, and company size: 2017

(Thousands)

Industry and company size	NAICS code	Total employment	Total	Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
Electrical equipment, appliances, and components	335	858	60	47	2	11	3
Transportation equipment	336	3,063	253	195	9	38	20
Automobiles, bodies, trailers, and parts	3361-63	1,745	131	104	5	20	8
Aerospace products and parts	3364	1,063	107	84	4	14	9
Aircraft, aircraft engine, and aircraft parts	336411-13	1,007	95	76	4	12	7
Guided missile, space vehicle, and related parts	336414-15, 336419	56	12	8	*	2	2
Military armored vehicle, tank, and tank component	336992	1	*	*	*	*	*
Other transportation	other 336	254	14	7	*	4	3
Furniture and related products	337	198	5	2	*	2	1
Miscellaneous manufacturing	339	1,210	95	63	6	21	12
Medical equipment and supplies	3391	901	72	49	5	15	8
Other miscellaneous manufacturing	3399	309	23	14	1	5	4
Nonmanufacturing industries	21-23, 42-81	13,215	997	645	49	264	88
Mining, extraction, and support activities	21	423	15	8	2	5	2
Utilities	22	476	3	1	*	1	*
Wholesale trade	42	372	10	4	*	2	3
Electronic shopping and electronic auctions	454111-12	441	71	43	1	24	4
Transportation and warehousing	48-49	1,418	7	4	*	2	1
Information	51	2,618	438	317	21	87	33
Publishing	511	953	224	175	9	28	21
Newspaper, periodical, book, and directory publishers	5111	9	1	*	*	*	*
Software publishers	5112	944	224	175	9	28	21
Telecommunications	517	842	32	18	1	13	1
Data processing, hosting, and related services	518	556	110	71	2	31	9
Other information	other 51	267	72	53	10	16	3
Finance and insurance	52	1,531	47	23	1	21	2
Real estate and rental and leasing	53	43	7	4	*	1	1
Lessors of nonfinancial intangible assets (except copyrighted works)	533	13	3	1	*	1	1
Other real estate and rental and leasing	other 53	30	4	4	*	1	*
Professional, scientific, and technical services	54	2,413	358	218	23	105	34
Architectural, engineering, and related services	5413	397	46	30	1	12	4
Computer systems design and related services	5415	1,041	130	102	7	16	12
Scientific research and development services	5417	387	148	63	13	69	16
Biotechnology research and development	541711	141	32	20	3	11	1



TABLE 56

## Worldwide total employment, R&amp;D employment, and level of education of researchers, by occupation, industry, and company size: 2017

(Thousands)

Industry and company size	NAICS code	Total employment	Total	Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
Physical, engineering, and life sciences (except biotechnology) research and development	541712	232	106	36	7	58	13
Social sciences and humanities research and development	541720	14	11	8	3 i	*	3
Other professional, scientific, and technical services	other 54	587	34	23	2 i	8	2 i
Health care services	621-23	573	7	3 i	1 i	3 i	2
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	2,907	35	20	1	11	4
All companies (number of domestic employees)	-	30,450	2,349	1,629	147	496	224
Small companies							
10-19 <sup>b</sup>	-	98	28	18	3	7	2
20-49	-	329	85	51	7	25	8
Medium companies							
50-99	-	400	80	45	6	26	9
100-249	-	962	129	76	8	38	15
Large companies							
250-499	-	954	116	74	7	31	11
500-999	-	1,151	120	81	7	24	15
1,000-4,999	-	4,380	411	290	24	83	38
5,000-9,999	-	3,313	310	194	17 i	85	31
10,000-24,999	-	5,124	367	262	29 i	69	36
25,000 or more	-	13,739	704	536	39	108	59

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

NAICS = 2012 North American Industry Classification System.

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

<sup>b</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D.

**Source(s)**

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2017.

TABLE 57

## Domestic total employment, R&amp;D employment, and level of education of researchers, by occupation, industry, and company size: 2017

(Thousands)

Industry and company size	NAICS code	Total employment	Total	Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
All industries	21-23, 31-33, 42-81	19,893	1,609	1,103	119	347	160
Manufacturing industries	31-33	9,919	916	642	76	173	101
Food	311	1,273	23	13	2 i	6	4
Beverage and tobacco products	312	453	4	3	1	1	1
Textile, apparel, and leather products	313-16	273	7	3	*	2	2
Wood products	321	78	3	1	*	2	1
Paper	322	244	8	5	*	2	1
Printing and related support activities	323	171	3	1	*	1	1
Petroleum and coal products	324	66	2	1	*	1	*
Chemicals	325	1,234	174	119	30	31	25
Basic chemicals	3251	184	16	9	3	4	2
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	66	4	2	*	1	*
Pesticide, fertilizer, and other agricultural chemicals	3253	54	5	4	1 i	1	*
Pharmaceuticals and medicines	3254	518	127	87	22	20	20
Soap, cleaning compound, and toilet preparation	3256	238	12	9	1	1	1
Paint, coating, adhesive, and other chemicals	3255, 3259	174	11	6	1	3	1
Plastics and rubber products	326	494	28	15	3	10	4
Nonmetallic mineral products	327	122	7	4	* i	2	1
Primary metals	331	198	8	3	*	2	3
Fabricated metal products	332	358	26	11	*	11	4
Machinery	333	839	85	57	4	21	7
Agricultural implement	33311	91	9	6	*	2	1
Semiconductor machinery	333242	31	10	8	2	2	*
Engine, turbine, and power transmission equipment	3336	92	11	9	*	1	*
Other machinery	other 333	624	55	34	2 i	16	6
Computer and electronic products	334	1,200	258	209	22 i	31	19
Communications equipment	3342	156	45	34	2	6	4
Semiconductor and other electronic components	3344	276	88	76 i	10 i	8 i	4 i
Navigational, measuring, electromedical, and control instruments	3345	480	69	54	6	10	4
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	78	13	10	1 i	3 i	* i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	210	33	26	1	4	2
Other measuring and controlling device	other 3345	192	23	18	3	4	2
Other computer and electronic products	other 334	287	57	45	4 i	6	6

TABLE 57

## Domestic total employment, R&amp;D employment, and level of education of researchers, by occupation, industry, and company size: 2017

(Thousands)

Industry and company size	NAICS code	Total employment	Total	Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
Electrical equipment, appliances, and components	335	291	29	20	1	7	2
Transportation equipment	336	1,771	172	128	7	27	17
Automobiles, bodies, trailers, and parts	3361-63	852	92	72	3	13	6
Aerospace products and parts	3364	710	67	49	3	10	8
Aircraft, aircraft engine, and aircraft parts	336411-13	667	55	42	3	8	5
Guided missile, space vehicle, and related parts	336414-15, 336419	44	12	8	*	2	2
Military armored vehicle, tank, and tank component	336992	1	*	*	*	*	*
Other transportation	other 336	208	13	6	* i	4	3
Furniture and related products	337	167	5	2	*	2	1
Miscellaneous manufacturing	339	687	73	48	5	15	10
Medical equipment and supplies	3391	475	53	36	4	11	6
Other miscellaneous manufacturing	3399	212	20	12	i 1 i	5	4 i
Nonmanufacturing industries	21-23, 42-81	9,974	693	461	42 i	174	59
Mining, extraction, and support activities	21	212	13	6	1 i	5	2
Utilities	22	464	3	1	*	1	*
Wholesale trade	42	282	i 8	4	*	2	2 i
Electronic shopping and electronic auctions	454111-12	291	41	29	1 i	10	2
Transportation and warehousing	48-49	1,127	7	4	*	2	1 i
Information	51	1,945	305	222	18 i	63	20
Publishing	511	581	135	106	7 i	19	10
Newspaper, periodical, book, and directory publishers	5111	9	1	*	*	*	*
Software publishers	5112	572	134	106	7 i	19	10
Telecommunications	517	775	31	18	1 i	12	i 1
Data processing, hosting, and related services	518	390	81	55	2	19	7
Other information	other 51	199	59	43	8	13	3
Finance and insurance	52	1,211	36	16	1	19	2
Real estate and rental and leasing	53	38	7	4	*	1	i 1 i
Lessors of nonfinancial intangible assets (except copyrighted works)	533	12	i 3 i	1 i	0	1	i 1 i
Other real estate and rental and leasing	other 53	26	4	3	*	*	*
Professional, scientific, and technical services	54	1,330	235	155	20	58	22
Architectural, engineering, and related services	5413	301	45	30	1	12	4
Computer systems design and related services	5415	456	78	60	6	12	6
Scientific research and development services	5417	283	86	48	11	28	11
Biotechnology research and development	541711	122	19	13	2	6	1

TABLE 57

## Domestic total employment, R&amp;D employment, and level of education of researchers, by occupation, industry, and company size: 2017

(Thousands)

Industry and company size	NAICS code	Total employment	Total	Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
Physical, engineering, and life sciences (except biotechnology) research and development	541712	148	57	28	6	22	7
Social sciences and humanities research and development	541720	14	11	8	3 i	*	3
Other professional, scientific, and technical services	other 54	289	25	17	2	7	2
Health care services	621-23	565	6	2 i	1 i	2 i	2
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	2,508	32	18	1	11	3
All companies (number of domestic employees)	-	19,893	1,609	1,103	119	347	160
Small companies							
10-19 <sup>b</sup>	-	73	26	17	3	7	2
20-49	-	285	78	46	7	24	8
Medium companies							
50-99	-	366	74	41	6	25	8
100-249	-	669	111	63	8	34	13
Large companies							
250-499	-	686	87	53	6	25	9
500-999	-	849	90	59	6	19	12
1,000-4,999	-	2,668	275	192	19	55	28
5,000-9,999	-	1,710	185	125	13 i	39	21
10,000-24,999	-	3,007	248	177	22 i	47	24
25,000 or more	-	9,581	437	329	30	73	35

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

NAICS = 2012 North American Industry Classification System.

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

<sup>b</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D.

**Source(s)**

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2017.

TABLE 58

## Foreign total employment, R&amp;D employment, and level of education of researchers, by occupation, industry, and company size: 2017

(Thousands)

Industry and company size	NAICS code	Total employment	Total	Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff	
				Total	With PhD			
All industries	21-23, 31-33, 42-81	10,557	740	526	28	149		65
Manufacturing industries	31-33	7,316	436	342	22	59		36
Food	311	572	12	9	*	2	i	1
Beverage and tobacco products	312	415	3	2	*	1		*
Textile, apparel, and leather products	313-16	133	1	*	*	1		*
Wood products	321	5	*	*	0	*		*
Paper	322	151	4	3	*	1		*
Printing and related support activities	323	72	*	*	i	0		*
Petroleum and coal products	324	9	1	*	*	i		*
Chemicals	325	977	70	45	8	13		12
Basic chemicals	3251	127	7	4	1	2		1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	68	3	2	*	1		*
Pesticide, fertilizer, and other agricultural chemicals	3253	30	2	1	*	i		*
Pharmaceuticals and medicines	3254	371	43	27	6	7		9
Soap, cleaning compound, and toilet preparation	3256	236	6	5	1	*		1
Paint, coating, adhesive, and other chemicals	3255, 3259	146	9	6	*	2		1
Plastics and rubber products	326	201	7	4	1	2		1
Nonmetallic mineral products	327	62	2	1	i	*	i	1
Primary metals	331	105	2	2	*	*		*
Fabricated metal products	332	130	4	3	*	*		*
Machinery	333	716	35	29	1	5		2
Agricultural implement	33311	55	5	4	*	1		*
Semiconductor machinery	333242	47	6	6	1	*		*
Engine, turbine, and power transmission equipment	3336	72	5	4	*	*		*
Other machinery	other 333	542	19	14	1	i	3	i
Computer and electronic products	334	1,355	160	134	i	6	i	13
Communications equipment	3342	118	30	26	*	i	1	2
Semiconductor and other electronic components	3344	427	60	55	i	2	i	3
Navigational, measuring, electromedical, and control instruments	3345	393	32	23	3		5	i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	69	7	4	i	1	i	2
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	109	i	6	5	i	*	1
Other measuring and controlling device	other 3345	215	19	15	2		3	1
Other computer and electronic products	other 334	417	38	29	i	1	i	4
Electrical equipment, appliances, and components	335	566	31	26	i	*	i	4

TABLE 58

## Foreign total employment, R&amp;D employment, and level of education of researchers, by occupation, industry, and company size: 2017

(Thousands)

Industry and company size	NAICS code	Total employment	Total	Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
Transportation equipment	336	1,292	81	67	2 i	11	3
Automobiles, bodies, trailers, and parts	3361-63	893	40	31	2 i	7	2
Aerospace products and parts	3364	353	40	35	1	4	1
Aircraft, aircraft engine, and aircraft parts	336411-13	340	40	35	1	4	1
Guided missile, space vehicle, and related parts	336414-15, 336419	12	*	*	0	0	0
Military armored vehicle, tank, and tank component	336992	0	0	0	0	0	0
Other transportation	other 336	46	2	1	*	*	*
Furniture and related products	337	31	*	*	0	*	*
Miscellaneous manufacturing	339	523	22	15	1	5	2
Medical equipment and supplies	3391	425	19	13	1	5	1
Other miscellaneous manufacturing	3399	97	3 i	2 i	* i	1	* i
Nonmanufacturing industries	21-23, 42-81	3,241	303	185	7	90	29
Mining, extraction, and support activities	21	211	3 i	2 i	* i	*	* i
Utilities	22	13	*	*	*	*	* i
Wholesale trade	42	90	i 1	*	*	*	1 i
Electronic shopping and electronic auctions	454111-12	150	30	14	* i	14	2
Transportation and warehousing	48-49	291	*	*	0	*	0
Information	51	672	133	95	3	24	13
Publishing	511	372	90	69	1	9	11
Newspaper, periodical, book, and directory publishers	5111	*	*	*	0	*	0
Software publishers	5112	371	90	69	1	9	11
Telecommunications	517	68	1	*	* i	1 i	*
Data processing, hosting, and related services	518	165	29	16	*	12	2
Other information	other 51	68	13	9	1	3	* i
Finance and insurance	52	320	10	7	* i	3	* i
Real estate and rental and leasing	53	5	*	*	* i	*	*
Lessors of nonfinancial intangible assets (except copyrighted works)	533	1	i *	* i	* i	0	0
Other real estate and rental and leasing	other 53	4	*	*	0	*	*
Professional, scientific, and technical services	54	1,083	123	64	3	47	12
Architectural, engineering, and related services	5413	96	1	1	*	*	*
Computer systems design and related services	5415	585	52	42	1	4 i	6
Scientific research and development services	5417	104	62	15	1	42	5 i
Biotechnology research and development	541711	19	13	7	1	6	*
Physical, engineering, and life sciences (except biotechnology) research and development	541712	85	49	8 i	1 i	36	5 i

TABLE 58

## Foreign total employment, R&amp;D employment, and level of education of researchers, by occupation, industry, and company size: 2017

(Thousands)

Industry and company size	NAICS code	Total employment	Total	Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff					
				Total	With PhD							
Social sciences and humanities research and development	541720	*	*	*	0	*	i	0				
Other professional, scientific, and technical services	other 54	298	i	9	7	i	*	i	1	i		
Health care services	621-23	7	*	*	i	*	i	*	i	*	i	
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	399		4	2		*		1		1	
All companies (number of domestic employees)	-	10,557		740	526		28		149		65	
Small companies												
10-19 <sup>b</sup>	-	25		2	1		*		*		1	
20-49	-	44		7	5		*		2		*	
Medium companies												
50-99	-	34		6	4		*		2		*	
100-249	-	293		18	13		1		4		1	i
Large companies												
250-499	-	268		29	21		1		6		2	
500-999	-	302		30	22		1		4		3	
1,000-4,999	-	1,712		136	99		5		28		9	
5,000-9,999	-	1,604		125	69		4	i	45		10	
10,000-24,999	-	2,116		119	85	i	7	i	22		12	i
25,000 or more	-	4,158		267	207		9		35		25	

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

NAICS = 2012 North American Industry Classification System.

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

<sup>b</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D.

**Source(s)**

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2017.

TABLE 59

## Domestic full-time equivalent R&amp;D employees and researchers, by work status, industry, and company size: 2017

(Thousands)

Industry and company size	NAICS code	FTE R&D employees <sup>a</sup>				FTE R&D scientists and engineers <sup>b</sup>				
		Total	Full-time R&D employees	Full-time employees working on R&D part-time	Part-time employees working on R&D	Total	Full-time R&D employees	Full-time employees working on R&D part-time	Part-time employees working on R&D	
All industries	21-23, 31-33, 42-81	1,475	1,231	228	16	1,023	885	130	9	i
Manufacturing industries	31-33	841	732	100	9	599	539	54	5	i
Food	311	19	17	2	1	12	11	1	*	i
Beverage and tobacco products	312	4	3	*	*	2	2	*	*	
Textile, apparel, and leather products	313-16	6	5	2	*	3	2	1	*	i
Wood products	321	2	1	1	*	1	1	*	*	
Paper	322	7	5	1	*	5	4	1	*	
Printing and related support activities	323	2	1	1	*	1	1	*	*	
Petroleum and coal products	324	2	2	*	*	1	1	*	*	i
Chemicals	325	171	160	9	1	116	110	5	1	
Basic chemicals	3251	15	14	1	*	9	9	1	*	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	4	3	*	*	2	2	*	*	
Pesticide, fertilizer, and other agricultural chemicals	3253	5	5	*	*	4	4	*	*	i
Pharmaceuticals and medicines	3254	125	118	6	1	86	82	4	*	
Soap, cleaning compound, and toilet preparation	3256	11	11	*	*	9	9	*	i	*
Paint, coating, adhesive, and other chemicals	3255, 3259	10	9	1	*	6	6	*	*	
Plastics and rubber products	326	23	18	5	1	13	11	2	*	
Nonmetallic mineral products	327	5	4	1	*	3	3	*	*	i
Primary metals	331	6	3	3	*	2	2	1	*	
Fabricated metal products	332	18	10	8	*	9	5	3	*	i
Machinery	333	74	53	21	*	51	38	13	*	
Agricultural implement	33311	8	7	1	*	6	5	1	*	
Semiconductor machinery	333242	10	10	*	*	8	8	*	*	i
Engine, turbine, and power transmission equipment	3336	10	3	7	*	8	2	6	*	
Other machinery	other 333	46	33	13	*	29	23	7	i	*
Computer and electronic products	334	250	228	18	i	3	202	187	13	i
Communications equipment	3342	43	42	1	*	33	32	1	i	*
Semiconductor and other electronic components	3344	85	80	4	i	2	74	70	3	i
Navigational, measuring, electromedical, and control instruments	3345	65	53	11	i	1	51	42	9	i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	13	12	1	i	*	10	9	*	i
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	29	20	9	i	*	24	16	7	i



TABLE 59

## Domestic full-time equivalent R&amp;D employees and researchers, by work status, industry, and company size: 2017

(Thousands)

Industry and company size	NAICS code	FTE R&D employees <sup>a</sup>				FTE R&D scientists and engineers <sup>b</sup>			
		Total	Full-time R&D employees	Full-time employees working on R&D part-time	Part-time employees working on R&D	Total	Full-time R&D employees	Full-time employees working on R&D part-time	Part-time employees working on R&D
Other measuring and controlling device	other 3345	23	21	2	*	18	16	1	*
Other computer and electronic products	other 334	56	54	2	*	44	43	1	i *
Electrical equipment, appliances, and components	335	26	i 23	i 3	1	19	i 17	i 2	i *
Transportation equipment	336	154	137	16	1	112	103	9	1
Automobiles, bodies, trailers, and parts	3361-63	88	83	5	*	69	67	3	*
Aerospace products and parts	3364	54	44	9	1	37	31	5	i *
Aircraft, aircraft engine, and aircraft parts	336411-13	43	34	8	1	31	25	5	i *
Guided missile, space vehicle, and related parts	336414-15, 336419	10	10	*	*	6	6	*	*
Military armored vehicle, tank, and tank component	336992	*	*	*	0	*	*	*	0
Other transportation	other 336	12	i 10	i 2	i *	6	i 5	1	i *
Furniture and related products	337	5	3	1	*	2	2	*	*
Miscellaneous manufacturing	339	67	60	6	1	45	41	3	i *
Medical equipment and supplies	3391	49	46	3	*	35	33	2	*
Other miscellaneous manufacturing	3399	18	15	3	*	11	i 9	i 2	i *
Nonmanufacturing industries	21-23, 42-81	634	499	128	7	424	345	75	4
Mining, extraction, and support activities	21	12	11	1	*	4	i 4	i *	i *
Utilities	22	1	1	*	*	1	* i	*	*
Wholesale trade	42	6	4	3	i *	3	2	1	i *
Electronic shopping and electronic auctions	454111-12	40	10	31	0	28	9	19	0
Transportation and warehousing	48-49	7	6	1	*	4	3	*	*
Information	51	296	257	38	1	216	193	22	i 1
Publishing	511	132	120	12	*	103	95	8	i *
Newspaper, periodical, book, and directory publishers	5111	1	*	*	*	*	*	*	0
Software publishers	5112	131	119	12	*	103	95	8	i *
Telecommunications	517	30	14	16	*	18	i 10	8	i *
Data processing, hosting, and related services	518	76	67	9	*	52	47	5	*
Other information	other 51	58	57	1	*	i 43	42	1	*
Finance and insurance	52	29	25	i 4	*	i 15	14	1	i *
Real estate and rental and leasing	53	6	4	2	i *	4	3	1	i *
Lessors of nonfinancial intangible assets (except copyrighted works)	533	2	i *	i 2	i 0	1	i *	i 1	i 0
Other real estate and rental and leasing	other 53	4	4	*	*	3	3	*	*

TABLE 59

## Domestic full-time equivalent R&amp;D employees and researchers, by work status, industry, and company size: 2017

(Thousands)

Industry and company size	NAICS code	FTE R&D employees <sup>a</sup>				FTE R&D scientists and engineers <sup>b</sup>			
		Total	Full-time R&D employees	Full-time employees working on R&D part-time	Part-time employees working on R&D	Total	Full-time R&D employees	Full-time employees working on R&D part-time	Part-time employees working on R&D
Professional, scientific, and technical services	54	207	169	34	5	133	110	21	2
Architectural, engineering, and related services	5413	30	13	16	1	20	9	10	*
Computer systems design and related services	5415	72	61	10	1	55	49	6	1
Scientific research and development services	5417	82	78	3	2	43	41	1	1
Biotechnology research and development	541711	19	18	*	*	10	10	*	*
Physical, engineering, and life sciences (except biotechnology) research and development	541712	53	50	2	1	25	23	1	1
Social sciences and humanities research and development	541720	11	10	*	*	8	7	*	*
Other professional, scientific, and technical services	other 54	23	18	4	*	15	12	3	*
Health care services	621-23	6	6	*	*	2	2	*	*
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	23	8	15	1	14	5	9	*
All companies (number of domestic employees)	-	1,475	1,231	228	16	1,023	885	130	9
Small companies									
10-19 <sup>c</sup>	-	23	16	6	1	15	11	3	*
20-49	-	67	43	22	1	42	29	12	*
Medium companies									
50-99	-	63	44	18	1	36	28	7	*
100-249	-	90	65	23	2	56	45	10	1
Large companies									
250-499	-	73	56	17	1	46	37	9	*
500-999	-	77	62	14	1	53	46	6	*
1,000-4,999	-	250	222	27	2	175	160	14	1
5,000-9,999	-	177	158	18	1	120	108	12	1
10,000-24,999	-	238	223	12	3	168	158	7	2
25,000 or more	-	417	343	72	3	312	262	48	2

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

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

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

<sup>c</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D.

**Source(s)**

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2017.

TABLE 60

## U.S. patent applications and patents issued to companies located in the United States that performed or funded R&amp;D, by industry and company size: 2017

(Number)

Industry and company size	NAICS code	Applications				Patents issued <sup>c</sup>
		Total	Nonprovisional utility patents			
			Total	To foreign jurisdictions <sup>a</sup>	From within organized R&D activity <sup>b</sup>	
All industries	21-23, 31-33, 42-81	151,928	100,485	50,572	79,011	101,607
Manufacturing industries	31-33	104,878	73,183	40,793	58,410	68,598
Food	311	1,383	866	435	66 - 867	775
Beverage and tobacco products	312	676	521	304	436	282
Textile, apparel, and leather products	313-16	769	500	226	372	246
Wood products	321	72	44	17	39	28
Paper	322	1,041	637	351	0 - 638	539
Printing and related support activities	323	173	110	48	90	113
Petroleum and coal products	324	220	166	81	127	86
Chemicals	325	16,229	9,047	6,739	8,169	8,775
Basic chemicals	3251	989	544	466	534	747
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	378	134	108	124	171
Pesticide, fertilizer, and other agricultural chemicals	3253	1,191	695	359	670	804
Pharmaceuticals and medicines	3254	10,799	5,726	4,611	5,212	5,350
Soap, cleaning compound, and toilet preparation	3256	1,677	1,088	584	766 - 1,089	1,044
Paint, coating, adhesive, and other chemicals	3255, 3259	1,195	860	611	538 - 861	658
Plastics and rubber products	326	3,858	2,486	1,838	2,274	1,707
Nonmetallic mineral products	327	1,506	1,259	904	1,231	801
Primary metals	331	778	168	117	141	179
Fabricated metal products	332	1,831	974	601	845	577
Machinery	333	8,641	5,572	2,739	4,604	5,281
Agricultural implement	33311	1,238	1,033	540	872	830
Semiconductor machinery	333242	2,007	1,210	0 - 1,211	462 - 1,211	1,097
Engine, turbine, and power transmission equipment	3336	1,001	723	326	662	1,111
Other machinery	other 333	4,394	2,606	661 - 1,875	1,858 - 2,607	2,243
Computer and electronic products	334	38,082	29,109	11,813	22,881	29,824
Communications equipment	3342	5,034	3,637	1,586	3,286	3,890
Semiconductor and other electronic components	3344	17,146	13,095	5,076	8,650	13,815
Navigational, measuring, electromedical, and control instruments	3345	5,494	4,236	2,937	3,391	4,365
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	612	345	242	307	347
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	2,728	2,426	1,669	2,128	2,230

TABLE 60

## U.S. patent applications and patents issued to companies located in the United States that performed or funded R&amp;D, by industry and company size: 2017

(Number)

Industry and company size	NAICS code	Applications				Patents issued <sup>c</sup>
		Total	Nonprovisional utility patents			
			Total	To foreign jurisdictions <sup>a</sup>	From within organized R&D activity <sup>b</sup>	
Other measuring and controlling device	other 3345	2,154	1,465	1,026	956	1,787
Other computer and electronic products	other 334	10,409	8,140	2,214	7,553	7,754
Electrical equipment, appliances, and components	335	4,172	2,873	1,547	2,783	2,308
Transportation equipment	336	14,630	12,444	8,772	7,712	9,299
Automobiles, bodies, trailers, and parts	3361-63	7,602	6,409	5,218	4,350	4,834
Aerospace products and parts	3364	6,357	5,661	3,295	2,985 - 3,039	4,047
Aircraft, aircraft engine, and aircraft parts	336411-13	6,218	5,574	3,255	2,951	3,977
Guided missile, space vehicle, and related parts	336414-15, 336419	139	87	40	34 - 88	70
Military armored vehicle, tank, and tank component	336992	0 - 414	0 - 117	0	0 - 117	0
Other transportation	other 336	258 - 673	258 - 376	259	205 - 376	419
Furniture and related products	337	496	264	143	189	195
Miscellaneous manufacturing	339	10,322	6,144	4,117	5,005 - 5,805	7,583
Medical equipment and supplies	3391	7,965	5,265	3,831	4,925	6,774
Other miscellaneous manufacturing	3399	2,357	879	286	79 - 880	809
Nonmanufacturing industries	21-23, 42-81	47,050	27,301	9,779	20,601	33,009
Mining, extraction, and support activities	21	3,043	2,542	1,937	2,475	2,578
Utilities	22	30	19	0 - 20	4	30
Wholesale trade	42	1,795	467	158	352	535
Electronic shopping and electronic auctions	454111-12	2,524	1,387 - 1,781	0 - 226	1,260 - 1,746	0 - 2,239
Transportation and warehousing	48-49	135	92	35	0 - 93	60
Information	51	19,522	15,380	5,737	11,066	14,522
Publishing	511	8,277	6,604	2,681	5,274	6,052
Newspaper, periodical, book, and directory publishers	5111	6	6	0	0 - 7	4
Software publishers	5112	8,271	6,598	2,681	5,267 - 5,275	6,048
Telecommunications	517	3,231	2,345	377	1,379	3,379
Data processing, hosting, and related services	518	2,501	1,965	253	1,783	967
Other information	other 51	5,513	4,466	2,425	2,630	4,124
Finance and insurance	52	2,109	1,404	200	942	889
Real estate and rental and leasing	53	83	0 - 84	0 - 84	0 - 84	37

TABLE 60

## U.S. patent applications and patents issued to companies located in the United States that performed or funded R&amp;D, by industry and company size: 2017

(Number)

Industry and company size	NAICS code	Applications				Patents issued <sup>c</sup>
		Total	Nonprovisional utility patents			
			Total	To foreign jurisdictions <sup>a</sup>	From within organized R&D activity <sup>b</sup>	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0	0	0
Other real estate and rental and leasing	other 53	83	0 - 84	0 - 84	0 - 84	37
Professional, scientific, and technical services	54	17,317	5,492	1,405	3,898	12,044
Architectural, engineering, and related services	5413	715 - 1,539	716	94	674	187
Computer systems design and related services	5415	12,981	1,851 - 3,011	333	740 - 1,680	10,305
Scientific research and development services	5417	2,686	1,654 - 1,990	865	1,546	1,110
Biotechnology research and development	541711	387 - 722	388	0 - 283	27 - 364	0 - 167
Physical, engineering, and life sciences (except biotechnology) research and development	541712	1,965	1,267	583	1,183	944
Social sciences and humanities research and development	541720	0 - 335	0 - 335	0 - 283	0 - 335	0 - 167
Other professional, scientific, and technical services	other 54	112 - 936	112 - 936	113	0 - 936	441
Health care services	621-23	191	129	85	122	80
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	301	0 - 302	0 - 226	0 - 302	0 - 2,239
All companies (number of domestic employees)	-	151,928	100,485	50,572	79,011	101,607
Small companies						
10-19 <sup>d</sup>	-	2,661	1,403	509	1,233	960
20-49	-	7,489	4,798	2,499	4,363	2,412
Medium companies						
50-99	-	4,921	2,084	1,112	1,747	1,551
100-249	-	5,278	2,989	1,346	2,669	2,361
Large companies						
250-499	-	5,314	3,110	1,523	2,742	3,452
500-999	-	7,222	3,980	2,201	3,440	3,778
1,000-4,999	-	18,785	12,912	6,487	11,209	13,382
5,000-9,999	-	14,215	10,692	4,570	8,218	10,122
10,000-24,999	-	28,211	20,628	11,155	16,842	18,226
25,000 or more	-	57,831	37,889	19,169	26,548	45,363

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Also includes patent applications that company planned to apply for in foreign jurisdictions.

<sup>b</sup> Includes patent applications in which the named inventor(s) were R&D employees.

<sup>c</sup> 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.

<sup>d</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D. Statistics are based on companies in the United States that reported to the survey. These statistics do not 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, 2017.

TABLE 61

**Total patent licensing revenue of companies located in the United States that performed or funded R&D, by industry and company size: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Revenue <sup>a</sup>
All industries	21–23, 31–33, 42–81	20,347
Manufacturing industries	31–33	18,022
Food	311	185
Beverage and tobacco products	312	1
Textile, apparel, and leather products	313–16	9
Wood products	321	*
Paper	322	63
Printing and related support activities	323	4
Petroleum and coal products	324	14
Chemicals	325	6,307
Basic chemicals	3251	108
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	5
Pesticide, fertilizer, and other agricultural chemicals	3253	7
Pharmaceuticals and medicines	3254	6,118
Soap, cleaning compound, and toilet preparation	3256	4
Paint, coating, adhesive, and other chemicals	3255, 3259	65 i
Plastics and rubber products	326	566
Nonmetallic mineral products	327	92 i
Primary metals	331	19
Fabricated metal products	332	54
Machinery	333	535
Agricultural implement	33311	*
Semiconductor machinery	333242	0 - 532
Engine, turbine, and power transmission equipment	3336	4
Other machinery	other 333	0 - 532
Computer and electronic products	334	8,753
Communications equipment	3342	555
Semiconductor and other electronic components	3344	6,507
Navigational, measuring, electromedical, and control instruments	3345	585
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	69
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	6
Other measuring and controlling device	other 3345	510
Other computer and electronic products	other 334	1,107
Electrical equipment, appliances, and components	335	255
Transportation equipment	336	669 i
Automobiles, bodies, trailers, and parts	3361–63	651 i
Aerospace products and parts	3364	12
Aircraft, aircraft engine, and aircraft parts	336411–13	9
Guided missile, space vehicle, and related parts	336414–15, 336419	3
Military armored vehicle, tank, and tank component	336992	0
Other transportation	other 336	7
Furniture and related products	337	37
Miscellaneous manufacturing	339	459
Medical equipment and supplies	3391	444
Other miscellaneous manufacturing	3399	14
Nonmanufacturing industries	21–23, 42–81	2,325
Mining, extraction, and support activities	21	236
Utilities	22	*
Wholesale trade	42	32



TABLE 61

**Total patent licensing revenue of companies located in the United States that performed or funded R&D, by industry and company size: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Revenue <sup>a</sup>
Electronic shopping and electronic auctions	454111-12	0
Transportation and warehousing	48-49	0
Information	51	1,283
Publishing	511	386
Newspaper, periodical, book, and directory publishers	5111	0
Software publishers	5112	386
Telecommunications	517	0 - 539
Data processing, hosting, and related services	518	360
Other information	other 51	0 - 539
Finance and insurance	52	111
Real estate and rental and leasing	53	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0
Other real estate and rental and leasing	other 53	0
Professional, scientific, and technical services	54	661
Architectural, engineering, and related services	5413	6
Computer systems design and related services	5415	203
Scientific research and development services	5417	126
Biotechnology research and development	541711	68
Physical, engineering, and life sciences (except biotechnology) research and development	541712	58
Social sciences and humanities research and development	541720	*
Other professional, scientific, and technical services	other 54	325
Health care services	621-23	1
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	*
All companies (number of domestic employees)	-	20,347
Small companies		
10-19 <sup>b</sup>	-	89
20-49	-	460
Medium companies		
50-99	-	395
100-249	-	305
Large companies		
250-499	-	1,549
500-999	-	566
1,000-4,999	-	3,810
5,000-9,999	-	1,754
10,000-24,999	-	8,961
25,000 or more	-	2,456

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Amounts received from all patent licensing activities during 2017.<sup>b</sup> Business Research and Development Survey does not include companies with fewer than 10 domestic employees.**Note(s)**

Statistics are representative of companies in the United States that performed or funded R&D. 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. 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, 2017.

TABLE 62  
**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: 2017**

(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	838	490	348
Received IP from others not owned by your company through participation in technical assistance or "know how" agreements	967	656	310
Transferred IP to a spin-off or spin-out of your company	267	126	141
Received IP from a parent company as part of a spin-off or spin-out	80	62	19
Acquired more than 50% ownership in another company for the primary purpose of acquiring its IP	250	131	119
Acquired any financial interest in another company in order to gain access to its IP	210	132	78
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	651	380	271
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)	656	208	447
Made use of open-source patents or other freely available IP not owned by your company	2,033	766	1,267

**Note(s)**

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

**Source(s)**

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2017.

TABLE 63

## R&amp;D costs paid for by the company and others projected for 2018, by industry and company size: 2017

(Millions of U.S. dollars)

Industry and company size	NAICS code	Projected worldwide R&D cost		Projected domestic R&D cost							Projected foreign R&D cost paid for by the company
		Paid for by the company	Paid for by others	Paid for by the company			Paid for by others				
				Total	Purchased and collaborative R&D	R&D performed by the company	Total	U.S. government	Non-U.S. government sources		
All industries	21-23, 31-33, 42-81	493,548	84,029	396,799	37,782	359,017	65,503	24,997	i	40,506	96,749
Manufacturing industries	31-33	340,221	52,182	268,204	34,302	233,902	43,047	18,798	i	24,249	72,017
Food	311	5,584	i 253	4,608	i 178	4,430	i 245	1		244	976
Beverage and tobacco products	312	2,105	105	1,273	221	1,053	105	0		105	831
Textile, apparel, and leather products	313-16	1,217	1	1,016	24	i 992	1	*	i	1	201
Wood products	321	171	5	170	10	160	5	*	i	5	1
Paper	322	1,521	36	1,248	39	1,209	36	*	i	36	273
Printing and related support activities	323	237	i 7	i 228	i 4	i 225	i 7	*	i	7	i 8
Petroleum and coal products	324	465	16	379	58	321	16	*		15	86
Chemicals	325	122,745	18,932	97,919	26,357	71,562	13,755	279		13,476	24,826
Basic chemicals	3251	3,195	160	2,540	82	i 2,458	156	10	i	146	655
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,005	17	667	17	650	16	*	i	16	338
Pesticide, fertilizer, and other agricultural chemicals	3253	1,898	2 - 431	1,386	130	i 1,256	i 2 - 392	3		0 - 389	512
Pharmaceuticals and medicines	3254	111,071	18,183	89,110	25,823	63,286	i 13,050	254		12,796	21,961
Soap, cleaning compound, and toilet preparation	3256	3,647	131 - 176	2,707	259	2,448	132	*	i	132	941
Paint, coating, adhesive, and other chemicals	3255, 3259	1,930	11 - 440	1,510	46	i 1,464	11 - 401	12	i	0 - 389	420
Plastics and rubber products	326	5,040	158	4,050	197	3,853	133	1	i	133	990
Nonmetallic mineral products	327	1,669	i 34	i 1,463	i 21	1,443	i 32	7		26	i 206
Primary metals	331	917	10	i 773	161	612	9	i 6	i	3	i 143
Fabricated metal products	332	2,416	82	i 2,227	148	2,080	78	i 41	i	38	i 188
Machinery	333	16,663	1,037	12,710	351	12,359	1,012	171		840	3,952
Agricultural implement	33311	2,674	73	i 1,780	60	i 1,720	71	i 3		67	i 894
Semiconductor machinery	333242	4,006	528	3,115	*	i 3,115	515	16		499	891
Engine, turbine, and power transmission equipment	3336	2,396	157	1,931 - 2,224	0 - 292	i 1,932	157	0 - 153		3 - 158	171 - 465
Other machinery	other 333	7,587	279	i 5,592 - 5,885	0 - 292	5,593	269	i 0 - 153	i	115 - 270	i 1,701 - 1,995
Computer and electronic products	334	105,319	9,200	80,766	1,631	79,135	8,625	3,774		4,851	24,553

TABLE 63

## R&amp;D costs paid for by the company and others projected for 2018, by industry and company size: 2017

(Millions of U.S. dollars)

Industry and company size	NAICS code	Projected worldwide R&D cost			Projected domestic R&D cost								Projected foreign R&D cost paid for by the company
		Paid for by the company	Paid for by others	Total	Paid for by the company				Paid for by others				
					Total	Purchased and collaborative R&D	R&D performed by the company	Total	U.S. government	Non-U.S. government sources			
Communications equipment	3342	15,336	1,707	11,817	489		11,327	1,691	807	883	3,519		
Semiconductor and other electronic components	3344	41,130	2,640	29,985	390		29,596	2,471	80	2,392	11,145		
Navigational, measuring, electromedical, and control instruments	3345	15,287	4,683	11,125	380		10,745	4,302	2,822	1,480	4,162		
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,873	174	2,697	75		2,622	144	26	118	1,176		
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	4,534	4,293	3,564	171		3,393	3,964	2,738	1,226	970		
Other measuring and controlling device	other 3345	6,880	216	4,865	134		4,731	193	58	135	2,015		
Other computer and electronic products	other 334	33,566	169	27,839	372		27,467	161	65	96	5,727		
Electrical equipment, appliances, and components	335	6,380	194	4,376	264		4,112	185	53	131	2,004		
Transportation equipment	336	47,283	21,730	37,670	3,591		34,079	18,480	14,407	4,074	9,614		
Automobiles, bodies, trailers, and parts	3361-63	31,570	3,286	23,921	2,892		21,029	2,663	88 - 1,520	1,142 - 2,574	7,649		
Aerospace products and parts	3364	13,740	16,982	11,967	655		11,312	14,385	12,887	1,498	1,773		
Aircraft, aircraft engine, and aircraft parts	336411-13	13,278	15,671	11,505	523		10,982	13,080	11,599	1,481	1,772		
Guided missile, space vehicle, and related parts	336414-15, 336419	462	1,311	462	132		330	1,306	1,289	17	1		
Military armored vehicle, tank, and tank component	336992	3	2 - 1,464	3	1		2	2 - 1,433	0 - 1,431	3	0		
Other transportation	other 336	1,970	0 - 1,461	1,779	44		1,735	0 - 1,431	0 - 1,431	0 - 1,431	191		
Furniture and related products	337	468	4	427	13		414	3	1	3	42		
Miscellaneous manufacturing	339	20,020	378	16,897	1,034		15,863	320	59	262	3,123		
Medical equipment and supplies	3391	17,368	329	14,606	899		13,706	272	53	219	2,762		
Other miscellaneous manufacturing	3399	2,652	49	2,292	135		2,157	49	6	43	360		
Nonmanufacturing industries	21-23, 42-81	153,327	31,846	128,595	3,480		125,116	22,456	6,199	16,257	24,732		
Mining, extraction, and support activities	21	3,766	333	3,289	523		2,766	304	0	304	477		
Utilities	22	467	81	455	154		301	67	27	40	12		
Wholesale trade	42	655	64	582	84		497	62	0	62	73		
Electronic shopping and electronic auctions	454111-12	12,142	0	8,941	4		8,938	0	0	0	3,201		

TABLE 63

## R&amp;D costs paid for by the company and others projected for 2018, by industry and company size: 2017

(Millions of U.S. dollars)

Industry and company size	NAICS code	Projected worldwide R&D cost		Projected domestic R&D cost						Projected foreign R&D cost paid for by the company
		Paid for by the company	Paid for by others	Paid for by the company			Paid for by others			
				Total	Purchased and collaborative R&D	R&D performed by the company	Total	U.S. government	Non-U.S. government sources	
Transportation and warehousing	48-49	910	46	903	26	877	46	0	46	6
Information	51	101,467	1,464	85,105	1,451	83,654	1,420	123	1,297	16,362
Publishing	511	46,132	1,112	36,369	769	35,600	1,090	83	1,006	9,763
Newspaper, periodical, book, and directory publishers	5111	96	*	87	14	73	0	0	0	9
Software publishers	5112	46,036	1,112	36,282	755	35,527	1,090	83	1,006	9,754
Telecommunications	517	3,471	0 - 203	3,355	123	3,232	0 - 202	1	0 - 201	116
Data processing, hosting, and related services	518	20,962	151	18,064	276	17,788	130	38	91	2,898
Other information	other 51	30,902	0 - 202	27,317	284	27,034	0 - 201	*	0 - 201	3,585
Finance and insurance	52	9,282	54	8,131	314	7,817	30 - 55	0	30 - 55	1,151
Real estate and rental and leasing	53	1,013	17	806	3	803	17	0	17	208
Lessors of nonfinancial intangible assets (except copyrighted works)	533	337	0	147	2	145	0	0	0	190
Other real estate and rental and leasing	other 53	677	17	659	1	657	17	0	17	18
Professional, scientific, and technical services	54	20,720	29,455	17,973	811	17,162	20,245	6,033	14,212	2,746
Architectural, engineering, and related services	5413	1,877	1,715	1,722	138	1,584	1,700	1,243	457	155
Computer systems design and related services	5415	11,541	1,780	9,524	195	9,329	1,661	991	670	2,017
Scientific research and development services	5417	3,871	25,066	3,662	401	3,261	16,089	3,462	12,627	208
Biotechnology research and development	541711	1,104	7,123	1,030	183	847	4,523	135	4,388	74
Physical, engineering, and life sciences (except biotechnology) research and development	541712	2,679	16,812	2,545	218	2,327	10,599	2,388	8,211	134
Social sciences and humanities research and development	541720	88	1,130	88	*	87	966	939	27	0
Other professional, scientific, and technical services	other 54	3,431	894	3,065	77	2,988	796	337	459	366
Health care services	621-23	1,237	214	999	27	972	143	9	134	238
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,669	117	1,410	82	1,329	93 - 118	7	86 - 111	259
All companies (number of domestic employees)	-	493,548	84,029	396,799	37,782	359,017	65,503	24,997	40,506	96,749
Small companies										
10-19 <sup>a</sup>	-	3,485	1,129	3,161	525	2,636	1,028	573	455	325

TABLE 63

**R&D costs paid for by the company and others projected for 2018, by industry and company size: 2017**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Projected worldwide R&D cost		Projected domestic R&D cost						Projected foreign R&D cost paid for by the company
		Paid for by the company	Paid for by others	Paid for by the company			Paid for by others			
				Total	Purchased and collaborative R&D	R&D performed by the company	Total	U.S. government	Non-U.S. government sources	
20-49	-	11,556	2,406	10,414	1,714	8,700	2,077	697	1,380	1,142
Medium companies										
50-99	-	11,551	2,731	10,780	1,470	9,310	2,507	833	1,674	771
100-249	-	21,098	5,215	19,094	3,054	16,040	4,633	1,373	3,260	2,004
Large companies										
250-499	-	17,102	3,170	14,515	1,556	12,959	2,669	645	2,024	2,587
500-999	-	24,184	2,055	20,053	1,758	18,295	1,710	239	1,471	4,131
1,000-4,999	-	78,726	17,528	61,714	4,838	56,875	13,932	1,403	12,529	17,012
5,000-9,999	-	49,071	14,396	37,479	3,067	34,412	7,956	1,599	6,357	11,592
10,000-24,999	-	91,175	12,592	73,376	11,003	62,373	10,396	3,522	6,874	17,799
25,000 or more	-	185,600	22,806	146,214	8,796	137,418	18,594	14,113	4,482	39,386

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> 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. Statistics are representative of companies located in the United States that performed or funded 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, 2017.

TABLE 64

## Worldwide R&amp;D paid for by the company and others and performed by the company, by industry and company size: 2008–17

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008 <sup>a</sup>	2009	2010	2011	2012	2013	2014	2015	2016	2017
All industries	21–23, 31–33, 42–81	NA	336,571	338,451	359,490	374,916	396,352	416,343	429,174	457,591	487,628
Manufacturing industries	31–33	NA	236,858	243,611	253,821	261,697	276,110	285,661	287,895	303,044	314,496
Food	311	NA	4,916	D	5,589	5,163	6,335	6,136	6,058	i 5,824	5,563
Beverage and tobacco products	312	NA	933	D	D	D	1,358	1,423	1,529	1,076 - 1,654	1,743
Textile, apparel, and leather products	313–16	NA	519	522	656	605	759	734	818	1,247	i 1,080
Wood products	321	NA	283	254	211	282	222	341	i 198	166 - 751	176
Paper	322	NA	NA	1,665	769	858	1,022	880	867	943	1,580
Printing and related support activities	323	NA	217	269	212	291	i 258	i 238	198	i 223	i 235
Petroleum and coal products	324	NA	NA	D	1,281	D	327	298	252	312	370
Chemicals	325	NA	64,442	72,610	72,068	70,218	74,551	79,428	80,961	84,612	89,427
Basic chemicals	3251	NA	NA	2,671	5,166	3,400	3,336	3,633	3,677	536 - 5,694	3,133
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	NA	NA	1,038	1,117	D	1,794	1,842	1,780	332 - 5,490	949
Pesticide, fertilizer, and other agricultural chemicals	3253	NA	NA	D	2,049	D	1,966	i 2,042	i 3,405	0 - 5,157	1,761 - 1,875
Pharmaceuticals and medicines	3254	NA	53,456	60,537	58,866	58,920	62,480	66,731	D	73,193	78,178
Soap, cleaning compound, and toilet preparation	3256	NA	NA	3,285	3,386	3,212	3,358	3,501	D	3,589	3,383 - 3,479
Paint, coating, adhesive, and other chemicals	3255, 3259	NA	NA	D	1,485	D	1,617	1,679	i 1,664	1,806 - 1,830	1,910 - 1,927
Plastics and rubber products	326	NA	2,982	2,515	2,640	4,446	4,576	4,519	2,906	4,583	4,656
Nonmetallic mineral products	327	NA	1,153	i 1,596	1,428	1,588	i 1,578	1,599	1,487	1,474	1,515
Primary metals	331	NA	993	802	763	818	700	770	711	662	879
Fabricated metal products	332	NA	2,174	1,818	1,993	1,949	i 2,303	i 2,329	2,467	i 2,273	2,371
Machinery	333	NA	11,156	12,403	18,312	17,462	15,420	15,089	16,827	15,958	16,463
Agricultural implement	33311	NA	NA	D	1,570	2,142	2,243	D	2,152	2,189	2,137
Semiconductor machinery	333242	NA	NA	2,469	2,727	1,357	3,645	3,434	3,812	4,138	4,479
Engine, turbine, and power transmission equipment	3336	NA	NA	D	D	D	1,795	2,894	2,920	2,484	2,397 - 2,540
Other machinery	other 333	NA	NA	6,566	D	D	7,736	D	7,943	7,147	7,306 - 7,451
Computer and electronic products	334	NA	68,772	75,345	79,145	87,406	90,114	94,199	92,860	98,319	101,223
Communications equipment	3342	NA	NA	17,069	15,197	18,877	20,392	22,048	23,049	16,124	15,819
Semiconductor and other electronic components	3344	NA	26,082	29,354	32,146	38,300	40,611	42,028	40,348	41,789	41,046



TABLE 64

## Worldwide R&amp;D paid for by the company and others and performed by the company, by industry and company size: 2008–17

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008 <sup>a</sup>	2009	2010	2011	2012	2013	2014	2015	2016	2017					
Navigational, measuring, electromedical, and control instruments	3345	NA	16,498	17,905	18,242	18,640	18,046	18,993	17,020	18,112	18,350					
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	NA	NA	4,548	4,987	4,999	2,837	5,049	3,599	3,553	3,773					
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	NA	NA	8,769	8,641	8,312	8,753	8,486	8,033	8,372	8,257					
Other measuring and controlling device	other 3345	NA	NA	4,588	4,615	5,329	6,456	5,458	5,387	6,187	6,320					
Other computer and electronic products	other 334	NA	NA	11,017	13,559	11,589	11,065	11,130	12,443	22,294	26,007					
Electrical equipment, appliances, and components	335	NA	4,475	4,767	5,319	4,140	5,738	5,705	5,710	6,207	6,158					
Transportation equipment	336	NA	56,183	51,362	49,030	50,415	51,547	56,597	57,698	60,161	62,114					
Automobiles, bodies, trailers, and parts	3361–63	NA	NA	17,764	D	D	23,610	D	25,735	6,671 - 54,230	30,478					
Aerospace products and parts	3364	NA	36,409	31,627	26,858	D	25,684	D	29,113	3,240 - 50,799	28,436					
Aircraft, aircraft engine, and aircraft parts	336411–13	NA	NA	D	D	D	D	D	27,463	1,812 - 49,371	26,626					
Guided missile, space vehicle, and related parts	336414–15, 336419	NA	NA	D	D	1,425	D	D	1,649	i	1,428	i	1,810			
Military armored vehicle, tank, and tank component	336992	NA	NA	D	52	D	9	i	D	16	3 - 38	9				
Other transportation	other 336	NA	NA	D	D	D	2,245	D	2,834	2,653 - 2,690	i	3,190				
Furniture and related products	337	NA	433	407	347	383	401	422	477	381	462					
Miscellaneous manufacturing	339	NA	NA	9,528	D	D	18,900	14,951	15,869	18,045	18,482					
Medical equipment and supplies	3391	NA	NA	7,461	D	10,311	15,938	12,091	13,166	15,387 - 15,400	16,079					
Other miscellaneous manufacturing	3399	NA	NA	2,066	D	D	2,962	2,860	2,703	i	2,646 - 2,657	i	2,403			
Nonmanufacturing industries	21–23, 42–81	NA	99,713	94,840	105,669	113,220	120,242	130,682	141,279	154,547	173,132					
Mining, extraction, and support activities	21	NA	NA	2,785	2,597	D	4,452	D	4,348	3,604	3,479 - 3,486					
Utilities	22	NA	NA	442	396	368	317	314	483	353	327					
Wholesale trade	42	NA	NA	1,145	1,697	i	2,165	i	459	i	D	1,723	i	489	i	571
Electronic shopping and electronic auctions	454111–12	NA	NA	D	D	D	1,845	D	D	0 - 14,624	11,873 - 12,096					
Transportation and warehousing	48–49	NA	NA	124	159	186	D	692	416	495	1,155					
Information	51	NA	43,197	45,099	52,341	56,815	68,375	78,013	77,965	84,400	94,898					



TABLE 64

**Worldwide R&D paid for by the company and others and performed by the company, by industry and company size: 2008–17**

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008 <sup>a</sup>	2009	2010	2011	2012	2013	2014	2015	2016	2017
10–19	– NA	NA	NA	NA	NA	NA	NA	NA	5,750 i	5,031 i	3,447
20–49	– NA	NA	NA	NA	NA	NA	NA	NA	10,654 i	9,972	10,011
Medium companies											
50–99	– NA	13,785	9,470	9,834	9,728	9,289	10,677	11,946	9,639	10,623	
100–249	– NA	14,365	12,989	13,354	13,665	14,980	15,081	14,964	16,160	18,596	
Large companies											
250–499	– NA	12,315	11,439	14,573	12,693	13,379	13,675	14,837	14,751	16,376	
500–999	– NA	12,124	11,794	11,388	12,955	13,663	15,422	17,442	16,601	20,387	
1,000–4,999	– NA	54,600	60,782	63,801	62,729	69,212	71,679	71,259	79,017	80,255	
5,000–9,999	– NA	27,461	34,453	32,578	41,006	43,087	51,305	48,399	49,479	54,428	
10,000–24,999	– NA	61,681	50,710	61,593	60,544	60,844	63,818	70,864	81,547	87,990	
25,000 or more	– NA	118,424	125,067	132,719	144,097	152,547	155,180	159,959	173,666	185,514	

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Worldwide R&D paid for by the company and others and performed by the company was not published in 2008.

<sup>b</sup> 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. Statistics are representative of companies located in the United States that performed or funded R&D. 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 2017 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 65

## Domestic R&amp;D paid for by the company and others and performed by the company, by industry and company size: 2008–17

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
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	400,100
Manufacturing industries	31–33	203,755	196,441	199,147	202,363	208,577	222,718	231,705	236,170	249,999	257,227
Food	311	2,100	4,099	D	4,393	4,087	5,021	4,854	i 4,828	4,830	4,697
Beverage and tobacco products	312	780	477	D	D	D	827	920	1,006	1,076 - 1,099	1,076
Textile, apparel, and leather products	313–16	815	439	482	608	553	662	631	748	1,166	i 920
Wood products	321	273	280	252	211	280	220	336	i 195	166 - 204	175
Paper	322	NA	NA	1,341	676	752	920	723	766	854	1,322
Printing and related support activities	323	349	210	231	181	256	i 252	i 234	196	i 219	i 229
Petroleum and coal products	324	NA	NA	D	D	888	281	234	214	268	316
Chemicals	325	58,250	54,753	58,343	55,853	56,748	62,086	66,134	68,032	71,803	74,977
Basic chemicals	3251	NA	NA	1,810	D	2,705	2,620	2,849	3,042	0 - 5,157	2,574
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	NA	NA	783	798	997	1,197	1,154	1,201	0 - 5,157	628
Pesticide, fertilizer, and other agricultural chemicals	3253	NA	NA	D	D	D	1,691	i 1,743	i D	0 - 5,157	1,376 - 1,475
Pharmaceuticals and medicines	3254	48,131	46,415	49,469	46,308	47,851	52,790	56,482	57,332	62,346 - 67,504	66,202
Soap, cleaning compound, and toilet preparation	3256	NA	NA	2,400	2,476	2,342	2,434	2,548	2,579	2,800	2,605 - 2,701
Paint, coating, adhesive, and other chemicals	3255, 3259	NA	NA	D	1,290	D	1,354	1,357	i D	1,500 - 1,523	1,495
Plastics and rubber products	326	1,817	2,388	2,129	2,278	3,585	3,647	3,614	2,549	3,752	3,754
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	1,334
Primary metals	331	695	863	681	655	741	618	677	625	592	749
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	2,206
Machinery	333	10,104	9,226	10,260	14,725	13,752	12,586	12,106	13,539	12,718	13,197
Agricultural implement	33311	NA	NA	1,345	1,277	1,546	1,597	1,578	1,531	1,565	1,570
Semiconductor machinery	333242	NA	NA	2,173	2,351	1,291	3,194	2,941	3,214	3,411	3,694
Engine, turbine, and power transmission equipment	3336	NA	NA	1,430	4,273	4,336	1,448	2,356	2,515	2,060	2,080
Other machinery	other 333	NA	NA	5,312	6,824	6,579	6,347	5,229	6,280	5,683	5,853
Computer and electronic products	334	60,464	55,856	61,623	62,438	66,290	68,629	73,256	72,182	77,451	78,575
Communications equipment	3342	NA	NA	13,875	12,335	14,352	15,663	18,345	19,424	13,156	12,687
Semiconductor and other electronic components	3344	22,324	20,023	23,011	24,237	28,218	30,176	31,668	30,451	31,413	30,148
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	14,509

TABLE 65

## Domestic R&amp;D paid for by the company and others and performed by the company, by industry and company size: 2008–17

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	NA	NA	4,189	4,430	4,413	2,634	3,975	2,676	2,632	2,696
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	7,297
Other measuring and controlling device	other 3345	NA	NA	3,265	3,356	3,772	4,379	4,035	4,165	4,722	4,516
Other computer and electronic products	other 334	NA	NA	8,990	10,014	7,801	7,671	7,372	8,105	17,997	21,231
Electrical equipment, appliances, and components	335	3,143	3,317	3,320	3,624	3,078	4,133	4,323	4,359	4,771	4,291
Transportation equipment	336	50,552	48,209	42,940	41,094	42,340	43,648	46,977	49,286	51,569	53,292
Automobiles, bodies, trailers, and parts	3361–63	NA	NA	D	D	D	16,733	18,518	19,113	0 - 47,558	23,881
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	26,383
Aircraft, aircraft engine, and aircraft parts	336411–13	NA	NA	24,777	24,839	23,454	D	25,002	25,793	0 - 47,558	24,576
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	1,807
Military armored vehicle, tank, and tank component	336992	NA	NA	D	51	D	9	18	16	3 - 38	9
Other transportation	other 336	NA	NA	D	D	D	2,124	2,148	2,716	2,549 - 2,586	3,018
Furniture and related products	337	477	395	374	319	360	374	377	452	359	422
Miscellaneous	339	NA	NA	D	D	D	15,292	12,757	13,662	14,988	15,695
Medical equipment and supplies	3391	NA	NA	6,459	7,796	8,333	12,741	10,309	11,353	12,647 - 12,660	13,589
Other miscellaneous manufacturing	3399	NA	NA	D	D	D	2,551	2,449	2,309	2,329 - 2,340	2,106
Nonmanufacturing industries	21–23, 42–81	86,926	86,064	80,142	87,877	94,183	100,389	108,834	119,501	128,591	142,874
Mining, extraction, and support activities	21	NA	NA	2,545	2,365	3,031	4,000	4,633	4,012	3,296	3,150
Utilities	22	NA	NA	425	358	348	294	313	480	351	317
Wholesale trade	42	NA	NA	1,092	1,556	2,053	452	339	1,698	467	534
Electronic shopping and electronic auctions	454111–12	NA	NA	D	949	1,353	1,356	1,388	D	0 - 9,499	9,318
Transportation and warehousing	48–49	NA	NA	95	132	178	D	679	403	488	1,147
Information	51	37,695	35,953	37,088	42,697	46,900	56,608	64,277	65,457	70,946	80,252
Publishing	511	28,427	26,838	26,957	28,411	29,067	34,365	36,621	33,348	33,459	34,338
Newspaper, periodical, book, and directory publishers	5111	NA	NA	770	372	219	342	88	98	79	74
Software publishers	5112	NA	NA	26,187	28,039	28,848	34,023	36,533	33,250	33,379	34,264
Telecommunications	517	1,684	1,523	1,912	2,169	2,729	3,049	3,768	3,607	3,568 - 3,611	3,682 - 3,806

TABLE 65

## Domestic R&amp;D paid for by the company and others and performed by the company, by industry and company size: 2008–17

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
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	16,155
Other information	other 51	1,016	4,850	5,466	7,006	10,190	12,039	14,826	19,147	19,820 - 24,532	25,954 - 26,077
Finance and insurance	52	NA	NA	2,101	3,447	3,530	4,412	4,122	5,409	7,331	7,616
Real estate and rental and leasing	53	NA	NA	330	343	363	191	262	300	475	718
Lessors of nonfinancial intangible assets (except copyrighted works)	533	NA	NA	NA	324	342	58 i	55	68	27	138 i
Other real estate and rental and leasing	other 53	NA	NA	NA	19	21 i	133	207	232	448	579
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	36,922
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	2,708
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	13,327
Scientific research and development services	5417	17,913	16,402	13,712	15,713	16,415	14,219	13,324	16,249	14,778	17,321
Biotechnology research and development	541711	NA	7,809	5,537	7,043	7,387	4,492	3,459	5,594 i	4,445	4,449
Physical, engineering, and life sciences (except biotechnology) research and development	541712	NA	7,916	7,628	8,058	8,431	8,935	9,187	9,950	9,613	11,913
Social sciences and humanities research and development	541720	NA	676	547	612	598	792	678	705	719	959
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	3,566
Health care services	621–23	NA	NA	1,049	542	672 i	528 i	501 i	758 i	848	1,101
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	1,799
All companies (number of domestic employees)	–	290,680	282,505	279,289	290,240	302,759	323,107	340,539	355,671	378,590	400,100
Micro companies <sup>a</sup>											
5–9	–	NA	NA	3,614	4,060	2,926 i	3,390 i	3,314 i	2,983 i	1,583 i	NA
Small companies											
10–19	–	NA	NA	NA	NA	NA	NA	NA	5,674 i	4,930 i	3,311
20–49	–	NA	NA	NA	NA	NA	NA	NA	10,281 i	9,635 i	9,435
Medium companies											
50–99	–	9,351	13,277	8,781	9,295	9,100 i	8,939	10,130 i	11,538	9,275	10,141

TABLE 65

**Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2008–17**

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
100–249	–	14,662	12,791	11,631	12,303	12,454	13,704	13,606	13,586	14,860	17,216
Large companies											
250–499	–	10,219	11,330	10,194	13,013	11,387	12,021	12,228	13,686	12,978	14,103
500–999	–	11,886	10,131	10,053	9,993	11,499	12,013	13,129	15,005	14,441	17,871
1,000–4,999	–	46,336	44,197	49,108	51,110	50,311	55,974	57,336	57,998	63,431	65,112
5,000–9,999	–	24,764	21,769	27,546	24,452	30,708	31,657	38,327	38,858	40,530	40,198
10,000–24,999	–	48,737	51,239	41,853	49,107	50,226	51,103	54,452	59,330	66,032	73,485
25,000 or more	–	100,820	97,056	99,291	102,222	110,042	119,493	122,533	126,732	140,895	149,227

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Business 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. Statistics are representative of companies located in the United States that performed or funded R&D. 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 2017 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 66

## Foreign R&amp;D paid for by the company and others and performed by the company, by industry and company size: 2008–17

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
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	87,528
Manufacturing industries	31–33	46,572	40,417	44,464	51,458	53,120	53,392	53,955	51,725	53,045	57,270
Food	311	596	817	1,006	1,195	1,076	1,315	1,282	1,231	994	865
Beverage and tobacco products	312	123	455	783	i 599	532	531	503	523	0 - 555	667
Textile, apparel, and leather products	313–16	367	80	39	49	52	98	103	70	81	160
Wood products	321	4	2	3	1	2	2	5	i 3	0 - 555	1
Paper	322	274	257	324	93	106	103	158	102	89	259
Printing and related support activities	323	9	7	38	30	35	6	3	2	4	5
Petroleum and coal products	324	D	156	D	D	D	46	64	38	44	54
Chemicals	325	13,990	9,689	14,267	16,215	13,470	12,464	13,294	12,929	12,809	14,450
Basic chemicals	3251	1,198	797	861	D	695	716	784	636	537	560
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	224	260	255	319	D	597	688	579	333	321
Pesticide, fertilizer, and other agricultural chemicals	3253	371	D	D	D	D	275	i 299	i D	0 - 5,157	384 - 401
Pharmaceuticals and medicines	3254	10,862	7,041	11,068	12,557	11,069	9,690	10,249	D	5,688 - 10,846	11,976
Soap, cleaning compound, and toilet preparation	3256	965	873	884	910	870	924	952	D	789	778
Paint, coating, adhesive, and other chemicals	3255, 3259	370	D	D	195	210	263	321	i D	307	415 - 432
Plastics and rubber products	326	341	595	386	362	861	929	905	358	831	902
Nonmetallic mineral products	327	106	54	282	i 253	261	249	i 155	i 228	185	181
Primary metals	331	114	130	121	108	77	82	94	86	69	130
Fabricated metal products	332	188	117	91	135	122	109	222	194	179	166
Machinery	333	1,929	1,930	2,143	3,587	3,710	2,833	2,984	3,288	3,239	3,266
Agricultural implement	33311	399	391	D	293	596	646	D	621	625	567
Semiconductor machinery	333242	366	285	296	376	66	451	493	599	727	786
Engine, turbine, and power transmission equipment	3336	92	83	D	D	D	347	537	405	424	317 - 460
Other machinery	other 333	1,072	1,170	1,254	D	D	1,389	D	1,664	1,464	1,453 - 1,597
Computer and electronic products	334	15,774	12,917	13,722	16,708	21,117	21,485	20,943	20,678	20,868	22,648
Communications equipment	3342	2,951	2,862	3,194	2,863	4,525	4,730	3,702	3,625	2,967	3,132
Semiconductor and other electronic components	3344	7,075	6,058	6,343	7,909	10,082	10,434	10,360	9,896	10,377	10,898
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	3,842



TABLE 66

## Foreign R&amp;D paid for by the company and others and performed by the company, by industry and company size: 2008–17

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	838	522	360	557	586	202	1,073	923	922	1,078
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	D	508	475	575	578	647	625	673	840	960
Other measuring and controlling device	other 3345	D	1,149	1,324	1,258	1,557	2,077	1,423	1,222	1,465	1,804
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	4,776
Electrical equipment, appliances, and components	335	1,162	1,158	1,447	1,695	1,062	1,605	1,382	1,351	1,436	1,867
Transportation equipment	336	10,267	7,974	8,422	7,936	8,075	7,899	9,621	8,412	8,592	8,822
Automobiles, bodies, trailers, and parts	3361–63	8,448	6,023	D	D	D	6,877	D	6,622	6,672	6,597
Aerospace products and parts	3364	1,816	1,846	1,770	772	D	901	D	1,672	1,817	2,053
Aircraft, aircraft engine, and aircraft parts	336411–13	1,742	1,760	D	D	D	D	D	1,670	1,813	2,050
Guided missile, space vehicle, and related parts	336414–15, 336419	74	85	D	D	5	D	D	2	4	3
Military armored vehicle, tank, and tank component	336992	0	D	D	1	0	0	D	0	0	0
Other transportation	other 336	3	D	D	D	D	121	D	118	104	173
Furniture and related products	337	27	38	33	28	23	28	45	25	22	40
Miscellaneous manufacturing	339	D	4,044	D	D	D	3,608	2,194	2,207	3,057	2,787
Medical equipment and supplies	3391	766	3,813	1,003	D	1,978	3,197	1,782	1,813	2,739	2,490
Other miscellaneous manufacturing	3399	D	231	D	D	D	411	412	394	317	297
Nonmanufacturing industries	21–23, 42–81	14,903	13,648	14,698	17,792	19,037	19,853	21,849	21,778	25,956	30,258
Mining, extraction, and support activities	21	D	D	239	232	D	452	D	336	308	329 - 337
Utilities	22	6	13	17	38	21	23	1	3	1	9
Wholesale trade	42	509	D	53	141	112	7	D	25	21	37
Electronic shopping and electronic auctions	454111–12	NA	NA	D	D	D	490	D	D	0 - 5,132	2,555 - 2,779
Transportation and warehousing	48–49	2	1	29	28	8	D	13	13	7	7
Information	51	7,657	7,243	8,011	9,644	9,915	11,767	13,736	12,508	13,454	14,646
Publishing	511	6,301	6,332	6,926	7,899	7,880	9,456	10,185	8,842	8,698	8,831
Newspaper, periodical, book, and directory publishers	5111	27	47	55	29	2	6	4	9	4	7
Software publishers	5112	6,274	6,285	6,871	7,870	7,878	9,450	10,181	8,833	8,693	8,824
Telecommunications	517	175	86	131	98	59	63	61	41	49	94
Data processing, hosting, and related services	518	1,089	266	142	339	661	631	1,294	1,245	0 - 4,710	2,272
Other information	other 51	93	559	812	1,308	1,316	1,616	2,196	2,378	0 - 4,710	3,450
Finance and insurance	52	74	518	467	496	628	587	625	950	1,136	965
Real estate and rental and leasing	53	65	28	37	D	38	11	6	13	2	191

TABLE 66

## Foreign R&amp;D paid for by the company and others and performed by the company, by industry and company size: 2008–17

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Lessors of nonfinancial intangible assets (except copyrighted works)	533	NA	NA	NA	41	37	D	3	D	*	173 i
Other real estate and rental and leasing	other 53	NA	NA	NA	D	* i	D	3	D	2	18 i
Professional, scientific, and technical services	54	6,150	5,328	5,309	6,424	6,723	6,418	6,534	7,653	5,744 - 10,877	11,064
Architectural, engineering, and related services	5413	200	126	148 i	D	57	41	65	58	57 i	53
Computer systems design and related services	5415	2,164	1,959	2,099	2,243 i	2,398 i	1,293	1,525 i	2,893	0 - 5,132	3,498
Scientific research and development services	5417	3,544	2,905	2,696	3,581	3,810	4,259	4,546	4,380	5,416	7,124
Biotechnology research and development	541711	NA	683	729	942	977	1,398	1,438	1,520	1,616	1,996
Physical, engineering, and life sciences (except biotechnology) research and development	541712	NA	2,213	1,962	2,638	2,830	2,859	3,103	2,858	3,796	5,125
Social sciences and humanities research and development	541720	NA	9	5	1	2	3	4 i	3	4	4
Other professional, scientific, and technical services	other 54	241	338	366	D	458	825	398 i	322	273	390
Health care services	621–23	1	10	D	D	36	7	*	12 i	154	224 - 231
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	NA	NA	NA	D	D	D	D	D	0 - 5,132	0 - 217
All companies (number of domestic employees)	–	61,475	54,066	59,162	69,251	72,157	73,245	75,804	73,503	79,001	87,528
Micro companies <sup>a</sup>											
5–9	–	NA	NA	178	83	99 i	52 i	95 i	118 i	145	NA
Small companies											
10–19	–	NA	NA	NA	NA	NA	NA	NA	76	101	136
20–49	–	NA	NA	NA	NA	NA	NA	NA	373	337	577
Medium companies											
50–99	–	976	509	688 i	539	628	351	547	407	364	482
100–249	–	1,735	1,574	1,358 i	1,051	1,212	1,276	1,475	1,378	1,300	1,380
Large companies											
250–499	–	1,178	985	1,245	1,561	1,306	1,359	1,446	1,151	1,773	2,272
500–999	–	1,753	1,992	1,741	1,396	1,455	1,650	2,293	2,437	2,159	2,516
1,000–4,999	–	11,350	10,403	11,674	12,691	12,419	13,238	14,343	13,261	15,587	15,143
5,000–9,999	–	7,000	5,692	6,907	8,126	10,298	11,430	12,979	9,541	8,949	14,230
10,000–24,999	–	11,785	10,442	8,856	12,485	10,317	9,741	9,366	11,534	15,515	14,505
25,000 or more	–	24,671	21,368	25,777	30,497	34,056	33,054	32,647	33,226	32,771	36,287

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Business 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. Statistics are representative of companies located in the United States that performed or funded R&D. 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 2017 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 67

## Worldwide R&amp;D paid for by the company and performed by the company and others, by business activity: 2008–17

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
All business activities	21100–81000	328,040	311,170	316,262	336,629	352,951	376,974	399,656	412,590	440,429	471,321
Oil and gas extraction	21100	1,215	1,223	1,268	1,379	D	1,487	1,308	1,486	1,089	986
Mining	21200	NA	D	75	128	92	114	56	71	63	164
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	1,474
Utilities	22100	NA	1,607	903	639	686	615	549	726	515	487
Construction	23000	NA	198	918	269	393 i	307	297	700	276	580
Food manufacturing	31100	2,983	4,039	4,478	4,970	4,635	7,028	6,842	5,892	6,073	5,941
Beverage manufacturing	31210	605	564	926	668	641	772	753	728	787 i	839
Tobacco manufacturing	31220	D	792	800	717	662	668	672	681	731	847
Textile, apparel, and leather products manufacturing	31990	NA	673	658	712	759	787	780	847	1,333	1,046
Wood products manufacturing	32100	264	304	239	208	D	244	336 i	251	0 - 7,094	265
Paper manufacturing	32200	1,130	1,144	1,231	1,156	1,362	1,588	1,614	D	1,555	1,705
Printing and related support activities	32300	297	241	244	265	356 i	391	390	321	340	283
Petroleum refineries	32401	NA	NA	708	591	807	558	617	526	625	567
Asphalt paving, roofing, and saturated materials manufacturing	32402	NA	NA	35	39	45	123	78	75	93	139
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	NA	NA	403	415	382	488	460 i	416	339	378
Basic chemicals manufacturing	32510	3,806	2,978	3,133	3,614	4,271	4,136	4,036	3,505	3,579	3,726
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	1,257
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	2,469 i
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing <sup>c</sup>	32541	70,016	68,588	71,603	67,688	69,473	68,318	68,846	63,606	69,518	71,788
In vitro diagnostic substances manufacturing <sup>c</sup>	32542	1,988	1,159	1,207	1,544	1,371 i	1,066	1,159	972	1,286	1,587
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	NA	NA	NA	NA	NA	10,356	14,947	23,172	24,458	30,008
Soap, cleaning compound, and toilet preparation manufacturing	32591	2,787	2,883	3,147	3,472	3,266	3,406	3,493	3,353	3,361	3,056
Paint, adhesive, and other chemicals manufacturing	32592	2,152	2,320	2,238	2,011	2,087	1,979	2,131	D	2,121	2,228
Plastics and rubber products manufacturing	32600	2,536	2,842	3,128	3,689	3,739	3,586	3,592	3,251	3,926	3,918
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	1,383
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	738	555	522	590	621	618 i	800	601	652	449

TABLE 67

## Worldwide R&amp;D paid for by the company and performed by the company and others, by business activity: 2008–17

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Primary metal manufacturing	33100	NA	840	933	783	882	792	853	719	0 - 7,094	699
Fabricated metal products manufacturing	33200	2,935	2,438	1,971	2,471	2,517	2,460	2,560	2,521	2,562	2,651
Agricultural machinery and equipment manufacturing	33311	1,404	1,507	1,523	1,430	1,893	2,055	1,990	1,916	1,977	1,875
Construction machinery manufacturing	33312	581	653	682	875	816	1,693	1,729	1,556	1,462	1,569
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	1,550
Semiconductor machinery manufacturing	33321	2,553	1,978	2,279	2,574	1,266	i 3,500	3,363	3,459	3,688	3,950
Industrial machinery manufacturing (except semiconductor machinery)	33322	1,191	853	806	1,128	1,031	1,006	1,237	1,181	893	1,185
Photographic and photocopying equipment manufacturing	33331	NA	852	270	757	25	i 108	25	114	59	54
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	2,311
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	33	587	i 519	511
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	3,120
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	2,623
Computers and peripheral equipment manufacturing and magnetic and optical media <sup>d</sup>	33412	NA	13,094	12,672	13,319	14,716	15,113	13,437	16,547	23,130	26,759
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	10,575
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	2,517
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	2,002
Audio and video equipment manufacturing	33430	773	977	1,352	1,019	1,081	1,108	1,282	1,587	1,535	1,146
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	40,730
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	3,926
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument manufacturing	33452	1,845	2,229	2,417	2,161	2,337	2,564	2,424	2,033	2,614	2,300
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	5,664
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	6,238

TABLE 67

## Worldwide R&amp;D paid for by the company and performed by the company and others, by business activity: 2008–17

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Motor vehicles manufacturing	33610	18,296	13,165	14,524	17,011	18,362	17,743	18,984	18,357	20,573	22,807
Motor vehicle body and trailer manufacturing	33620	70	96	190	73	98 i	107 i	104	160	118	46
Motor vehicle parts manufacturing	33630	5,401	4,158	4,310	4,681	4,736	5,600	7,146	7,285	6,801	7,811
Aircraft manufacturing	33641	4,053	7,390	4,430	4,512	4,716 i	4,373	4,221	4,859	5,639	4,644
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	1,448
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	3,176
Guided missile, space vehicle, and related parts manufacturing	33644	1,402	1,176	1,132	1,050	659	487	877	1,034	954	1,132
Railroad rolling stock manufacturing	33651	195	83	177	165	237	224	363	310	224	251
Ship and boat building	33660	151	616 i	608 i	154	143 i	192	489	251	618	156
Motorcycle, bicycle, and parts manufacturing	33691	199	194	186	234	197	231	283	320	335	358
Military armored vehicle, tank, and tank component manufacturing	33692	107	228	182	118	135	90	159	202	130	367 i
All other transportation equipment manufacturing	33699	176	135	232	367	437	425	361	430	478	507
Furniture and related products manufacturing	33700	511	495	402	344	431	433	455	509	411	471
Medical equipment and supplies manufacturing	33910	11,587	11,457	13,226	13,701	14,259	15,264	14,317	15,145	15,939	16,683
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	2,720
Merchant wholesalers, durable goods	42300	449	923 i	714	711	1,277 i	589	516	1,551	637	588
Merchant wholesalers, nondurable goods	42400	257	365 i	348	605	699 i	327	209	484	219	329
Wholesale electronic markets and agents and brokers (business to business)	42500	14	43 i	19 i	70	173 i	18	D	35	24	24 - 188 i
Retail trade (except electronic shopping and electronic auctions)	44000	NA	50	164	74	100 i	120	65	D	120	131
Electronic shopping and electronic auctions	45411	NA	NA	753	D	1,749	1,284	D	D	8,200 i	12,193
Transportation	48000	NA	319	211	111	199	377	412	229 i	123	808
Couriers, messengers, and express delivery services	49200	D	14	6	D	D	90	348	D	394	268
Warehousing and storage	49300	26	17	19	16	17	4	3	D	0	89
Newspaper, periodical, book, and directory publishers (except Internet)	51110	180	748	853	408 i	257 i	339 i	103	117	87	108
Software publishers (except Internet) <sup>e</sup>	51120	31,369	26,362	28,457	29,992	31,209	35,047	41,052	36,040	34,699	32,186
Motion picture and sound recording (except Internet)	51200	104	135	93	67	67	38	83 i	12	20	24 - 188 i
Broadcasting (except Internet)	51500	NA	89	100	115	165 i	179	206	306	347	466
Wired telecommunications carriers	51710	673	D	1,499 i	1,685	1,631 i	1,012 i	1,166	1,269 i	1,180	1,017

TABLE 67

**Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–17**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Wireless telecommunications carriers (except satellite)	51720	532 i	186	724 i	815 i	860 i	1,732 i	2,500	1,192 i	1,458 i	1,953
Satellite telecommunications	51740	153	108	229	114	163	176	134	705 i	746	621
Other telecommunications (not listed elsewhere)	51790	501	351	338	462	399	377	330	536	362	370
Data processing, hosting, and related services <sup>e</sup>	51800	NA	2,889	3,051	5,293	4,406	4,381	5,402	6,895	7,040	6,778
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	4,344	6,730	6,801	11,913	19,237
Other information services, including Internet publishing, broadcasting, and Web search portals <sup>e</sup>	51910	NA	5,519	7,270	9,456	12,998	15,433	17,443	25,330	27,524	32,696
Finance: banking and credit intermediation	52200	NA	D	1,235	1,703	2,454	3,238	3,553	3,299	5,171	5,640
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	1,799
Insurance carriers and related activities	52400	NA	798	611	872	1,429	1,772	1,069	1,573	1,444	1,428
Real estate	53100	20	32	3	13	27	105	199	288	440	390
Rental and leasing services	53200	NA	129	146	51	59	94	80	80	106 i	213 i
Lessors of nonfinancial intangible assets, including patent licensing	53300	80	259	268	369	437	100	97	104	45	330 i
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	NA	D	505	705 i	535	696	1,128	1,587	1,052	1,047
Architectural, engineering, and related services	54130	1,742	1,115	1,390	1,380	1,232	1,495	1,649	2,449	1,975	1,893
Specialized design services	54140	75	76	65	283	157 i	81	42	13	26	132
Computer systems design and related services <sup>e</sup>	54150	11,476	12,292	11,528	13,673	13,909 i	12,577	13,288	14,090	14,864	14,040
Management, scientific, and technical consulting services	54160	1,110	2,246	1,380	1,618	2,066 i	1,428	1,681	1,531	1,668	1,611
Research and development services in social sciences and humanities	54172	NA	96	8	19	64	36	47	15	0 - 7,094 i	0 - 430
Research and development services in biotechnology <sup>c</sup>	54173	NA	6,850	2,601	6,238	6,294	1,723	1,344	2,387	1,176	918
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	2,393
Advertising and related services	54180	37	1,950	422	97	375 i	390	424	452	373	383
Professional, scientific, and technical services (not listed elsewhere)	54190	439	1,036	543	1,242	1,199	1,627	810	944	622	660
Management of companies and enterprises	55100	11	40	23	43	18	76	43	D	20	93
Administrative and support services	56100	NA	419	640	348	609	589	459	375	588	1,730
Waste management and remediation services	56200	NA	15	684	20	D	23	D	D	8	0 - 187
Offices of physicians	62110	40	37	371	36	42 i	43	39	28	70	107 i

TABLE 67

**Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–17**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Medical and diagnostic laboratories	62150	903	246	409	287	364	347	410	424	0-7,094 <sup>i</sup>	1,022
Other ambulatory health care services (ambulance, dental, home health care)	62199	NA	47	145 <sup>i</sup>	15	45 <sup>i</sup>	52	37	39	23	87
Hospitals and nursing care facilities	62200	NA	62 <sup>i</sup>	68	2	2 <sup>i</sup>	2	2	4	6	18
Social assistance services	62400	NA	D	15	13	36	47	17	2	2	0-430
Arts, entertainment, and recreation	71000	NA	161	137	85	70	29	103 <sup>i</sup>	50	45	53
Accommodation and food services	72000	NA	50	119	84	149 <sup>i</sup>	163	D	106	76	77
Other services (not listed elsewhere)	81000	NA	89	465	345	484	405	550	669	0-7,094 <sup>i</sup>	891
Undistributed	-	10,660	14,175	5,373 <sup>i</sup>	D	491	359 <sup>i</sup>	69	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.

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

<sup>b</sup> Business codes and descriptions are based on 2012 NAICS industry definitions.

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

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

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

**Note(s)**

Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded R&D. 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 2017 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

## Worldwide sales for companies located in the United States that performed or funded R&amp;D, by business activity: 2008–17

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
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	12,948,005
Oil and gas extraction	21100	271,493	153,939	212,469	331,320	271,983	250,884	241,227	141,687	117,720	109,273
Mining	21200	NA	D	38,302	57,661	43,857	54,531	D	D	29,976	22,509
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	60,844
Utilities	22100	NA	317,243	310,768	348,763	318,893	324,150	356,225	346,925	309,116	396,134
Construction	23000	NA	42,287	93,305	107,286	107,685	94,057	91,507	64,463	52,363	77,156
Food manufacturing	31100	475,588	630,500	694,763	690,698	688,804	941,309	844,673	744,318	705,021	799,010
Beverage manufacturing	31210	143,008	129,396	141,259	180,153	167,003	164,270	166,544	170,059	155,459	148,875
Tobacco manufacturing	31220	28,970	134,972	133,993	140,998	130,759	69,191	D	D	64,978	71,720
Textile, apparel, and leather products manufacturing	31990	NA	56,131	68,515	66,416	89,086	70,260	66,546	83,170	109,296	84,497
Wood products manufacturing	32100	34,563	27,826	28,342	24,165	32,908	42,472	51,879	33,713	0 - 373,524	36,213
Paper manufacturing	32200	139,953	110,534	136,302	144,064	142,335	146,748	148,797	D	129,369	146,227
Printing and related support activities	32300	26,426	37,743	37,398	32,823	32,152	29,576	34,227	42,885	31,310	47,965
Petroleum refineries	32401	NA	NA	837,945	954,108	911,784	968,046	787,825	512,224	415,433	324,107 - 555,481
Asphalt paving, roofing, and saturated materials manufacturing	32402	NA	NA	7,566	8,872	8,563	14,504	11,150	10,324	12,322	16,003
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	19,161
Basic chemicals manufacturing	32510	273,809	179,494	243,193	299,476	473,666	278,661	270,287	212,951	264,935	237,198
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	97,108
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	73,305
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing <sup>c</sup>	32541	582,910	438,687	471,763	577,607	594,394	577,930	569,968	564,398	608,453	619,783

TABLE 68

## Worldwide sales for companies located in the United States that performed or funded R&amp;D, by business activity: 2008–17

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
In vitro diagnostic substances manufacturing <sup>c</sup>	32542	22,317	16,940	20,637	25,005	27,022	13,871	25,365	14,159	7,892 - 171,885	15,914
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	NA	NA	NA	NA	NA	40,409	56,454	84,437	0 - 373,524	99,127
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	168,785
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	127,257
Plastics and rubber products manufacturing	32600	162,401	161,057	193,471	243,447	265,623	219,020	241,780	201,164	232,466	227,168
Clay and glass products manufacturing	32710	36,417	27,803	37,853	34,184	36,960	39,365	34,863	39,676	47,603	42,173
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	30,491
Primary metal manufacturing	33100	NA	124,478	197,315	179,318	176,544	161,443	128,532	103,093	121,321	100,878
Fabricated metal products manufacturing	33200	188,359	132,465	161,593	179,228	207,423	199,678	235,784	194,098	165,184	175,352
Agricultural machinery and equipment manufacturing	33311	48,185	46,695	53,946	43,410	59,651	68,793	63,617	53,559	51,776	60,583
Construction machinery manufacturing	33312	32,109	23,195	30,685	42,974	43,355	63,344	65,348	56,090	49,267	59,675
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	63,193
Semiconductor machinery manufacturing	33321	20,019	10,505	21,588	25,960	9,973	24,420	27,333	24,653	30,749	37,848
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	36,711
Photographic and photocopying equipment manufacturing	33331	NA	7,471	D	D	307	7,502	9,162	8,602	6,775 - 170,768	7,438
Commercial, service industry, temperature control, and air-	33332	NA	49,546	76,811	73,896	90,814	97,984	111,674	101,920	113,832	104,926

TABLE 68

## Worldwide sales for companies located in the United States that performed or funded R&amp;D, by business activity: 2008–17

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
flow control machinery manufacturing											
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	15	D	5,579	5,574
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	105,285
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	117,062
Computers and peripheral equipment manufacturing and magnetic and optical media <sup>d</sup>	33412	NA	273,429	330,020	342,416	304,309	307,523	297,193	282,890	414,641	438,419
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	48,816	66,123	87,159	64,811	64,652	75,886	72,421	202,399	76,218	75,277
Radio, television, and wireless communication equipment manufacturing	33422	76,167	64,808	79,675	92,884	136,470	148,680	168,774	D	39,937 - 203,930	37,605
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	13,998
Audio and video equipment manufacturing	33430	13,212	15,041	22,242	11,476	17,926	19,596	18,333	38,954	35,473	32,459
Semiconductor and other electronic components manufacturing	33440	220,272	196,399	296,058	336,789	332,771	320,780	350,779	D	323,512	366,749
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	44,539
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	65,594

TABLE 68

## Worldwide sales for companies located in the United States that performed or funded R&amp;D, by business activity: 2008–17

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
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	92,340	
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	184,347	
Motor vehicles manufacturing	33610	521,541	399,125	476,726	539,595	541,730	615,136	539,139	646,110	693,548	625,969	
Motor vehicle body and trailer manufacturing	33620	D	15,688	23,105	15,325	34,284	25,913	32,719	23,229	63,232	19,883	
Motor vehicle parts manufacturing	33630	163,993	126,638	242,201	224,450	228,418	269,022	379,492	294,414	238,521	268,118	
Aircraft manufacturing	33641	97,635	75,960	89,235	121,480	97,484	i 154,241	139,924	148,986	136,497	127,450	
Aircraft engine and engine parts manufacturing	33642	42,829	37,086	34,925	42,514	40,376	54,024	48,134	D	38,176	42,094	
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	101,928	
Guided missiles, space vehicles, and related parts manufacturing	33644	D	51,326	D	D	16,554	17,200	30,237	31,776	30,600	38,398	
Railroad rolling stock manufacturing	33651	7,248	3,639	9,075	i 8,870	14,255	12,639	19,679	19,353	14,852	13,433	
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	22,585	
Motorcycle, bicycle, and parts manufacturing	33691	8,423	6,677	6,646	8,948	7,829	11,331	9,142	9,067	9,507	9,187	
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	11,267	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	14,717	
Furniture and related products manufacturing	33700	43,401	35,821	37,487	39,031	43,719	41,407	45,760	43,530	43,362	46,246	
Medical equipment and supplies manufacturing	33910	164,066	159,611	243,406	304,215	217,549	237,729	234,177	235,706	244,748	244,936	
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	121,824	

TABLE 68

**Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–17**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Merchant wholesalers, durable goods	42300	412,269	313,095	334,004	214,772	246,702	378,550	180,014	260,038	221,852	254,445
Merchant wholesalers, nondurable goods	42400	340,956	273,118	280,982	496,309	587,019	571,742	698,182	547,921	512,867	527,563
Wholesale electronic markets and agents and brokers (business to business)	42500	2,600	8,684	3,347	4,722	115,452	53,497	86,215	41,905	60,197	20,879
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	390,679
Electronic shopping and electronic auctions	45411	NA	NA	D	D	88,213	96,577	D	130,399	110,617 - 274,610	201,534
Transportation	48000	NA	D	182,535	109,842	139,615	95,821	117,267	D	0 - 373,524	196,106
Couriers, messengers, and express delivery services	49200	D	D	47,619	D	D	D	170,934	D	187,345	84,691
Warehousing and storage	49300	31,235	1,536	24,457	22,885	3,983	13,530	2,585	D	4,652	14,230
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	6,190
Software publishers (except Internet) <sup>e</sup>	51120	210,186	195,833	214,359	230,898	237,602	266,587	278,159	272,944	256,293	232,939
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	9,119
Broadcasting (except Internet)	51500	NA	39,734	53,313	44,029	67,429	81,499	D	74,473	84,879	88,173
Wired telecommunications carriers	51710	D	187,439	210,704	268,345	223,829	181,992	230,630	216,588	181,904	221,017
Wireless telecommunications carriers (except satellite)	51720	135,248	154,682	138,479	156,696	193,408	D	247,759	D	172,416	199,344 - 430,718
Satellite telecommunications	51740	19,330	12,662	16,021	2,783	3,056	D	3,581	44,400	61,927	57,078
Other telecommunications (not listed elsewhere)	51790	5,603	9,122	7,737	18,803	17,803	18,504	6,507	14,561	8,524	15,164
Data processing, hosting, and related services <sup>e</sup>	51800	NA	36,196	38,523	60,641	95,872	58,502	81,059	79,017	76,345	73,963
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	27,442	D	33,792	57,770	98,001
Other information services, including Internet publishing,	51910	NA	41,660	77,319	39,551	45,729	65,134	102,254	94,541	113,123	164,943

TABLE 68

## Worldwide sales for companies located in the United States that performed or funded R&amp;D, by business activity: 2008–17

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017		
broadcasting, and Web search portals <sup>e</sup>													
Finance: banking and credit intermediation	52200	NA	D	1,068,703	631,129	673,238	i	347,139	364,224	377,622	400,369	471,876	
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	102,511	
Insurance carriers and related activities	52400	NA	294,233	281,344	280,278	358,159		397,971	380,117	420,526	372,903	312,714	
Real estate	53100	D	7,738	D	D	D		D	D	8,537	9,292	11,173	
Rental and leasing services	53200	NA	32,231	36,299	23,830	29,033		35,488	21,986	29,238	14,235	25,351	
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	4,713
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	NA	D	16,188	D	11,315		14,588	22,315	22,259	19,526	19,827	
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	90,076	
Specialized design services	54140	D	6,504	3,976	2,581	3,646	i	3,614	2,165	D	706	4,160	i
Computer systems design and related services <sup>e</sup>	54150	210,916	216,477	224,026	377,919	i	272,065	249,600	272,937	243,790	249,430	225,307	
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	49,336	
Research and development services in social sciences and humanities	54172	NA	980	1,170	827	D		1,301	992	D	1,131	1,300	
Research and development services in biotechnology <sup>c</sup>	54173	NA	22,354	i	8,493	8,657	11,316	12,390	17,543	10,962	9,026	9,401	
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	39,842	
Advertising and related services	54180	D	48,883	12,992	i	D	52,764	D	D	D	44,669 - 208,661	107,770	
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	25,732	

TABLE 68

**Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–17**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Management of companies and enterprises	55100	828	2,333	3,613	17,275	5,435	177,880	9,213	16,180	11,794	18,063
Administrative and support services	56100	NA	35,867	45,135	32,735	50,684	44,004	243,644	50,037	55,602	59,208
Waste management and remediation services	56200	NA	6,242	14,172	8,182	6,564	6,245	4,766	24,985	27,470	22,541
Offices of physicians	62110	7,492	25,752	24,133	23,844	35,513	36,233	19,041	36,724	40,586	63,828
Medical and diagnostic laboratories	62150	20,968	15,216	37,950	17,047	21,038	17,914	5,919	20,904	27,539	31,160
Other ambulatory health care services (ambulance, dental, home health care)	62199	NA	8,127	8,487	D	3,361	10,919	5,274	5,651	0 - 229,395	11,101
Hospitals and nursing care facilities	62200	NA	D	D	D	D	D	26,866	27,616	32,896	34,370
Social assistance services	62400	D	286	448	326	249	1,065	1,338	63	77	112
Arts, entertainment, and recreation	71000	NA	17,339	16,089	16,023	18,344	D	D	18,677	17,509 - 181,502	25,033
Accommodation and food services	72000	NA	D	69,474	39,421	88,878	107,255	46,228	76,898	66,849	32,190
Other services (not listed elsewhere)	81000	NA	15,585	43,778	129,084	57,612	142,029	78,365	70,781	237,671	220,241 - 451,615
Less: intersegment eliminations	-	381,031	237,743	234,289	281,460	309,288	301,615	316,930	240,217	226,993	190,205
Undistributed	-	1,092,275	1,590,109	516,754	598,369	167,240	D	4,602	9,547	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.

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

<sup>b</sup> Business codes and descriptions are based on 2012 NAICS industry definitions.

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

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

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

**Note(s)**

Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded R&D. 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 2017 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

## Domestic sales for companies located in the United States that performed or funded R&amp;D, by business activity: 2008–17

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
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	9,682,692
Oil and gas extraction	21100	127,788	61,582	85,797	178,926	i 124,569	120,495	124,534	71,385	58,231	52,023
Mining	21200	NA	D	33,072	38,109	24,837	38,270	22,962	37,589	i 19,449	17,133
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	37,568
Utilities	22100	NA	D	301,613	337,871	309,573	316,082	347,997	336,457	304,643	389,447
Construction	23000	NA	27,180	81,641	88,626	64,402	60,516	66,835	49,892	45,660	71,838
Food manufacturing	31100	394,404	503,047	501,332	494,683	503,915	693,438	608,765	541,557	520,546	625,212
Beverage manufacturing	31210	83,691	78,740	84,764	95,236	83,774	106,580	109,397	D	111,431	95,712
Tobacco manufacturing	31220	28,680	32,431	31,357	29,645	27,706	35,864	36,177	31,715	34,196	35,262
Textile, apparel, and leather products manufacturing	31990	NA	45,893	56,890	52,532	68,545	55,066	51,532	70,105	89,019	66,085
Wood products manufacturing	32100	28,183	26,213	25,241	22,344	28,764	36,703	44,706	28,998	0-229,395	32,000
Paper manufacturing	32200	100,057	80,030	99,820	103,867	101,033	106,399	106,178	108,659	95,481	110,383
Printing and related support activities	32300	22,678	33,532	32,163	26,809	26,267	26,281	29,178	35,056	26,808	39,269
Petroleum refineries	32401	NA	NA	540,612	581,297	578,075	639,569	521,504	336,271	245,323	324,108
Asphalt paving, roofing, and saturated materials manufacturing	32402	NA	NA	7,549	8,781	8,489	13,260	8,873	9,694	9,088	12,998
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	14,153
Basic chemicals manufacturing	32510	158,621	103,950	150,240	206,723	344,515	i 198,843	195,066	154,351	205,221	168,210
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	58,861
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	54,774
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing <sup>c</sup>	32541	445,985	309,750	324,266	414,284	428,486	415,199	414,154	410,983	463,633	478,088
In vitro diagnostic substances manufacturing <sup>c</sup>	32542	15,353	9,805	12,835	13,735	14,646	8,141	14,006	6,219	7,893	9,183
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	NA	NA	NA	NA	NA	36,856	48,419	71,205	0-229,395	81,126

TABLE 69

**Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–17**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
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	88,341
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	80,003
Plastics and rubber products manufacturing	32600	118,523	114,191	137,777	173,290	194,568	153,705	165,082	156,033	175,524	161,672
Clay and glass products manufacturing	32710	24,394	19,014	25,143	21,754	20,164	22,987	21,577	23,739	30,753	28,177
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	26,360
Primary metal manufacturing	33100	NA	97,493	161,558	148,670	153,926	137,000	104,419	90,956	105,884	83,339
Fabricated metal products manufacturing	33200	142,788	102,595	119,246	130,090	155,294	160,359	168,139	150,860	129,779	127,982
Agricultural machinery and equipment manufacturing	33311	27,543	25,669	29,904	29,258	35,667	45,717	36,857	32,054	30,092	39,296
Construction machinery manufacturing	33312	18,228	13,180	19,480	25,854	31,853	42,912	41,256	35,668	34,984	38,879
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	30,135
Semiconductor machinery manufacturing	33321	9,091	4,765	11,918	15,018	6,839	10,807	11,067	8,215	15,676	19,812
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	26,111
Photographic and photocopying equipment manufacturing	33331	NA	5,392	3,927	4,791	D	6,885	7,246	7,124	6,776	6,513
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	70,030
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	15	D	0 - 5,580	1,433
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	57,233
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	76,941
Computers and peripheral equipment manufacturing and magnetic and optical media <sup>d</sup>	33412	NA	136,666	167,290	174,898	143,492	180,146	165,617	153,211	211,415	230,968
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	26,447	35,592	40,631	32,334	34,783	39,026	40,004	92,411	44,009	41,786

TABLE 69

## Domestic sales for companies located in the United States that performed or funded R&amp;D, by business activity: 2008–17

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Radio, television, and wireless communication equipment manufacturing	33422	46,641	46,769	61,641	55,217	82,027	94,606	96,564	D	39,938	31,698
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	11,961
Audio and video equipment manufacturing	33430	10,969	10,929	19,142	7,296	14,633	14,832	13,162	D	25,739	28,886
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	179,804
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	24,347
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	53,381
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	60,689
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	118,813
Motor vehicles manufacturing	33610	346,591	274,985	329,874	373,194	375,113	459,721	385,647	526,522	561,193	507,269
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	19,177
Motor vehicle parts manufacturing	33630	97,433	77,528	146,257	125,593	130,372	155,179	244,948	192,928	148,781	179,016
Aircraft manufacturing	33641	97,973	69,001	81,666	111,748	91,545	145,641	132,472	139,909	130,676	120,502
Aircraft engine and engine parts manufacturing	33642	35,056	24,737	25,563	27,491	26,706	46,618	41,051	D	36,861	40,321
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	82,023
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	36,954
Railroad rolling stock manufacturing	33651	6,354	2,763	7,095	7,204	11,800	10,875	16,122	16,100	11,092	8,235
Ship and boat building	33660	14,880	D	10,531	11,647	22,778	15,008	32,077	13,569	33,497	20,899
Motorcycle, bicycle, and parts manufacturing	33691	8,078	6,282	6,081	7,422	7,067	10,406	7,777	7,687	6,276	5,468
Military armored vehicle, tank, and tank components manufacturing	33692	13,092	9,674	9,072	5,755	4,668	4,190	4,895	4,304	0 - 229,395	9,629
All other transportation equipment manufacturing	33699	7,131	5,438	11,079	11,066	16,258	15,809	D	11,472	11,940	11,606

TABLE 69

## Domestic sales for companies located in the United States that performed or funded R&amp;D, by business activity: 2008–17

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
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	42,418
Medical equipment and supplies manufacturing	33910	105,647	102,585	169,760	225,177	136,664	160,263	155,890	154,650	166,341	161,449
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	87,312
Merchant wholesalers, durable goods	42300	238,101	196,341	206,240	171,815	221,488	353,401	i 161,500	232,112	194,976	191,142
Merchant wholesalers, nondurable goods	42400	274,190	239,385	247,311	266,388	349,833	362,965	457,745	387,489	359,871	367,555
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	20,549
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	371,991
Electronic shopping and electronic auctions	45411	NA	NA	32,624	40,254	53,712	59,174	43,787	i D	110,618	138,396
Transportation	48000	NA	D	95,591	83,912	107,212	87,113	111,576	D	0-229,395	158,870
Couriers, messengers, and express delivery services	49200	D	D	36,420	D	D	D	123,456	D	141,429	64,033
Warehousing and storage	49300	28,723	1,296	23,982	21,910	3,157	12,235	1,971	2,305	3,358	8,900
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	4,509
Software publishers (except Internet) <sup>e</sup>	51120	121,028	118,001	129,649	132,970	136,905	154,237	163,059	159,688	155,068	135,245
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	6,477
Broadcasting (except Internet)	51500	NA	34,110	45,779	39,563	59,926	73,283	59,724	64,390	70,169	71,374
Wired telecommunications carriers	51710	99,917	D	209,490	261,484	216,736	181,127	227,778	213,921	179,239	218,689
Wireless telecommunications carriers (except satellite)	51720	134,162	153,937	138,473	156,525	193,254	205,148	247,714	210,820	172,357	199,345
Satellite telecommunications	51740	14,005	6,743	i 15,845	2,430	2,822	3,143	3,518	43,812	61,622	56,785
Other telecommunications (not listed elsewhere)	51790	4,374	8,108	7,222	15,929	14,610	16,325	5,973	13,669	7,684	13,438
Data processing, hosting, and related services <sup>e</sup>	51800	NA	29,903	31,417	51,197	82,997	i 49,201	67,167	64,916	59,491	55,062
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	19,455	26,461	26,654	44,759	77,055

TABLE 69

## Domestic sales for companies located in the United States that performed or funded R&amp;D, by business activity: 2008–17

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Other information services, including Internet publishing, broadcasting, and Web search portals <sup>e</sup>	51910	NA	27,907	47,397	28,424	28,760	36,613	57,405	53,823	75,332	108,357
Finance: banking and credit intermediation	52200	NA	D	992,651	601,628	631,902	i 305,994	317,147	312,954	342,319	400,158
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	83,735
Insurance carriers and related activities	52400	NA	282,640	265,110	265,293	349,252	363,799	347,710	398,746	353,842	294,274
Real estate	53100	6,053	D	4,615	4,727	8,069	8,227	10,128	8,449	9,235	11,080
Rental and leasing services	53200	NA	D	27,719	18,597	21,801	26,614	15,330	23,848	0 - 14,237	17,228
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	4,000
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	17,275
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	69,096
Specialized design services	54140	3,325	D	3,522	2,353	3,301	i 2,714	1,487	769	638	2,228
Computer systems design and related services <sup>e</sup>	54150	124,832	140,234	143,787	224,144	167,759	158,858	168,793	165,417	176,418	153,903
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	42,365
Research and development services in social sciences and humanities	54172	NA	978	1,168	820	934	1,297	969	1,042	1,124	1,294
Research and development services in biotechnology <sup>c</sup>	54173	NA	18,691	i 7,194	7,388	9,769	10,689	15,872	9,381	6,548	6,341
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	29,560
Advertising and related services	54180	14,574	D	11,336	i 21,227	27,500	34,889	34,379	38,454	44,670	52,826
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	23,515
Management of companies and enterprises	55100	752	2,310	3,347	11,847	4,131	176,993	8,497	D	11,172	i 16,387
Administrative and support services	56100	NA	29,045	25,660	22,146	38,874	i 26,981	214,331	23,581	27,504	30,881
Waste management and remediation services	56200	NA	D	13,971	7,223	6,080	5,650	4,152	23,159	25,561	21,190
Offices of physicians	62110	7,492	25,751	24,133	23,844	35,513	36,233	19,041	36,724	40,586	63,827

TABLE 69

**Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–17**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Medical and diagnostic laboratories	62150	19,930	14,359	36,288	15,778	19,655	17,027	5,024	19,415	25,614	29,465
Other ambulatory health care services (ambulance, dental, home health care)	62199	NA	D	8,333	D	3,334	i	10,919	5,274	0 - 229,395	10,562
Hospitals and nursing care facilities	62200	NA	D	7,831	16,084	870	i	1,227	26,866	27,485	34,370
Social assistance services	62400	D	D	448	326	249		1,036	1,336	63	112
Arts, entertainment, and recreation	71000	NA	14,265	12,920	12,727	15,248		13,180	12,903	16,137	19,384
Accommodation and food services	72000	NA	D	37,218	27,476	54,266	i	57,908	31,664	44,505	25,877
Other services (not listed elsewhere)	81000	NA	9,638	35,994	118,268	44,823		120,458	60,949	51,253	220,242
Less: intersegment eliminations	-	219,384	110,499	132,754	117,417	136,579		136,540	160,374	126,960	116,556
Undistributed	-	756,553	1,137,705	412,892	450,613	108,244	i	D	1,945	D	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.

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

<sup>b</sup> Business codes and descriptions are based on 2012 NAICS industry definitions.

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

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

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

**Note(s)**

Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded R&D. 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 2017 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

## Foreign sales for companies located in the United States that performed or funded R&amp;D, by business activity: 2008–17

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
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	3,265,314
Oil and gas extraction	21100	143,705	92,357	126,671	152,394	147,415	130,389	116,693	70,302	59,489	57,250
Mining	21200	NA	D	5,230	19,552	19,020	16,261	D	D	10,528	5,376
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	23,277
Utilities	22100	NA	D	9,155	10,892	9,320	8,068	8,229	10,468	4,473	6,686
Construction	23000	NA	15,107	11,664	18,660	43,283	33,541	24,672	14,571	6,703	5,318
Food manufacturing	31100	81,184	127,453	193,432	196,015	184,889	247,871	235,909	202,761	184,474	173,798
Beverage manufacturing	31210	59,317	50,655	56,495	84,916	83,229	57,690	57,147	D	44,029	53,163
Tobacco manufacturing	31220	290	102,541	102,636	111,353	103,052	33,327	D	D	30,782	36,458
Textile, apparel, and leather products manufacturing	31990	NA	10,239	11,625	13,883	20,542	15,193	15,014	13,065	20,278	18,411
Wood products manufacturing	32100	6,381	1,613	3,101	i 1,821	4,144	5,769	7,172	4,715	0 - 163,991	4,213
Paper manufacturing	32200	39,895	30,504	36,481	40,196	41,303	40,349	42,619	D	33,888	35,844
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	8,696
Petroleum refineries	32401	NA	NA	297,333	372,811	333,710	328,477	266,321	175,953	170,110	0 - 231,373
Asphalt paving, roofing, and saturated materials manufacturing	32402	NA	NA	17	91	74	i 1,244	2,278	630	3,234	3,005
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	5,007
Basic chemicals manufacturing	32510	115,189	75,544	92,953	92,754	129,151	79,818	75,221	58,600	59,714	68,988
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	38,247
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	18,531
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing <sup>c</sup>	32541	136,925	128,937	147,497	163,323	165,908	162,730	155,814	153,415	144,820	141,695
In vitro diagnostic substances manufacturing <sup>c</sup>	32542	6,964	7,135	7,802	11,270	12,376	5,730	11,359	7,940	0 - 163,991	6,731
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	NA	NA	NA	NA	NA	3,553	8,035	13,232	0 - 163,991	18,001

TABLE 70

## Foreign sales for companies located in the United States that performed or funded R&amp;D, by business activity: 2008–17

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
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	80,444
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	47,254
Plastics and rubber products manufacturing	32600	43,878	46,866	55,694	70,156	71,055	65,315	76,697	45,131	56,942	65,496
Clay and glass products manufacturing	32710	12,023	8,789	12,710	12,430	16,796	16,378	13,287	15,938	16,850	13,996
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	4,130
Primary metal manufacturing	33100	NA	26,985	35,756	30,648	22,619	24,443	24,114	12,138	15,437	17,539
Fabricated metal products manufacturing	33200	45,571	29,870	42,347	49,138	52,129	39,319	67,646	43,238	35,404	47,370
Agricultural machinery and equipment manufacturing	33311	20,642	21,025	24,042	14,152	23,984	23,076	26,760	21,505	21,684	21,287
Construction machinery manufacturing	33312	13,881	10,015	11,205	17,120	11,502	20,431	24,092	20,423	14,283	20,797
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	33,058
Semiconductor machinery manufacturing	33321	10,928	5,740	9,670	10,941	3,134	13,613	16,266	16,438	15,074	18,036
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	10,600
Photographic and photocopying equipment manufacturing	33331	NA	2,080	D	D	D	618	1,915	1,477	0 - 163,991	925
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	34,896
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	0	D	0 - 5,580	4,141
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	48,051
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	40,121
Computers and peripheral equipment manufacturing and magnetic and optical media <sup>d</sup>	33412	NA	136,763	162,729	167,518	160,818	127,377	131,576	129,679	203,226	207,452
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	33,491



TABLE 70

## Foreign sales for companies located in the United States that performed or funded R&amp;D, by business activity: 2008–17

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
Radio, television, and wireless communication equipment manufacturing	33422	29,526	18,039	18,034	37,667	54,443	54,074	i 72,211	i 15,183	0 - 163,991	5,907	
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	6,791	4,680	4,015	8,552	2,041	6,695	i 1,747	1,326	0 - 163,991	2,037	
Audio and video equipment manufacturing	33430	2,243	4,112	3,100	4,180	3,294	4,764	5,171	D	9,734	3,573	
Semiconductor and other electronic components manufacturing	33440	100,661	79,098	157,934	185,199	186,007	197,516	188,661	D	163,360	186,945	
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	20,192	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	12,213	i
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	31,651	
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	65,533	
Motor vehicles manufacturing	33610	174,950	124,140	146,852	166,401	166,616	155,415	153,493	119,588	132,355	118,700	
Motor vehicle body and trailer manufacturing	33620	D	504	937	903	2,302	187	573	145	384	706	
Motor vehicle parts manufacturing	33630	66,559	49,109	95,944	98,857	98,046	113,842	134,544	101,485	89,740	89,102	
Aircraft manufacturing	33641	S	6,959	7,569	9,732	i 5,939	8,600	i 7,452	9,077	5,821	6,948	
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	1,773	
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	19,905	
Guided missiles, space vehicles, and related parts manufacturing	33644	D	D	D	D	1,899	2,431	2,366	2,434	i 339	1,444	i
Railroad rolling stock manufacturing	33651	894	875	1,980	1,666	2,455	1,764	3,557	i 3,253	3,760	5,198	
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 1,685	
Motorcycle, bicycle, and parts manufacturing	33691	345	395	565	1,526	762	926	1,365	1,381	3,231	i 3,720	
Military armored vehicle, tank, and tank components manufacturing	33692	249	462	D	484	224	164	2,608	D	78	1,638	i

TABLE 70

## Foreign sales for companies located in the United States that performed or funded R&amp;D, by business activity: 2008–17

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
All other transportation equipment manufacturing	33699	2,382	895	1,929	2,349	2,212	13,125	D	3,093	2,495	3,111	
Furniture and related products manufacturing	33700	7,183	4,342	4,610	6,151	6,272	5,960	6,085	5,506	5,625	3,828	
Medical equipment and supplies manufacturing	33910	58,419	57,025	73,646	79,038	80,885	77,466	78,288	81,056	78,407	83,487	
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 34,512	
Merchant wholesalers, durable goods	42300	174,168	116,754	127,763	42,957	25,213	25,149	i 18,514	27,926	26,876	63,303	
Merchant wholesalers, nondurable goods	42400	66,765	33,733	33,672	229,921	237,186	208,777	240,437	160,432	152,996	160,008	
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	331	
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	18,688	i
Electronic shopping and electronic auctions	45411	NA	NA	D	D	34,500	37,403	D	D	0 - 163,991	63,138	
Transportation	48000	NA	D	86,945	25,930	32,403	8,708	5,691	D	0 - 163,991	37,236	
Couriers, messengers, and express delivery services	49200	D	D	11,199	D	0	30,192	47,478	D	45,916	20,659	
Warehousing and storage	49300	2,512	240	474	975	826	1,295	614	D	1,294	5,330	
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	1,681	
Software publishers (except Internet) <sup>e</sup>	51120	89,158	77,832	84,710	97,929	100,697	112,350	115,101	113,255	101,226	97,694	
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	2,642	
Broadcasting (except Internet)	51500	NA	5,624	7,533	4,466	7,504	i 8,215	D	10,083	14,710	16,799	
Wired telecommunications carriers	51710	D	D	1,214	6,862	7,093	865	2,852	2,667	2,665	2,328	
Wireless telecommunications carriers (except satellite)	51720	1,085	745	6	171	154	i D	45	D	59	0 - 231,373	
Satellite telecommunications	51740	5,325	5,919	i 176	353	i 234	D	63	587	305	293	
Other telecommunications (not listed elsewhere)	51790	1,230	1,015	515	2,875	3,193	i 2,179	534	893	840	1,726	
Data processing, hosting, and related services <sup>e</sup>	51800	NA	6,292	7,107	9,443	12,874	9,301	13,891	14,101	16,853	18,901	

TABLE 70

## Foreign sales for companies located in the United States that performed or funded R&amp;D, by business activity: 2008–17

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	7,987 i	D	7,138	13,012	20,946
Other information services, including Internet publishing, broadcasting, and Web search portals <sup>e</sup>	51910	NA	13,753	29,921	11,126	16,969	28,521	44,849 i	40,718	37,792	56,586
Finance: banking and credit intermediation	52200	NA	45,027	76,052 i	29,501	41,335	41,144	47,077	64,668	58,050	71,719
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	18,776
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	18,440 i
Real estate	53100	D	D	D	D	D	D	D	88	57	93
Rental and leasing services	53200	NA	D	8,580 i	5,232 i	7,232	8,873	6,656	5,390	0 - 14,237	8,123
Lessors of nonfinancial intangible assets, including patent licensing	53300	D	352	225	359	764	640	517	168	82	712
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	2,552
Architectural, engineering, and related services	54130	4,931	14,969	33,706	36,917	19,373	45,064	49,007	49,180	26,789	20,979
Specialized design services	54140	D	D	454	228	345	900	678	D	68	1,932 i
Computer systems design and related services <sup>e</sup>	54150	86,084	76,243	80,239	153,776 i	104,306	90,742	104,143	78,373	73,013	71,405
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	6,971
Research and development services in social sciences and humanities	54172	NA	2	2	7	D	4	22	D	7	5
Research and development services in biotechnology <sup>c</sup>	54173	NA	3,663 i	1,299	1,269	1,547	1,701	1,671	1,581	2,478 i	3,060
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	10,282
Advertising and related services	54180	D	D	1,656	D	25,263	D	D	D	0 - 163,991	54,944
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	2,217
Management of companies and enterprises	55100	76	23	266	5,428	1,304	887	716	D	622	1,677
Administrative and support services	56100	NA	6,821	19,476	10,588	11,810	17,023	29,314	26,456	28,098	28,327

TABLE 70

**Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–17**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Waste management and remediation services	56200	NA	D	201	959	484	595	614	1,827	1,910	1,351
Offices of physicians	62110	0	* i	0	0	0	0	0	0	0	1
Medical and diagnostic laboratories	62150	1,037	857	1,662	1,269	1,383	887	895	1,488 i	1,925 i	1,695
Other ambulatory health care services (ambulance, dental, home health care)	62199	NA	D	154	D	27	0	0	0	0	539
Hospitals and nursing care facilities	62200	NA	0	D	D	D	D	0	131	287	0
Social assistance services	62400	D	D	0	0	0	29	2	0	0	0
Arts, entertainment, and recreation	71000	NA	3,074	3,169	3,297	3,096	D	D	2,540	0 - 163,991	5,649
Accommodation and food services	72000	NA	9,891	32,256	11,945	34,612	49,347	14,564	32,394	34,445	6,313
Other services (not listed elsewhere)	81000	NA	5,946	7,784	10,816	12,789	21,571	17,416	19,528	64,593	0 - 231,373
Less: intersegment eliminations	-	161,647	127,244	101,536	164,044	172,709	165,075	156,556	113,257	97,136	73,649
Undistributed	-	335,723	452,404	103,862	147,756 i	58,997 i	D	2,657	D	0	0

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

NAICS = 2012 North American Industry Classification System.

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

<sup>b</sup> Business codes and descriptions are based on 2012 NAICS industry definitions.

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

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

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

**Note(s)**

Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded R&D. 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 2017 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

## Domestic R&amp;D paid for by the company and others and performed by the company, by business activity: 2008–17

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008 <sup>c</sup>	2009 <sup>d</sup>	2010 <sup>d</sup>	2011	2012	2013	2014	2015	2016	2017
All business activities	21100–81000	NA	NA	NA	290,240	302,759	323,107	340,539	355,671	378,590	400,100
Oil and gas extraction	21100	NA	NA	NA	D	D	D	1,108	D	867	738 - 2,072 i
Mining	21200	NA	NA	NA	83	88	80	54	68	58	117
Support activities for mining, including oil and gas	21300	NA	NA	NA	D	1,860	1,871	2,349	2,076	1,544	1,474 i
Utilities	22100	NA	NA	NA	298	434	343	343	485	349	314 i
Construction	23000	NA	NA	NA	752	756	244 i	204 i	521	258 i	587
Food manufacturing	31100	NA	NA	NA	3,769	3,565	5,156	4,934 i	4,388 i	4,966	4,897
Beverage manufacturing	31210	NA	NA	NA	D	D	628	D	664	0 - 28,354 i	722
Tobacco manufacturing	31220	NA	NA	NA	D	140	163	D	153	153	170
Textile, apparel, and leather products manufacturing	31990	NA	NA	NA	623	688	687	662 i	794	1,244 i	866
Wood products manufacturing	32100	NA	NA	NA	202	278	234	322 i	227	238	238
Paper manufacturing	32200	NA	NA	NA	755	982	1,166	1,028	D	1,165	1,386
Printing and related support activities	32300	NA	NA	NA	244	305 i	389	363	287	304	262
Petroleum refineries	32401	NA	NA	NA	D	596	438	D	443	441	395
Asphalt paving, roofing, and saturated materials manufacturing	32402	NA	NA	NA	38	41	117 i	66	52 i	75	126
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	NA	NA	NA	285	218	312 i	279 i	268	202	214
Basic chemicals manufacturing	32510	NA	NA	NA	3,099	3,228	2,925	3,144	3,071	2,946	3,045
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	NA	NA	NA	815	1,093	999	1,054	1,213	930	831
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	NA	NA	NA	D	1,951	2,114 i	2,057 i	D	1,900 i	1,964
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing <sup>e</sup>	32541	NA	NA	NA	42,381	43,672	42,456	43,748	40,540	43,964	45,515
In vitro diagnostic substances manufacturing <sup>e</sup>	32542	NA	NA	NA	1,110	1,044 i	831	729	801	987	1,324
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	NA	NA	NA	NA	NA	7,118	10,337	14,071	16,440	18,330
Soap, cleaning compound, and toilet preparations manufacturing	32591	NA	NA	NA	2,344	2,261	2,286	2,365	2,451	2,550	2,168 - 3,502
Paint, adhesive, and other chemical manufacturing	32592	NA	NA	NA	1,552	1,630	1,489	1,562 i	D	0 - 28,354	1,663
Plastics and rubber products manufacturing	32600	NA	NA	NA	2,669	3,277	3,010	3,072 i	2,910	3,396	3,275
Clay and glass products manufacturing	32710	NA	NA	NA	801 i	987 i	973 i	1,003 i	948	987	1,234
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	NA	NA	NA	303	367	458 i	564 i	393 i	374	382

TABLE 71

## Domestic R&amp;D paid for by the company and others and performed by the company, by business activity: 2008–17

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008 <sup>c</sup>	2009 <sup>d</sup>	2010 <sup>d</sup>	2011	2012	2013	2014	2015	2016	2017
Primary metal manufacturing	33100	NA	NA	NA	552	750	644	703	596	0 - 28,354	589
Fabricated metal products manufacturing	33200	NA	NA	NA	D	2,236	2,535	2,280	2,541	2,321	2,616
Agricultural machinery and equipment manufacturing	33311	NA	NA	NA	989	1,175	1,193	1,230	1,172	1,194	1,227
Construction machinery manufacturing	33312	NA	NA	NA	655	675	1,340	1,309	1,210	1,209	1,190
Mining, oil, and gas field machinery and equipment manufacturing	33319	NA	NA	NA	1,735	1,999	1,436	1,142	1,431	1,107	1,242
Semiconductor machinery manufacturing	33321	NA	NA	NA	2,207	1,308	3,146	2,979	3,218	3,374	3,663
Industrial machinery manufacturing (except semiconductor machinery)	33322	NA	NA	NA	945	850	878	1,158	1,143	900	1,019
Photographic and photocopying equipment manufacturing	33331	NA	NA	NA	656	23	458	79	133	92	61
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	NA	NA	NA	D	1,182	1,367	1,446	1,380	0 - 28,354	1,814
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	25	491	421	431
Engine, turbine, and power transmission equipment manufacturing	33360	NA	NA	NA	3,257	3,603	2,373	1,847	2,304	2,365	2,489
Metalworking and other general purpose machinery manufacturing	33390	NA	NA	NA	1,832	1,607	1,780	2,089	2,292	2,139	2,066
Computers and peripheral equipment manufacturing and magnetic and optical media <sup>f</sup>	33412	NA	NA	NA	10,311	10,893	11,162	9,651	10,997	18,321	21,276
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	NA	NA	NA	7,006	5,101	5,534	7,734	9,529	8,182	7,918
Radio, television, and wireless communication equipment manufacturing	33422	NA	NA	NA	4,182	5,851	7,664	6,325	3,387	4,108	4,206
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	NA	NA	NA	871	1,937	1,729	1,687	1,695	1,798	1,551
Audio and video equipment manufacturing	33430	NA	NA	NA	798	865	876	1,018	1,071	972	982
Semiconductor and other electronic components manufacturing	33440	NA	NA	NA	24,580	28,983	30,792	31,986	30,805	31,428	30,629
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	NA	NA	NA	2,787	2,868	3,178	3,670	3,409	3,417	3,137
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	NA	NA	NA	5,666	6,403	6,550	6,234	6,503	8,275	7,271
Measuring and control instruments manufacturing (not listed elsewhere)	33459	NA	NA	NA	3,191	3,465	3,901	4,045	4,201	4,222	4,016
Electrical equipment, appliances, and components manufacturing	33500	NA	NA	NA	3,007	3,391	4,208	4,461	4,378	4,805	4,504
Motor vehicles manufacturing	33610	NA	NA	NA	9,320	11,314	11,696	12,134	12,502	15,095	16,546
Motor vehicle body and trailer manufacturing	33620	NA	NA	NA	69	91	98	96	156	113	44
Motor vehicle parts manufacturing	33630	NA	NA	NA	3,010	D	4,554	6,022	6,158	6,401	7,066

TABLE 71

## Domestic R&amp;D paid for by the company and others and performed by the company, by business activity: 2008–17

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008 <sup>c</sup>	2009 <sup>d</sup>	2010 <sup>d</sup>	2011	2012	2013	2014	2015	2016	2017
Aircraft manufacturing	33641	NA	NA	NA	5,853	15,380	16,607	15,632	14,757	0 - 28,354	10,511
Aircraft engine and engine parts manufacturing	33642	NA	NA	NA	1,636	1,296	1,758	2,294	1,580	1,738	1,840
Other aircraft parts and auxiliary equipment manufacturing	33643	NA	NA	NA	1,896	2,655	3,446	4,443	4,919	3,817	4,378
Guided missiles, space vehicles, and related parts manufacturing	33644	NA	NA	NA	3,526	2,850	2,703	2,826	3,011	3,063	3,529
Railroad rolling stock manufacturing	33651	NA	NA	NA	136	177	183	295	240	187	169 - 1,503
Ship and boat building	33660	NA	NA	NA	D	D	1,106	1,568	D	0 - 28,354	1,299
Motorcycle, bicycle, and parts manufacturing	33691	NA	NA	NA	212	176	214	251	282	286	298 - 1,632
Military armored vehicle, tank, and tank components manufacturing	33692	NA	NA	NA	D	122	215	358	335	392	652
All other transportation equipment manufacturing	33699	NA	NA	NA	415	D	362	428	D	368	568
Furniture and related products manufacturing	33700	NA	NA	NA	300	382	383	389	458	364	430
Medical equipment and supplies manufacturing	33910	NA	NA	NA	10,141	10,703	11,797	10,987	11,336	12,024	12,981
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	NA	NA	NA	2,593	D	2,544	2,387	2,455	2,597	2,243
Merchant wholesalers, durable goods	42300	NA	NA	NA	505	1,461	449	414	1,507	551	460
Merchant wholesalers, nondurable goods	42400	NA	NA	NA	429	651	272	D	546	153	256
Wholesale electronic markets and agents and brokers (business to business)	42500	NA	NA	NA	54	182	D	139	D	23	40
Retail trade (except electronic shopping and electronic auctions)	44000	NA	NA	NA	52	101	96	58	87	149	73
Electronic shopping and electronic auctions	45411	NA	NA	NA	940	1,239	993	1,051	1,543	0 - 28,354	9,337
Transportation	48000	NA	NA	NA	123	D	D	388	205	100	784
Couriers, messengers, and express delivery services	49200	NA	NA	NA	D	D	D	344	D	394	264
Warehousing and storage	49300	NA	NA	NA	15	15	15	3	3	0	98
Newspaper, periodical, book, and directory publishers (except Internet)	51110	NA	NA	NA	345	229	316	89	99	80	91
Software publishers (except Internet) <sup>g</sup>	51120	NA	NA	NA	22,635	23,803	26,661	31,392	29,887	26,685	24,775
Motion picture and sound recording (except Internet)	51200	NA	NA	NA	61	73	86	71	10	16	25
Broadcasting (except Internet)	51500	NA	NA	NA	94	36	53	70	101	0 - 28,354	213 - 1,547
Wired telecommunications carriers	51710	NA	NA	NA	867	1,482	951	945	1,229	1,067	908 - 2,242
Wireless telecommunications carriers (except satellite)	51720	NA	NA	NA	391	739	1,768	2,481	1,176	1,477	1,901
Satellite telecommunications	51740	NA	NA	NA	D	195	106	107	681	699	590

TABLE 71

**Domestic R&D paid for by the company and others and performed by the company, by business activity: 2008–17**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008 <sup>c</sup>	2009 <sup>d</sup>	2010 <sup>d</sup>	2011	2012	2013	2014	2015	2016	2017
Other telecommunications (not listed elsewhere)	51790	NA	NA	NA	495	383	322	255	459	448	408
Data processing, hosting, and related services <sup>g</sup>	51800	NA	NA	NA	4,922	3,997	4,009	4,754	5,839	6,295	6,060
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	3,727	5,718	5,783	9,981	16,515
Other information services, including Internet publishing, broadcasting, and Web search portals <sup>g</sup>	51910	NA	NA	NA	D	11,397	13,485	15,306	21,534	23,962	28,514 - 29,848
Finance: banking and credit intermediation	52200	NA	NA	NA	1,365	1,601	1,834	2,451	2,708	4,474	4,812
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	NA	NA	NA	1,148	893	1,153	937	1,352	1,516	1,601
Insurance carriers and related activities	52400	NA	NA	NA	D	1,141	1,573	887	1,364	1,216	1,125
Real estate	53100	NA	NA	NA	13	26	100	193	280	438	386
Rental and leasing services	53200	NA	NA	NA	27	D	69	59	D	97	204
Lessors of nonfinancial intangible assets, including patent licensing	53300	NA	NA	NA	319	369	74	78	79	40	154
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	NA	NA	NA	578	417	514	826	1,283	892	802
Architectural, engineering, and related services	54130	NA	NA	NA	2,028	4,206	3,398	3,392	4,143	3,259	2,844
Specialized design services	54140	NA	NA	NA	271	207	101	97	83	77	195
Computer systems design and related services <sup>g</sup>	54150	NA	NA	NA	11,129	12,390	11,472	13,216	13,647	14,159	12,221
Management, scientific, and technical consulting services	54160	NA	NA	NA	1,745	2,280	2,030	1,958	1,761	2,137	1,907
Research and development services in social sciences and humanities	54172	NA	NA	NA	D	601	792	745	756	0 - 28,354	0 - 1,631
Research and development services in biotechnology <sup>e</sup>	54173	NA	NA	NA	6,030	7,146	4,145	3,083	5,178	3,911	3,786
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	NA	NA	NA	7,196	9,427	9,139	9,068	10,907	10,621	12,958
Advertising and related services	54180	NA	NA	NA	80	377	450	435	424	344	353
Professional, scientific, and technical services (not listed elsewhere)	54190	NA	NA	NA	1,316	2,463	1,786	1,020	1,228	874	1,049
Management of companies and enterprises	55100	NA	NA	NA	20	40	68	25	D	28	91
Administrative and support services	56100	NA	NA	NA	338	436	556	401	202	418	1,548
Waste management and remediation services	56200	NA	NA	NA	19	D	39	31	24	25	24
Offices of physicians	62110	NA	NA	NA	24	73	74	88	79	106	195
Medical and diagnostic laboratories	62150	NA	NA	NA	764	1,027	959	965	1,204	0 - 28,354	1,395
Other ambulatory health care services (ambulance, dental, home health care)	62199	NA	NA	NA	11	41	51	35	42	24	79
Hospitals and nursing care facilities	62200	NA	NA	NA	2	2	2	7	7	9	17 - 1,351



TABLE 71

**Domestic R&D paid for by the company and others and performed by the company, by business activity: 2008–17**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008 <sup>c</sup>	2009 <sup>d</sup>	2010 <sup>d</sup>	2011	2012	2013	2014	2015	2016	2017		
Social assistance services	62400	NA	NA	NA	7	36	38	16	2	2	0 - 359		
Arts, entertainment, and recreation	71000	NA	NA	NA	105	108	31	91	D	44	59		
Accommodation and food services	72000	NA	NA	NA	74	131	i	123	i	57	87	61	60
Other services (not listed elsewhere)	81000	NA	NA	NA	366	553	366	576	682	0 - 28,354	645		
Undistributed	-	NA	NA	NA	28,583	i	1,689	i	336	i	63	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.

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

<sup>b</sup> Business codes and descriptions are based on 2012 NAICS industry definitions.

<sup>c</sup> Questions used to collect these data in survey year 2008 are not directly comparable to those used in later survey years.

<sup>d</sup> Data were collected as worldwide R&D paid for by others and performed by the company for survey years 2009 and 2010.

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

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

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

**Note(s)**

Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded R&D. 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 2017 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

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### 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 is 0607-0912 and expires 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.

*Reference period.* Calendar year 2017.

*Response unit.* Company.

*Sample or census.* Sample.

*Population size.* 1,097,510 companies.<sup>[1]</sup> This is a substantial decrease from the previous cycle because of a change in coverage criteria. See the section **Target Population** below for details.

*Sample size.* 44,978 companies.<sup>[2]</sup>

### 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 3 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.

For 2017 BRDS, all companies with 10 or more employees were in scope to BRDS. If the prior year employment information was unavailable and a company's prior year aggregated payroll was \$500,000 or more, these companies were also included in the frame. The employment cutoff is a modification to a scope change made for the 2016 BRDS in which companies with 5 or more employees were in scope except for those classified in other nonmanufacturing (ONM): NAICS 23, 44, 45, 55, 56, 624, 71, 72, and 81. All companies classified in ONM with fewer than 10 employees were out of scope to 2016 BRDS. Prior to this 2016 BRDS scope change, all companies with 5 or more employees were in scope, regardless of classification.

### **Sampling Frame**

The scope of the 2017 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 2016; (4) have at least one establishment that is physically located in the United States and is in business at the end of calendar year 2017 (the time at which the U.S. Census Bureau finished the 2016 Business Register processing); and (5) are not federally funded R&D centers.

Single-unit company records were extracted from the 2016 Business Register if the company had at least 10 paid employees in 2016 or, if employment information was unavailable, if the company's 2016 payroll was greater than or equal to \$500,000. Companies were removed from the sampling frame if their NAICS codes were designated as Crop production (NAICS 111), Animal production (NAICS 112), 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 2016 Business Register if the given establishment's 2016 payroll was greater than zero or if the establishment employed at least one person in 2016. 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 Crop production (NAICS 111), Animal production (NAICS 112), or Educational services (NAICS 61) were not removed during the construction of multiunit company records. 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 2016 from the Business Register.

### **Industry Classification for Sampling**

Each company was assigned to 1 of 60 industry sampling strata based on the reported business segment in which the company performed the largest amount of total domestic R&D as reported in the prior period (2012–16 BRDIS), 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 U.S. Census Bureau's Business Register using the following method, with some adjustments made to account for vertical integration of related business activities within the company. The company was first assigned to the economic sector, defined by a 2-digit NAICS code that accounted for the highest percentage of its aggregated annual payroll. Then the company was assigned to a subsector, defined by a 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. 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 2017, there were 32,206 companies in the first group, 27,679 companies in the second group, and 1,037,625 companies in the third group, for a total of 1,097,510 companies (**table A-1**). This was a decrease of 387,641 companies compared with the target population for 2016 BRDIS of 1,485,151 companies. The population decreased primarily because the criteria for inclusion in the BRDS sample were changed as described above in the section **Target Population**.

### **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 stratum 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 four 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; 0.02 for Manufacturing (NAICS 31–33), Computer systems design and related services (NAICS 5415), and Management, scientific, and technical consulting services (NAICS 5416); 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 NCSSES project officer.

## Sample Size

With the sample design parameters detailed above, a total of 44,978 companies were selected, of which 17,737 companies were in the known positive R&D group, 2,112 companies were in the known zero R&D group, and 25,129 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, 97 large R&D performers from the 2016 sample were found that were not included on the 2017 sampling frame. The primary reasons for this are mergers, acquisitions, or other company structure changes that cause a difference between a company's current Business Register ID and its prior year survey ID—in this case, its ID in the 2016 BRDIS file. To follow up with these companies, they were added to the 2017 sample with certainty, and 93 were mailed a form (the other 4 were inactive based on Business Register data). Because it was expected that many of these records would not contribute to 2017 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 requested multiple forms to facilitate subcompany reporting (**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 (S&T), 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 2017 survey, 24.4% did not submit any response, and an additional 1.1% 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 expense 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 2017 BRDS, the check-in rate was 75.6%, and the URR was 74.5%. The coverage rate for the 2017 BRDS was 92.4% for the known positive R&D group, 73.6% for the unknown R&D group, and 80.0% 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 2017 was 70%.

**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 NCSSES project officer. Also see section [Item Nonresponse](#).

### Response by Mode

Overall, 1.7% of checked-in cases responded to BRDS by mailing in the paper form, and 98.3% responded using the online version of the survey. Lastly, 99.1% 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**

Except for estimates of counts, patents, patent licensing agreements, and intellectual property protection, 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 2017 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.

For count estimates for the BRDS checkbox items that involve intellectual property protection, both unit and item nonresponse are handled using a nonresponse weight adjustment that is different from the one described above. The adjustment cells for tabulating the item are based on the three R&D groups, industry sampling strata, and the presence or absence of R&D activity. For a given adjustment cell and item, the nonresponse adjustment factor is a ratio. The numerator of the ratio is the sum of two components: the sum of the weights for the companies in the cell that reported the item, inflated to account for unit nonresponse; and the sum of the weights for the companies in the cell that reported to BRDS but did not include the item. The denominator of the ratio is the sum of the weights for the companies in the cell that reported the item.

No unit nonresponse adjustment is performed for estimates of counts, patents, and patent licensing agreements.

#### **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 (i.e., data from the company's website, annual Form 10-K report, or administrative sources) or ad hoc methods, which are approved 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 NCSSES 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 (if applicable), and these weighted values are then summed to create the estimate. No nonresponse adjustment factor is used for estimates of counts, patents, and patent licensing agreements. For these estimates, each value that contributes to a given BRDS estimate is weighted only by its sampling weight.

## 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 Business Register on the payroll for each business establishment in the United States. The weighted amount of company R&D is apportioned to CBSAs within states using the same hybrid estimator method used for state estimates (below). Current 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 states or the District of Columbia, but the specific location is not estimated and is reported as "undistributed" in BRDS tables.

## 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, 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 2017 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 2015 or 2016 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 2015 or 2016 BRDIS, establishment payroll data from the Business Register were used to provide the business codes.

### **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).

## **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 0.30% in 2017.

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 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 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 a BRD-1(S) form 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 expense 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 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 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 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 main R&D paid for by others question 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 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 head counts of total and R&D employees, estimates of FTE domestic R&D employment are produced from BRDS. 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.

**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, biotechnology.** Biotechnology is the application of S&T 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: applies 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 S&T 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 S&T 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)
- Nanomagnetism: 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/programs-surveys/ces/research.html>).

## Disclosure Avoidance

Disclosure is the release of data that reveals information or permits deduction of information about a particular survey unit through the release of either tables or microdata. Disclosure avoidance is the process used to protect each survey unit's identity and data from disclosure. Using disclosure avoidance procedures, the Census Bureau modifies or removes the characteristics that put information at risk of disclosure. Although it may appear that a table shows information about a specific survey unit, the Census Bureau has taken steps to disguise or suppress a unit's data that may be "at risk" of disclosure while making sure the results are still useful.

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 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 2017 tabular statistics, the approval IDs are the following:

- CBDRB-FY19-152, approved on 11 February 2019
- CBDRB-FY19-210, approved on 11 March 2019
- CBDRB-FY19-347, approved on 20 May 2019
- CBDRB-FY19-352, approved on 20 May 2019
- CBDRB-FY19-395, approved on 17 June 2019

[1]The population size was revised from 1,097,607 following final processing of the complete data set available for the 2017 cycle.

[2]The sample size was revised from 45,075 following final processing of the complete data set available for the 2017 cycle.



## Technical Tables

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## TECHNICAL TABLE A-1

**Target population counts, by frame partition: 2008–17**

(Number of companies)

Year	Total <sup>a</sup>	Known positive R&D	Known zero R&D	Unknown R&D
2008	1,926,012	16,059	75,923	1,834,030
2009	2,090,181	22,181	79,031	1,988,969
2010	2,013,399	24,723	67,281	1,921,395
2011	1,964,757	27,049	73,930	1,863,778
2012	1,971,731	29,512	73,004	1,869,215
2013	1,971,959	34,482	70,032	1,867,445
2014	1,998,858	35,532	79,343	1,883,983
2015	2,029,436	35,839	71,386	1,922,211
2016	1,485,151	34,958	11,355	1,438,838
2017	1,097,510	32,206	27,679	1,037,625

<sup>a</sup> For each year, the estimate of the number of companies in the total target population is based on the original sampling frame that was created to select the sample. The target population estimates in this table do not include R&D performers from the previous year's sample, which were not on the original sampling frame but were found during the survey's annual contact update procedures. See [appendix 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. For 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. For 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: 2017**

(Number of companies)

Industry and company size	NAICS code	Companies in target population <sup>a</sup>	Companies selected for the sample		
			All companies	Noncertainties	Certainties
All industries	21–23, 31–33, 42–81	1,097,510	44,978	24,400	20,578
Manufacturing industries	31–33	97,936	18,635	9,445	9,190
Food	311	9,037	1,073	708	365
Beverage and tobacco products	312	2,495	315	202	113
Textile, apparel, and leather products	313–16	4,110	644	412	232
Wood products	321	4,896	625	425	200
Paper	322	1,575	372	203	169
Printing and related support activities	323	6,338	1,197	809	388
Petroleum and coal products	324	355	152	20	132
Chemicals	325	4,871	1,968	456	1,512
Basic chemicals	3251	705	300	107	193
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	569	250	54	196
Pesticide, fertilizer, and other agricultural chemicals	3253	284	104	26	78
Pharmaceuticals and medicines	3254	1,337	712	63	649
Soap, cleaning compound, and toilet preparation	3256	780	235	67	168
Paint, coating, adhesive, and other chemicals	3255, 3259	1,196	367	139	228
Plastics and rubber products	326	5,017	1,015	559	456
Nonmetallic mineral products	327	4,044	558	351	207
Primary metals	331	1,859	518	241	277
Fabricated metal products	332	20,231	2,279	1,426	853
Machinery	333	9,648	2,114	1,023	1,091
Agricultural implement	33311	561	170	41	129
Semiconductor machinery	333242	83	73	0	73
Engine, turbine, and power transmission equipment	3336	400	162	46	116
Other machinery	other 333	8,604	1,709	936	773
Computer and electronic products	334	5,036	1,736	529	1,207
Communications equipment	3342	586	243	31	212
Semiconductor and other electronic components	3344	1,877	463	151	312
Navigational, measuring, electromedical, and control instruments	3345	1,870	787	279	508
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	320	184	42	142
Search, detection, navigation, guidance, aeronautical, and nautical system and instrument	334511	248	123	19	104
Other measuring and controlling device	other 3345	1,302	480	218	262
Other computer and electronic products	other 334	703	243	68	175
Electrical equipment, appliances, and components	335	2,320	618	294	324
Transportation equipment	336	4,764	1,052	432	620
Automobiles, bodies, trailers, and parts	3361–63	2,991	537	235	302
Aerospace products and parts	3364	827	273	92	181
Aircraft, aircraft engine, and aircraft parts	336411–13	782	238	92	146
Guided missile, space vehicle, and related parts	336414, 336415, 336419	45	35	0	35
Military armored vehicle, tank, and tank component	336992	29	21	0	21
Other transportation	other 336	917	221	105	116

## TECHNICAL TABLE A-2

## Companies in the target population and selected for the sample, by industry and company size: 2017

(Number of companies)

Industry and company size	NAICS code	Companies in target population <sup>a</sup>	Companies selected for the sample		
			All companies	Noncertainties	Certainties
Furniture and related products	337	4,597	958	615	343
Miscellaneous	339	6,687	1,388	740	648
Medical equipment and supplies	3391	2,435	652	281	371
Other miscellaneous manufacturing	3399	4,252	736	459	277
Unclassified	–	56	53	0	53
Nonmanufacturing industries	21–23, 42–81	999,574	26,343	14,955	11,388
Mining, extraction, and support activities <sup>b</sup>	21	4,941	647	398	249
Utilities	22	751	203	60	143
Wholesale trade	42	70,421	5,628	4,422	1,206
Electronic shopping and electronic auctions	454111–12	3,410	398	300	98
Transportation and warehousing	48–49	33,166	522	186	336
Information	51	15,294	3,075	1,505	1,570
Publishing	511	5,211	1,225	580	645
Newspaper, periodical, book, and directory publishers	5111	2,928	527	331	196
Software publishers	5112	2,283	698	249	449
Telecommunications	517	2,177	520	297	223
Data processing, hosting, and related services	518	2,935	824	292	532
Other information	other 51	4,971	506	336	170
Finance and insurance	52	26,589	915	205	710
Real estate and rental and leasing	53	24,795	424	127	297
Lessors of nonfinancial intangible assets (except copyrighted works)	533	469	94	2	92
Other real estate and rental and leasing	other 53	24,326	330	125	205
Professional, scientific, and technical services	54	100,975	9,560	4,341	5,219
Architectural, engineering, and related services	5413	17,229	2,709	1,846	863
Computer systems design and related services	5415	16,226	2,987	1,901	1,086
Scientific research and development services	5417	2,405	2,405	0	2,405
Biotechnology research and development	541711	645	645	0	645
Physical, engineering, and life sciences (except biotechnology) research and development	541712	1,604	1,604	0	1,604
Social sciences and humanities research and development	541720	156	156	0	156
Other professional, scientific, and technical services	other 54	65,115	1,459	594	865
Health care services	621–23	109,101	1,223	532	691
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	609,834	3,636	2,875	761
Unclassified	–	297	112	4	108
Company size (number of domestic employees)					
All companies	–	1,097,510	44,978	24,400	20,578
< 10 <sup>c</sup>	–	6,318	359	154	205
10–19	–	544,096	10,310	8,245	2,065
20–49	–	353,076	10,344	7,594	2,750
50–99	–	106,388	6,676	4,066	2,610
100–249	–	56,061	7,441	2,997	4,444
250–499	–	16,301	3,681	771	2,910
500–999	–	7,511	2,425	305	2,120
1,000–4,999	–	6,048	2,622	213	2,409

## TECHNICAL TABLE A-2

**Companies in the target population and selected for the sample, by industry and company size: 2017**

(Number of companies)

Industry and company size	NAICS code	Companies in target population <sup>a</sup>	Companies selected for the sample		
			All companies	Noncertainties	Certainties
5,000–9,999	–	841	490	11	479
10,000–24,999	–	534	366	21	345
25,000 or more	–	336	264	23	241

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Estimates of the number of companies in the target population are based on the original sampling frame that was created to select the 2017 Business Research and Development Survey (BRDS) sample. These estimates do not include 93 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 2017 sample with certainty but are not reflected in the number of certainties selected for the sample.

<sup>b</sup> Because of the widespread practice of the larger petroleum extraction and refining companies vertically integrating their activities, petroleum refineries (NAICS 32411) and oil and gas extraction (NAICS 211) were combined during sampling.

<sup>c</sup> 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 1. Companies that were missing or had an incomplete NAICS code at the time of sampling were assigned to an "unclassified" industry category temporarily. If an unclassified company reported R&D expenditures, its primary industrial activity was investigated, and a NAICS code was assigned during statistical processing.

**Source(s)**

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2017.

## TECHNICAL TABLE A-3

**Sample size, by frame partition: 2008–17**

(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

**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: 2017**

(Number of companies)

Stratum	Total
Total	44,978
Known positive R&D	17,737
Certainties	13,011
Noncertainties	4,726
Known zero R&D	2,112
Certainties	1,531
Noncertainties	581
Unknown R&D	25,129
Certainties	6,036
Noncertainties	19,093

**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 5 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, 2017.

## TECHNICAL TABLE A-5

**Companies included in the survey that were not in the original sampling frame: 2008–17**

(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

**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 [appendix 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

## Survey forms mailed, by type: 2008–17

(Number)

Year	Total <sup>a</sup>	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

na = not applicable.

<sup>a</sup> For each year, the "Total forms mailed" is smaller than the sum of the "Total" sample size in **appendix table A-3** plus the number of "Known positive R&D" companies added to the sample in **appendix 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: 2017**

(Number)

<b>Stratum</b>	<b>Total</b>
Total	44,763
Known positive R&D	17,620
Certainties	12,913
Noncertainties	4,707
Known zero R&D	2,105
Certainties	1,524
Noncertainties	581
Unknown R&D	24,945
Certainties	5,885
Noncertainties	19,060
Cases not in the frame	93

**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 5 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, 2017.

## TECHNICAL TABLE A-8

**Survey forms mailed for companies with subcompany reporting units, by sampling stratum: 2017**

(Number of companies)

Stratum	Sent one form	Sent multiple forms <sup>a</sup>
Total	44,671	92
Known positive R&D	17,528	92
Certainties	12,821	92
Noncertainties	4,707	0
Known zero R&D	2,105	0
Certainties	1,524	0
Noncertainties	581	0
Unknown R&D	24,945	0
Certainties	5,885	0
Noncertainties	19,060	0
Cases not in the frame	93	0

<sup>a</sup> Portions of some companies are surveyed separately using multiple survey forms, under special arrangement with the U.S. Census Bureau, to facilitate reporting. 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 5 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, 2017.

## TECHNICAL TABLE A-9

**Response measures: 2008–17**

(Percent)

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

<sup>a</sup> The number of survey responses from in-scope companies divided by the total number of in-scope companies in the sample.

<sup>b</sup> The number of responding companies with worldwide R&D expenses or costs funded by others or the number of responding companies with worldwide or domestic sales or worldwide or domestic employees (if R&D was zero) divided by the total number of in-scope companies in the sample.

<sup>c</sup> Based on the same numerator and denominator as the response rate, but each company's measure of size at the time of sample selection is taken into account.

**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: 2017

(Number and percent)

Industry and company size	NAICS code	Active reporting units <sup>a</sup>	Reporting units that met the response criteria <sup>b</sup>		Reporting units that met the response criteria and reported domestic R&D paid for by the company and others and performed by the company of \$1 million or more	
			Number	Percent	Number	Percent
All industries	21-23, 31-33, 42-81	41,912	31,242	74.5	6,357	15.2
Manufacturing industries	31-33	17,889	13,452	75.2	3,868	21.6
Food	311	1,011	721	71.3	173	17.1
Beverage and tobacco products	312	300	230	76.7	27	9.0
Textile, apparel, and leather products	313-16	617	419	67.9	53	8.6
Wood products	321	582	456	78.4	17	2.9
Paper	322	353	257	72.8	35	9.9
Printing and related support activities	323	1,141	860	75.4	26	2.3
Petroleum and coal products	324	141	108	76.6	26	18.4
Chemicals	325	1,979	1,559	78.8	908	45.9
Basic chemicals	3251	286	214	74.8	113	39.5
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	233	181	77.7	49	21.0
Pesticide, fertilizer, and other agricultural chemicals	3253	103	69	67.0	18	17.5
Pharmaceuticals and medicines	3254	797	684	85.8	593	74.4
Soap, cleaning compound, and toilet preparation	3256	217	154	71.0	55	25.3
Paint, coating, adhesive, and other chemicals	3255, 3259	344	258	75.0	81	23.5
Plastics and rubber products	326	997	734	73.6	196	19.7
Nonmetallic mineral products	327	525	388	73.9	43	8.2
Primary metals	331	475	343	72.2	53	11.2
Fabricated metal products	332	2,167	1,655	76.4	252	11.6
Machinery	333	2,060	1,573	76.4	485	23.5
Agricultural implement	33311	173	125	72.3	37	21.4
Semiconductor machinery	333242	65	50	76.9	26	40.0
Engine, turbine, and power transmission equipment	3336	144	113	78.5	32	22.2
Other machinery	other 333	1,679	1,286	76.6	391	23.3
Computer and electronic products	334	1,632	1,177	72.1	648	39.7
Communications equipment	3342	226	162	71.7	98	43.4

## TECHNICAL TABLE A-10

## Unit response rates, by industry and company size: 2017

(Number and percent)

Industry and company size	NAICS code	Active reporting units <sup>a</sup>	Reporting units that met the response criteria <sup>b</sup>		Reporting units that met the response criteria and reported domestic R&D paid for by the company and others and performed by the company of \$1 million or more	
			Number	Percent	Number	Percent
Semiconductor and other electronic components	3344	442	336	76.0	187	42.3
Navigational, measuring, electromedical, and control instruments	3345	752	528	70.2	279	37.1
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	169	106	62.7	63	37.3
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	106	81	76.4	41	38.7
Other measuring and controlling devices	other 3345	477	341	71.5	175	36.7
Other computer and electronic products	other 334	212	151	71.2	84	39.6
Electrical equipment, appliances, and components	335	596	438	73.5	171	28.7
Transportation equipment	336	1,060	793	74.8	309	29.2
Motor vehicles, bodies, trailers, and parts	3361-63	550	418	76.0	176	32.0
Aerospace products and parts	3364	270	206	76.3	90	33.3
Aircraft, aircraft engine, and aircraft parts	336411-13	239	181	75.7	77	32.2
Guided missile, space vehicle, and related parts	336414-15, 336419	31	25	80.6	13	41.9
Military armored vehicle, tank, and tank component	336992	18	14	77.8	3	16.7
Other transportation equipment	other 336	223	156	70.0	41	18.4
Furniture and related products	337	912	689	75.5	49	5.4
Miscellaneous manufacturing	339	1,355	1,065	78.6	408	30.1
Medical equipment and supplies	3391	640	492	76.9	277	43.3
Other miscellaneous	3399	715	573	80.1	131	18.3
Nonmanufacturing industries	21-23, 42-81	24,027	17,793	74.1	2,491	10.4
Mining, extraction, and support activities	21	605	470	77.7	34	5.6
Utilities	22	181	142	78.5	21	11.6
Wholesale trade	42	5,113	3,797	74.3	51	1.0
Electronic shopping and electronic auctions	454111-12	347	234	67.4	8	2.3
Transportation and warehousing	48-49	518	385	74.3	19	3.7
Information	51	3,092	2,261	73.1	842	27.2
Publishing	511	1,131	818	72.3	266	23.5
Newspaper, periodical, book, and directory publishers	5111	489	359	73.4	6	1.2

## TECHNICAL TABLE A-10

## Unit response rates, by industry and company size: 2017

(Number and percent)

Industry and company size	NAICS code	Active reporting units <sup>a</sup>	Reporting units that met the response criteria <sup>b</sup>		Reporting units that met the response criteria and reported domestic R&D paid for by the company and others and performed by the company of \$1 million or more	
			Number	Percent	Number	Percent
Software publishers	5112	642	459	71.5	260	40.5
Telecommunications	517	488	347	71.1	58	11.9
Data processing, hosting, and related services	518	995	764	76.8	449	45.1
Other information	other 51	478	332	69.5	69	14.4
Finance and insurance	52	890	708	79.6	69	7.8
Real estate and rental and leasing	53	393	279	71.0	16	4.1
Lessors of nonfinancial intangible assets (except copyrighted works)	533	82	47	57.3	D	D
Other real estate and rental and leasing	other 53	311	232	74.6	D	D
Professional, scientific, and technical services	54	8,342	6,192	74.2	1,243	14.9
Architectural, engineering, and related services	5413	2,523	2,051	81.3	189	7.5
Computer systems design and related services	5415	2,535	1,732	68.3	276	10.9
Scientific research and development services	5417	1,902	1,332	70.0	604	31.8
Biotechnology research and development	541711	411	253	61.6	137	33.3
Physical, engineering, and life sciences (except biotechnology) research and development	541712	1,363	973	71.4	457	33.5
Social sciences and humanities research and development	541720	128	106	82.8	10	7.8
Other professional, scientific, and technical services	other 54	1,382	1,077	77.9	174	12.6
Health care services	621-23	1,154	840	72.8	51	4.4
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	3,397	2,490	73.3	140	4.1
All companies (number of domestic employees)	-	41,912	31,242	74.5	6,357	15.2
Small companies						
10-19 <sup>c</sup>	-	8,030	6,158	76.7	455	5.7
20-49	-	10,428	8,108	77.8	943	9.0
Medium companies						
50-99	-	6,483	4,911	75.8	917	14.1
100-249	-	7,320	5,241	71.6	1,307	17.9
Large companies						

## TECHNICAL TABLE A-10

**Unit response rates, by industry and company size: 2017**

(Number and percent)

Industry and company size	NAICS code	Active reporting units <sup>a</sup>	Reporting units that met the response criteria <sup>b</sup>		Reporting units that met the response criteria and reported domestic R&D paid for by the company and others and performed by the company of \$1 million or more	
			Number	Percent	Number	Percent
250–499	–	3,580	2,487	69.5	831	23.2
500–999	–	2,325	1,618	69.6	627	27.0
1,000–4,999	–	2,544	1,789	70.3	829	32.6
5,000–9,999	–	489	385	78.7	198	40.5
10,000–24,999	–	361	303	83.9	151	41.8
25,000 or more	–	246	205	83.3	99	40.2
Undistributed <sup>d</sup>	–	106	37	34.9	0	0.0

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

NAICS = 2012 North American Industry Classification System.

<sup>a</sup> Active reporting units are defined as reporting units of active companies that are in the scope of the survey (for-profit companies with locations in the United States, 10 or more employees, business activities in the survey year, and primary business activities in the NAICS codes listed above) after all of the data have been processed. Because of special handling requests made by company respondents, some sampled companies were mailed more than one form. A company having multiple reporting parts for data collection may contribute to the statistics for multiple industries, so the detail may not add to the total for the number of companies.

<sup>b</sup> Reporting units were considered to have fulfilled the response criteria if they reported that they performed or funded R&D. If not, a reporting unit fulfilled the response criteria if 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.

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

<sup>d</sup> Companies were not assigned an employment category during 2017.

**Source(s)**

National Center for Science and Engineering Statistics and U.S. Census Bureau, Business Research and Development Survey, 2017.



## TECHNICAL TABLE A-11

**Companies that required an analyst action, by sampling stratum: 2017**

(Number)

Stratum	Total	Companies deleted <sup>a</sup>	Companies requiring action due to merger or acquisition <sup>b</sup>	Companies requiring action due to analyst review <sup>c</sup>
Total	2,970	2,819	131	20
Known positive R&D	720	640	69	11
Certainties	511	441	61	9
Noncertainties	209	199	8	2
Known zero R&D	111	107	4	0
Certainties	71	68	3	0
Noncertainties	40	39	1	0
Unknown R&D	2,125	2,061	55	9
Certainties	380	365	10	5
Noncertainties	1,745	1,696	45	4
Cases not in the frame	14	11	3	0

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

<sup>b</sup> Information regarding mergers and acquisitions comes from several sources. The information is collected on the form, and there is a presurvey phone call that requests the information from top R&D-performing companies. Information may also come from the company profiles that are maintained by survey staff.

<sup>c</sup> These companies are added based on a review of historic R&D reported to the Business Research and Development Survey and on 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 5 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, 2017.

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## Contact

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**Raymond M. Wolfe**

Project Officer

Research and Development Statistics Program

**[rwolfe@nsf.gov](mailto:rwolfe@nsf.gov)**

National Center for Science and Engineering Statistics

Directorate for Social, Behavioral and Economic Sciences

National Science Foundation

2415 Eisenhower Avenue, Suite W14200, Alexandria, VA 22314

Tel: (703) 292-8780

FIRS: (800) 877-8339

TDD: (800) 281-8749