



National Center for Science and  
Engineering Statistics

# Business Enterprise Research and Development: 2021

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## General Notes

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The Business Enterprise Research and Development (BERD) Survey is the primary source of information on domestic and global research and development (R&D) expenditures and the R&D workforce for companies operating in the 50 U.S. states and the District of Columbia. The survey is conducted annually by the Census Bureau in accordance with an interagency agreement with the National Center for Science and Engineering Statistics (NCSES) within the National Science Foundation. NCSES has cosponsored an annual business R&D survey since 1953. The Survey of Industrial Research and Development (SIRD) collected data for 1953–2007, and its successor, the Business R&D and Innovation Survey (BRDIS), collected data for 2008–16. Beginning with 2017, the collection of innovation data was moved to the Annual Business Survey, another survey cosponsored with the Census Bureau, and the 2017 and 2018 business R&D data collections reported in this report series were renamed the Business Research and Development Survey (BRDS). Beginning with the data collection for 2019, the survey was renamed for international comparability. BERD Survey [questionnaires, reports, and data](https://nces.nsf.gov/surveys/business-enterprise-research-development/) can be found at <https://nces.nsf.gov/surveys/business-enterprise-research-development/>.

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

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

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

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

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

In addition to single-year tables for 2021 (table 1 through table 57, table 66 through table 68), this report includes tables containing statistics for multiple years (table 58 through table 65). In these tables, most prior year statistics have been revised since they were originally published. Revised statistics include adjustments based on information obtained after the original statistics were prepared. For any given year, after the tables are published, the statistical file used to produce the tables stays open for about 1 year before it is permanently closed. During that year, respondents may provide updated data; also, information from other Census Bureau surveys or publicly available sources may become available. The new data and information are evaluated and tested; if appropriate, revisions are made to the statistical file. The multiyear tables in this report were prepared using the statistical files for the 2021 BERD Survey, the revised 2020 BERD Survey, and the revised BRDIS and BRDS statistical files for 2008–19.

Beginning with the tables for the 2017 survey year, disclosure avoidance is now handled differently than it had been in prior years' tables. Cell suppression is a disclosure avoidance technique that protects the confidentiality of individual survey units by withholding cell values from release and replacing the cell value with a data code. This technique was used in SIRD, BRDIS, and BRDS 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.

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TABLE 1

**Business Enterprise Research and Development Survey aggregate estimates, by questionnaire reference: 2021**

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

Question	Survey item	Aggregate amount
Company and financial information (US\$millions)		
1.12	Worldwide net sales and operating revenues	17,410,590
1.13	Net sales and operating revenues from domestic operations	13,097,756
	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	755,069
2.3	Worldwide R&D paid for by the company (expense), adjustments	45,406
2.4/ 2.7c	Worldwide R&D paid for by the company and performed by the company and others	709,663
2.7a	Domestic R&D paid for by the company and performed by the company and others	577,661
2.7b	Foreign R&D paid for by the company and performed by the company and others	132,002
2.5	Indirect R&D charges to be recouped from the U.S. federal government (independent R&D [IR&D]) <sup>a</sup>	5,909
2.8m(1)	Domestic R&D paid for by the company and performed by the company and others	577,661
2.8a(1)	Salaries, wages, and fringe benefits	287,984
2.8b(1)	Stock-based compensation	60,491
2.8c(1)	Leased or temporary staffing, including on-site contractors, working on R&D	23,725
2.8d(1)	Expensed equipment (not capitalized)	8,605
2.8e(1)	Materials and supplies	32,925
2.8f(1)	Leased facilities and equipment	7,770
2.8g(1)	Depreciation and amortization on R&D property, plant, equipment, and intangible assets	18,433
2.8h(1)	Royalties and licensing fees	3,450
2.8i(1)	Collaborative R&D payments	14,091
2.8j(1)	Contract R&D	35,765
2.8k(1)	Other purchased services	15,319
2.8l(1)	All other costs	69,102
2.9(3)	Worldwide R&D paid for by the company and performed by others	61,588
2.9(1)	Domestic R&D paid for by the company and performed by others	49,856
2.9(2)	Foreign R&D paid for by the company and performed by others	11,732
2.10(3)	Worldwide R&D paid for and performed by the company	648,075
2.10(1)	Domestic R&D paid for and performed by the company	527,804
2.10(2)	Foreign R&D paid for and performed by the company	120,270
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	807,429
2.10(3) + 3.5(3)	Worldwide R&D paid for by the company and others and performed by the company	737,911
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	659,458
2.10(1) + 3.5 (1)	Domestic R&D paid for by the company and others and performed by the company	602,499
	Domestic R&D paid for and performed by the company	
2.14	Performed at largest domestic location	304,919
2.16	Performed at second-largest domestic location	44,689
2.18	Domestic R&D paid for by foreign operations or subsidiaries and performed by the company <sup>a</sup>	32,055
2.19	Foreign R&D paid for by domestic operations or subsidiaries and performed by the company <sup>a</sup>	26,188
2.9(1)/ 2.20i	Domestic R&D paid for by the company and performed by others	49,856
2.20a	Companies in United States	43,700
2.20b	Your company's foreign parent or owner	1,291 i
2.20c	Companies outside United States	3,620
2.20d	U.S. federal government agencies or laboratories	109
2.20e	U.S. state and local government agencies or laboratories	8
2.20f	U.S. universities, colleges, and academic researchers	574
2.20g	All other organizations in the United States	367 - 458
2.20h	All other organizations outside the United States	100 - 190
2.22	Monetary gifts made by the company to U.S. universities and colleges <sup>a</sup>	95

TABLE 1

**Business Enterprise Research and Development Survey aggregate estimates, by questionnaire reference: 2021**

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

Question	Survey item	Aggregate amount
	Projected worldwide R&D expense paid for and performed by the company in 2022	
2.23(3)	Worldwide R&D to be paid for and performed by the company	808,021
2.23(1)	Domestic R&D to be paid for and performed by the company	661,993
2.23(2)	Foreign R&D to be paid for and performed by the company	146,028
2.24	Projected R&D services and projected payments for collaborative R&D	56,078
3.1j/ 3.2c	Worldwide R&D paid for by others and performed by the company and others	97,766
3.1a	R&D reimbursed by the company's foreign parent or owner	19,585
3.1b	Collaborative R&D reimbursed by business partners	9,391
3.1c	R&D paid for by grants (government or private foundation)	7,015
3.1d	Defense R&D goods or services provided as a prime contractor or subcontractor to the federal government and/ or government contractors	17,803
3.1e	Medical clinical trial Phase I–III services provided to others not owned by the company	32,651 i
3.1f	Medical R&D services, other than clinical trials, provided to others not owned by the company	4,150
3.1g	Nondefense custom software development or computer systems designed for others not owned by the company	537
3.1h	Prototype development, production, and testing for customer's products	1,817
3.1i	All other R&D services provided to the federal government or to others not owned by the company	4,817
3.2c/ 3.1j	Worldwide R&D paid for by others and performed by the company and others	97,766
3.2a	Domestic R&D paid for by others and performed by the company and others	81,797
3.2b	Foreign R&D paid for by others and performed by the company and others	15,968 i
3.3m(1)	Domestic R&D paid for by others and performed by the company and others	81,797
3.3a(1)	Salaries, wages, and fringe benefits	41,653
3.3b(1)	Stock-based compensation	985
3.3c(1)	Leased or temporary staffing, including on-site contractors	3,197
3.3d(1)	Expensed equipment (not capitalized)	600 i
3.3e(1)	Materials and supplies	8,324 i
3.3f(1)	Leased facilities and equipment rental payments	1,140
3.3g(1)	Depreciation and amortization on R&D property, plant, equipment, and intangible assets	2,747
3.3h(1)	Royalties and licensing fees	281
3.3i(1)	Collaborative R&D payments	1,795
3.3j(1)	Contract R&D	5,308
3.3k(1)	Other purchased services	6,170 i
3.3l(1)	All other costs	9,597
3.4(3)	Worldwide R&D paid for and performed by others	7,929
3.4(1)	Domestic R&D paid for and performed by others	7,103
3.4(2)	Foreign R&D paid for and performed by others	826
3.5(3)	Worldwide R&D paid for by others and performed by the company	89,837
3.5(1)	Domestic R&D paid for by others and performed by the company	74,695
3.5(2)	Foreign R&D paid for by others and performed by the company	15,142 i
3.8a	Other companies in the United States	26,587 i
3.8b	Your company's foreign parent or owner	20,806
3.8c	Other companies outside the United States	2,450
3.8d/ 3.11j/ 3.12c	U.S. federal government agencies or laboratories	23,582
3.8e	U.S. state and local government agencies or laboratories	329
3.8f	Foreign government agencies or laboratories	155
3.8g	U.S. universities, colleges, and academic researchers	78
3.8h	Universities, colleges, and academic researchers outside the United States	1
3.8i	All other organizations in the United States	674
3.8j	All other organizations outside the United States	34
3.8d	Federally funded R&D performed by the company	23,582
3.9/ 3.8a + 3.8b + 3.8c	Domestic R&D paid for by other companies and performed by the company	49,842

TABLE 1

**Business Enterprise Research and Development Survey aggregate estimates, by questionnaire reference: 2021**

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

Question	Survey item	Aggregate amount	
	Domestic R&D paid for by others and performed by the company		
3.11j/ 3.8d/ 3.12c	Federally funded R&D performed by the company	23,582	
3.11a	Department of Defense	17,119	
3.11b	Department of Energy	643	
3.11c	National Aeronautics and Space Administration	2,834	i
3.11d	National Institutes of Health	697	i
3.11e	Department of Homeland Security	106	
3.11f	Department of Transportation	18	
3.11g	Environmental Protection Agency	7	
3.11h	National Science Foundation	32	
3.11i	Other U.S. federal agencies	2,125	
3.12c/ 3.8d/ 3.11j	Federally funded R&D performed by the company by type of agreement	23,582	
3.12a	Contracts	21,573	
3.12b	Grants and all other agreements	2,008	
3.13/ 3.8k - 3.8d	Domestic R&D paid for by nonfederal sources and performed by the company	51,113	
3.16	Performed at largest domestic location	35,960	
3.18	Performed at second-largest domestic location	6,876	
3.19	Domestic R&D paid for by U.S. federal government agencies or laboratories and performed by others	1,769	
	Projected R&D to be paid for by others and performed by the company in 2022		
3.20	Worldwide R&D to be paid for by others and performed by the company	105,528	i
3.21	Domestic R&D to be paid for by others and performed by the company	80,708	
3.22	Domestic R&D to be paid for by the U.S. federal government and performed by the company	26,320	
4.1d	Total value of assets owned or leased	14,154,190	
4.1a	Property, plant, and equipment	6,626,256	
4.1b	Goodwill	4,451,530	
4.1c	Identifiable intangible assets	3,076,405	
4.2c	Accumulated depreciation and amortization on owned or leased assets	8,613,792	
4.2a	Property, plant, and equipment	6,064,256	
4.2b	Identifiable intangible assets	2,549,536	
4.3d	Reduction in asset value due to impairment, changes, disposal, or retirement	1,697,658	
4.3a	Property, plant, and equipment	1,411,133	
4.3b	Goodwill	41,028	
4.3c	Identifiable intangible assets	245,497	
4.4d	Book value of assets acquired through mergers and acquisitions	685,500	
4.4a	Property, plant, and equipment	145,850	
4.4b	Goodwill	320,727	
4.4c	Identifiable intangible assets	218,923	
4.5c	Worldwide expenditures for capitalized assets	981,447	
4.5a	Property, plant, and equipment	852,787	
4.5b	Identifiable intangible assets	128,661	
4.6c(1)	Domestic expenditures for capitalized assets	793,263	
4.6a(1)	Property, plant, and equipment	682,629	
4.6b(1)	Identifiable intangible assets	110,634	
4.6c(2)	Foreign expenditures for capitalized assets	188,184	
4.6a(2)	Property, plant, and equipment	170,158	
4.6b(2)	Identifiable intangible assets	18,026	
4.7c/ 4.8g	Domestic capital expenditures for R&D	52,844	
4.7a	Property, plant, and equipment	39,084	
4.7b	Identifiable intangible assets	13,760	
4.8a	Land acquisition	584	i

TABLE 1

**Business Enterprise Research and Development Survey aggregate estimates, by questionnaire reference: 2021**

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

Question	Survey item	Aggregate amount
4.8b	Buildings and land improvement	5,220
4.8c	Machinery and equipment	19,665
4.8d	Capitalized software	16,247 i
4.8e	Other intellectual property	5,711
4.8f	All other capital expenditures for R&D operations	5,417 i
5.1	Worldwide R&D paid for and performed by the company and others directed toward business areas or product lines new to the company	110,378
5.2/ 2.10(1)	Domestic R&D paid for and performed by the company	527,804
	Type of R&D (character of work)	
5.4b	Basic research	32,763
5.4a	Applied research	69,130
5.3b	Development	425,912
	Application areas	
5.5	Energy applications	31,632 i
5.6	Environmental protection applications, including pollution abatement	11,278 i
5.7	Defense applications	13,980 i
5.8	Health or medical applications	120,687
5.9	Agricultural applications	7,582 i
	Technology focus areas	
5.10	Software products and software embedded in other projects or products	243,879 i
5.11	Biotechnology	81,585
5.12	Nanotechnology	31,371 i
5.13	Artificial intelligence	25,267 i
5.15c/ 5.14	Foreign R&D paid for and performed by the company	120,270
5.15a	Research	19,940
5.15b	Development	100,330
5.16/ 3.5(1)	Domestic R&D paid for by others and performed by the company	74,695
	Type of R&D (character of work)	
5.18b	Basic research	7,367
5.18a	Applied research	17,355 i
5.17b	Development	49,972
	Application areas	
5.19	Energy applications	2,109 i
5.20	Environmental protection applications, including pollution abatement	1,098 i
5.21	Defense applications	20,988 i
5.22	Health or medical applications	35,506 i
5.23	Agricultural applications	684 i
	Technology focus areas	
5.24	Software products and software embedded in other projects or products	13,151 i
5.25	Biotechnology	20,928
5.26	Nanotechnology	1,347 i
5.27	Artificial intelligence	3,609 i
5.28/ 3.8d	Federally funded R&D performed by the company	23,582
	Type of R&D (character of work)	
5.30b	Basic research	2,344 i
5.30a	Applied research	3,250
5.29b	Development	17,987
	Technology focus areas	
5.31	Federally funded R&D performed by the company for software products and software embedded in other projects or products	5,468
5.33c/ 5.32	Foreign R&D paid for by others and performed by the company	15,142 i

TABLE 1

**Business Enterprise Research and Development Survey aggregate estimates, by questionnaire reference: 2021**

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

Question	Survey item	Aggregate amount	
5.33a	Research	4,537	i
5.33b	Development	10,605	i
Employees (thousands)			
	Worldwide		
1.8/ 1.9(3)/ 6.1c(3)	Total employees	35,574	
6.1b(3)	Non-R&D employees	32,413	
6.1a(3)	R&D employees	3,161	
6.4a(3)	Female	933	
6.4b(3)	Male	2,229	
6.5a(3)	Researchers	2,127	
6.5b(3)	Technicians	734	
6.5c(3)	Support staff	300	
	Domestic		
1.9(1)/ 6.1c(1)	Total employees	23,654	
6.1b(1)	Non-R&D employees	21,522	
6.1a(1)	R&D employees	2,132	
6.4a(1)	Female	596	
6.4b(1)	Male	1,536	
6.5a(1)	Researchers	1,426	
6.5b(1)	Technicians	501	
6.5c(1)	Support staff	205	
	Foreign		
1.9(2)/ 6.1c(2)	Total employees	11,920	
6.1b(2)	Non-R&D employees	10,891	
6.1a(2)	R&D employees	1,029	
6.4a(2)	Female	336	
6.4b(2)	Male	693	
6.5a(2)	Researchers	700	
6.5b(2)	Technicians	233	
6.5c(2)	Support staff	96	
	Researchers with PhD		
6.6(3)	Worldwide	169	
6.6(1)	Domestic	130	
6.6(2)	Foreign	38	
	Full-time equivalent		
6.7d	R&D employees	1,941	
6.7a	Full-time R&D employees	1,590	
6.7b	Full-time employees not solely working on R&D	327	
6.7c	Part-time employees working on R&D	24	
6.8d	Researchers	1,311	
6.8a	Full-time R&D employees	1,113	
6.8b	Full-time employees not solely working on R&D	187	
6.8c	Part-time employees working on R&D	10	i
6.9	Non-U.S. citizens employed as researchers under temporary visa <sup>a</sup>	70	
6.10d(1)	Total leased and temporary employees working on R&D	295	i
6.10a(1)	Researchers	174	i
6.10b(1)	Technicians	86	i
6.10c(1)	Support staff	35	i



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

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

**Note(s):**

Detail may not add to total because of rounding. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

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: 2021  
(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	737,911	648,075	89,837	602,499	527,804	74,695	135,412	120,270	15,142 i
Manufacturing industries	31–33	404,449	364,349	40,100	326,060	287,666	38,394	78,389	76,683	1,706
Food	311	6,456	6,151	305	5,266	4,963 - 4,968	297 - 302	1,190	1,182 - 1,187	3 - 8
Beverage and tobacco products	312	2,139	2,121	19	1,247	1,228	19	893	893	0
Textile, apparel, and leather products	313–16	997	987	11	829	818	11	169	169	0
Wood products	321	447	437 - 445	2 - 10	444	433 - 442	2 - 10	4	4	0
Paper	322	1,206	1,206	* i	1,139	1,139	0	67	67	* i
Printing and related support activities	323	231	223 - 232	0 - 7	204 i	196 - 205 i	0 - 7	27	27	0
Petroleum and coal products	324	1,131	1,127	5	957	952	5	175	175	0
Chemicals	325	133,231	120,516	12,715	109,490	97,097	12,393	23,741	23,419	322
Basic chemicals	3251	3,710	3,553	157	2,713	2,559	154	997	994	4
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,969 i	1,844 - 1,889 i	81 - 125 i	1,389 i	1,291 - 1,320 i	69 - 98 i	580 i	550 - 581 i	0 - 29
Pesticide, fertilizer, and other agricultural chemicals	3253	1,279	1,025 - 1,069	211 - 254 i	1,157	915 - 946	211 - 241 i	123	94 - 123	0 - 29
Pharmaceuticals and medicines	3254	121,157	109,180	11,976	100,220	88,524	11,697	20,936	20,656	280
Soap, cleaning compound, and toilet preparations	3256	3,611	3,392	219	2,740	2,531	209	871	861	10
Paint, coating, adhesive, and other chemicals	3255, 3259	1,505	1,477	28	1,271	1,242 - 1,252	19 - 28	234	224 - 234	0 - 9
Plastics and rubber products	326	3,752	3,564	188	3,144	2,961	183	607	603	5
Nonmetallic mineral products	327	1,731	1,700	31	1,533	1,503	31	198	198	0
Primary metals	331	963	936	27 i	912	887 - 890	22 - 26 i	50 i	46 - 49 i	2 - 5
Fabricated metal products	332	4,669	4,225	444	4,291	3,879	412	378	346	32
Machinery	333	23,073	21,951	1,121	17,730	16,726	1,003	5,343	5,225	118
Agricultural implement	33311	2,774	2,707	67	1,867	1,799 - 1,807	60 - 68	907	899 - 907	0 - 8
Semiconductor machinery	333242	6,648	6,460	189	5,349	5,182	167	1,299	1,278	21
Engine, turbine, and power transmission equipment	3336	1,920	1,772	147	1,374	1,239 - 1,246	128 - 134	546	526 - 533	13 - 19 i
Other machinery	other 333	11,731	11,012	718	9,140	8,499	641	2,591	2,513	77
Computer and electronic products	334	132,597	125,475	7,123	101,063	94,211	6,852	31,535	31,264	271
Communications equipment	3342	15,968	14,731	1,237 i	12,557	11,339	1,218 i	3,411	3,392	19
Semiconductor and other electronic components	3344	63,917	61,900	2,018	47,396	45,516	1,880	16,521	16,384	137
Navigational, measuring, electromedical, and control instruments	3345	17,220	13,480	3,740	13,644	10,014	3,630	3,576	3,466	110
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,554	3,291	263	3,087	2,837	250	467	454	12

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: 2021  
(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
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	5,895	2,628	3,267	5,301	2,109	3,193	594	519	75
Other measuring and controlling devices	other 3345	7,771	7,561	210	5,256	5,068	187	2,516	2,493	23
Other computer and electronic products	other 334	35,492	35,364	128	27,465	27,342	123	8,027	8,022	5
Electrical equipment, appliances, and components	335	7,374	6,847	527	5,494	5,007	486	1,880	1,840	41
Transportation equipment	336	58,423	41,228	17,195	50,760	34,405	16,356	7,663	6,824	839
Motor vehicles, bodies, trailers, and parts	3361-63	33,111	28,824	4,287	26,391	22,754	3,637	6,720	6,070	650 i
Aerospace products and parts	3364	22,180 i	10,448	11,731 i	21,468 i	9,900	11,568 i	711	548	164
Aircraft, aircraft engine, and aircraft parts	336411-13	20,538 i	9,822	10,716 i	19,845 i	9,293	10,552 i	693	529	164
Guided missile, space vehicle, and related parts	336414-15, 336419	1,642	626	1,016	1,623	608	1,016	18	18	0
Military armored vehicle, tank, and tank components	336992	24	23	1	21 - 25	20 - 24	1	0 - 3	0 - 3	0
Other transportation	other 336	3,109	1,934	1,175	2,875 - 2,880	1,726 - 1,731	1,149	228 - 233	202 - 207	26
Furniture and related products	337	464	460	3	426	423	3	37	37	* i
Miscellaneous	339	25,564	25,181	383	21,133	20,822	311	4,431	4,359	72
Medical equipment and supplies	3391	22,444	22,146	298	18,438	18,204	233	4,007	3,942	65
Other miscellaneous manufacturing	3399	3,120	3,035	85	2,695	2,618	78	424	418	7 i
Nonmanufacturing industries	21-23, 42-81	333,462	283,726	49,736 i	276,439	240,138	36,300 i	57,024	43,588	13,436 i
Mining, quarrying, oil and gas extraction, and support activities	21	1,339 i	1,150	189 i	1,260 - 1,334	1,077 - 1,151	183 i	5 - 79	0 - 73	6
Utilities	22	168 - 19,125	134 - 19,090	35 i	168 - 17,997	133 - 17,961	35 i	0 - 1,129	0 - 1,129	0
Wholesale trade	42	1,855 i	1,770 i	84	1,745 - 1,855 i	1,661 - 1,770 i	84	0 - 109 i	0 - 109 i	0
Electronic shopping and electronic auctions	454111-12	10,538 - 29,503 i	10,533 - 29,498 i	4 - 8	5,936 - 24,040 i	5,931 - 24,034 i	4 - 8	4,330 - 6,357 i	4,330 - 6,357 i	0
Transportation and warehousing	48-49	7,282	7,272	9	7,208	7,198 - 7,200	8 - 10	73	72 - 74	0 - 1
Information	51	177,113	175,699	1,414	147,855	146,488	1,366	29,258	29,210	48
Publishing	511	49,085	48,429	656	39,152	38,521	631	9,933	9,908	25
Newspaper, periodical, book, and directory publishers	5111	103	81	23 r	103	81	23 r	* i	* i	0
Software publishers	5112	48,981	48,349	633	39,049	38,441	608	9,933	9,908	25
Telecommunications	517	3,912	3,813 - 3,883	30 - 98	3,835	3,736 - 3,805	30 - 98	77 i	77 i	0
Data processing, hosting, and related services	518	55,072	54,442	630	45,192	44,585	607	9,881	9,858	23

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: 2021  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Worldwide R&D performance			Domestic R&D performance			Foreign R&D performance		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Other information	other 51	69,044	68,944 - 69,014	29 - 99	59,676	59,577 - 59,647	29 - 99	9,367 i	9,367 i	* r
Finance and insurance	52	23,409	23,323	86	20,947	20,902	45	2,461	2,421	40
Real estate and rental and leasing	53	2,199	2,197 - 2,200	0 - 1	2,096	2,095 - 2,097	0 - 1	103	103	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	7	7	0	5 - 8	5 - 8	0	0 - 2	0 - 2	0
Other real estate and rental and leasing	other 53	2,192	2,190 - 2,193	0 - 1	2,088 - 2,091	2,087 - 2,091	0 - 1	100 - 104	100 - 104	0
Professional, scientific, and technical services	54	85,259	37,506	47,753 i	66,496	32,083	34,413 i	18,763 i	5,423	13,340 i
Architectural, engineering, and related services	5413	4,598	2,590	2,008	4,560	2,553	2,007	39 r	38 r	1
Computer systems design and related services	5415	25,041	21,779	3,262	20,409	17,188	3,221	4,632	4,591	42
Scientific research and development services	5417	47,772 i	6,476	41,296 i	34,142 i	6,123	28,019 i	13,630 i	353	13,277 i
Research and development in nanotechnology	541713	244	170	73 i	228	154	73 i	16	16	0
Research and development in biotechnology (except nanobiotechnology)	541714	13,441	1,800	11,641	9,039	1,664	7,374	4,402	136	4,267
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	33,519 i	4,467	29,052 i	24,312 i	4,266	20,046 i	9,207 i	201	9,005 i
Research and development in the social sciences and humanities	541720	568	38	530	563	38	525	5	0	5
Other professional, scientific, and technical services	other 54	7,847	6,660	1,187	7,385	6,218	1,166	463	442	21
Health care services	621–23	2,140	2,045	95	2,060 - 2,138	1,965 - 2,043	95	2 - 81	2 - 80	* i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	3,200	3,135	65	2,564 - 3,199	2,501 - 3,136	62 - 66	1 - 637	0 - 634	0 - 3
All companies (number of domestic employees)	–	737,911	648,075	89,837	602,499	527,804	74,695	135,412	120,270	15,142 i
Small companies										
10–19 <sup>a</sup>	–	5,836	4,611	1,226	5,477	4,258	1,219	359	353	6
20–49	–	15,969	13,501	2,468	15,061	12,626	2,434	909	875	34
Medium companies										
50–99	–	15,406	13,300	2,106	14,540	12,488	2,052	866	812	53
100–249	–	26,406	22,233	4,172	24,023	20,030	3,993	2,382	2,203	179
Large companies										
250–499	–	27,592	24,185	3,407	23,932	20,574	3,358	3,660	3,611	49 i
500–999	–	31,961	27,917	4,043	27,432	23,655	3,777	4,528	4,262	266
1,000–4,999	–	115,278	103,779	11,500	94,615	83,609	11,006	20,663	20,170	493 i
5,000–9,999	–	78,388	67,394	10,995 i	62,817	53,873	8,944 i	15,571	13,521	2,051

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: 2021

(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
10,000–24,999	–	133,088	103,153	29,935 i	104,607	84,057	20,549	28,481	19,096	9,385 i
25,000 or more	–	287,987	268,001	19,986	229,995	212,634	17,361	57,992	55,367	2,625

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

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: 2021  
(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	737,911	5,538	34,279	49,391	31,600	617,104
Manufacturing industries	31–33	404,449	2,919	14,841	26,242	19,637	340,810
Food	311	6,456	202	668	946	582	4,058
Beverage and tobacco products	312	2,139	25	128	73	191	1,722
Textile, apparel, and leather products	313–16	997	64	192	363	100	279
Wood products	321	447	26	272	150	0	0
Paper	322	1,206	21	134	169	184	698
Printing and related support activities	323	231	29	96	106	0	0
Petroleum and coal products	324	1,131	19	70	95	221	726
Chemicals	325	133,231	341	2,697	9,149	6,441	114,603
Basic chemicals	3251	3,710	55	244	684	676	2,051
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,969	27	166	218	143	1,414
Pesticide, fertilizer, and other agricultural chemicals	3253	1,279	16	82	119	0	1,062
Pharmaceuticals and medicines	3254	121,157	95	1,805	7,612	5,484	106,160
Soap, cleaning compound, and toilet preparations	3256	3,611	78	162	225	0	3,146
Paint, coating, adhesive, and other chemicals	3255, 3259	1,505	70	237	290	138	769
Plastics and rubber products	326	3,752	204	703	904	822	1,118
Nonmetallic mineral products	327	1,731	95	213	158	109	1,157
Primary metals	331	963	63	190	342	0	368
Fabricated metal products	332	4,669	509	1,878	1,105	634	543
Machinery	333	23,073	384	2,151	2,291	1,922	16,325
Agricultural implement	33311	2,774	0 - 65	117	189	50 - 115	2,355
Semiconductor machinery	333242	6,648	7	50	135	446	6,010
Engine, turbine, and power transmission equipment	3336	1,920	11	90	198	225	1,395
Other machinery	other 333	11,731	299 - 368	1,893	1,770	1,134 - 1,203	6,565
Computer and electronic products	334	132,597	374	2,196	3,553	3,368	123,107
Communications equipment	3342	15,968	45	288	515	705	14,414
Semiconductor and other electronic components	3344	63,917	86	710	1,398	954	60,770
Navigational, measuring, electromedical, and control instruments	3345	17,220	217	839	1,365	1,196	13,604
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,554	38	241	479	378	2,417
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	5,895	48	96	215	421	5,114
Other measuring and controlling devices	other 3345	7,771	130	502	670	397	6,072

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: 2021  
(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 computer and electronic products	other 334	35,492	25 i	359	275	514	34,319	
Electrical equipment, appliances, and components	335	7,374	91	584	1,364	869	4,466	
Transportation equipment	336	58,423	183	1,092	2,689	2,472	51,988	
Motor vehicles, bodies, trailers, and parts	3361–63	33,111	94	443	1,616	1,480	29,478	
Aerospace products and parts	3364	22,180 i	47	400	900	720	20,112 i	
Aircraft, aircraft engine, and aircraft parts	336411–13	20,538 i	0 - 48	1 - 400	567	373	19,149 - 19,599 i	
Guided missile, space vehicle, and related parts	336414–15, 336419	1,642	0 - 48	1 - 400	333	347	513 - 962	
Military armored vehicle, tank, and tank components	336992	24	5 r	19	0	0	0	
Other transportation	other 336	3,109	37	229	173	272	2,398	
Furniture and related products	337	464	39	136	289	0	0	
Miscellaneous	339	25,564	250	1,444	2,495	1,722	19,653	
Medical equipment and supplies	3391	22,444	110	897	1,759	1,501	18,177	
Other miscellaneous manufacturing	3399	3,120	140	547	736	221	1,476	
Nonmanufacturing industries	21–23, 42–81	333,462	2,619	19,438	23,149	11,962	276,293	
Mining, quarrying, oil and gas extraction, and support activities	21	1,339 i	21	294 i	244	275 i	506	
Utilities	22	168 - 19,125	2	1 - 1,482	10 - 942	50 - 258 i	100 - 19,063	
Wholesale trade	42	1,855 i	423	1,325 i	106 i	0	0	
Electronic shopping and electronic auctions	454111–12	10,538 - 29,503 i	42	1 - 1,482	10 - 942	50 - 258	7,816 - 29,400 i	
Transportation and warehousing	48–49	7,282	0 - 61	87	565	50 - 111 i	6,521	
Information	51	177,113	496	5,606	10,304	5,406	155,301	
Publishing	511	49,085	277	2,129	3,325	1,521	41,833	
Newspaper, periodical, book, and directory publishers	5111	103	9	38 r	56 i	0	0	
Software publishers	5112	48,981	268	2,090	3,269	1,521	41,833	
Telecommunications	517	3,912	12	191	364	58	3,287	
Data processing, hosting, and related services	518	55,072	195	2,907	5,839	3,359	42,772	
Other information	other 51	69,044	11	380	776	468	67,408	
Finance and insurance	52	23,409	13 r	768	1,117	747	20,764	
Real estate and rental and leasing	53	2,199	0 - 78	33	10 - 87	0	2,080	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	7	1	6	0	0	0	
Other real estate and rental and leasing	other 53	2,192	0 - 77	27	10 - 87	0	2,080	

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: 2021  
(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	85,259	1,209	9,605	9,487	4,459	60,499
Architectural, engineering, and related services	5413	4,598	252	1,673	1,771	239	663
Computer systems design and related services	5415	25,041	651	3,903	2,544	1,658	16,286
Scientific research and development services	5417	47,772 i	145	2,777	3,602	2,209	39,039 i
Research and development in nanotechnology	541713	244	10	164	70 i	0	0
Research and development in biotechnology (except nanobiotechnology)	541714	13,441	25	688	805	973	10,950
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	33,519 i	107	1,893	2,650	1,236	27,633 i
Research and development in the social sciences and humanities	541720	568	3	32	76	0	457
Other professional, scientific, and technical services	other 54	7,847	161	1,252	1,570	353	4,511
Health care services	621–23	2,140	100	241	358	670	771
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	3,200	170 - 317	1 - 1,482	10 - 942	50 - 258	201 - 2,969
All companies (number of domestic employees)	–	737,911	5,538	34,279	49,391	31,600	617,104
Small companies							
10–19 <sup>a</sup>	–	5,836	1,323	3,606	639	54 - 170	100 - 213
20–49	–	15,969	1,748	9,536	4,216	255 - 371	100 - 213
Medium companies							
50–99	–	15,406	1,103	6,061	7,057	971 - 1,087	100 - 213
100–249	–	26,406	864	7,266	10,220	5,333	2,722
Large companies							
250–499	–	27,592	261	3,363	8,194	4,633	11,142
500–999	–	31,961	125	2,151	5,861	7,026	16,798
1,000–4,999	–	115,278	101	1,923	9,029	8,383	95,842
5,000–9,999	–	78,388	11	159	2,361	2,667	73,190
10,000–24,999	–	133,088	2	151	1,199	1,413	130,324
25,000 or more	–	287,987	*	65	615	629	286,677

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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



**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. R&D program size classifications are based on R&D performance. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

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: 2021  
(Number of companies)

Industry and company size	NAICS code	Worldwide R&D performance			Domestic R&D performance			Foreign R&D performance		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
All industries	21–23, 31–33, 42–81	31,670	30,060	4,660	31,490	29,860	4,560	3,470	3,340	320
Manufacturing industries	31–33	15,660	15,020	2,090	15,620	14,980	2,040	1,590	1,540	190
Food	311	900	880	50	890	880	50	50	50	10
Beverage and tobacco products	312	190	190	20	190	190	20	10	10	0
Textile, apparel, and leather products	313–16	310	300	20	310	300	20	30	30	0
Wood products	321	150	150	10	150	150	10	10	10	0
Paper	322	120	120	10	120	120	0	20	20	10
Printing and related support activities	323	170	170	10	170	170	10	10	10	0
Petroleum and coal products	324	110	110	10	110	110	10	10	10	0
Chemicals	325	2,250	2,120	450	2,250	2,120	430	350	340	40
Basic chemicals	3251	250	240	50	250	240	50	50	50	10
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	130	120	30	130	120	30	20	20	10
Pesticide, fertilizer, and other agricultural chemicals	3253	100	100	10	100	100	10	10	10	10
Pharmaceuticals and medicines	3254	1,220	1,110	350	1,210	1,110	340	240	240	30
Soap, cleaning compound, and toilet preparations	3256	290	290	10	290	290	10	30	30	10
Paint, coating, adhesive, and other chemicals	3255, 3259	300	300	20	300	300	20	30	30	10
Plastics and rubber products	326	930	890	100	920	880	100	90	90	10
Nonmetallic mineral products	327	350	340	20	340	340	20	20	20	0
Primary metals	331	260	250	30	260	250	30	20	20	10
Fabricated metal products	332	2,310	2,160	310	2,310	2,160	310	70	60	10
Machinery	333	2,170	2,090	260	2,170	2,090	260	160	160	30
Agricultural implement	33311	150	140	10	150	140	10	20	20	10
Semiconductor machinery	333242	60	50	20	60	50	10	20	20	10
Engine, turbine, and power transmission equipment	3336	80	80	30	80	80	30	20	20	10
Other machinery	other 333	1,900	1,830	220	1,900	1,830	210	120	110	20
Computer and electronic products	334	2,140	2,060	360	2,130	2,040	350	380	380	40
Communications equipment	3342	280	280	30	280	270	30	70	70	10
Semiconductor and other electronic components	3344	670	610	150	660	610	140	120	110	20
Navigational, measuring, electromedical, and control instruments	3345	970	950	170	960	940	170	150	150	20
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	180	180	30	180	180	30	50	50	10
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	190	180	40	190	180	40	50	50	10
Other measuring and controlling devices	other 3345	610	600	110	600	600	110	60	60	10
Other computer and electronic products	other 334	240	240	30	240	240	20	60	60	10
Electrical equipment, appliances, and components	335	580	570	50	580	570	50	90	90	10

TABLE 4  
Companies with worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, by source of funds, industry, and company size: 2021  
(Number of companies)

Industry and company size	NAICS code	Worldwide R&D performance			Domestic R&D performance			Foreign R&D performance			
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	
Transportation equipment	336	1,150	1,080	260	1,150	1,080	260	190	160	60	i
Motor vehicles, bodies, trailers, and parts	3361-63	570	530	130	570	530	130	100	100	20	
Aerospace products and parts	3364	350	320	100	350	320	100	30	30	20	
Aircraft, aircraft engine, and aircraft parts	336411-13	310	300	80	310	300	80	30	30	20	
Guided missile, space vehicle, and related parts	336414-15, 336419	40	30	30	40	30	30	10	10	0	
Military armored vehicle, tank, and tank components	336992	20	20	10	20	20	10	10	10	0	
Other transportation	other 336	220	220	40	220	220	40	60	40	30	r
Furniture and related products	337	230	220	20	230	220	20	10	10	10	i
Miscellaneous	339	1,450	1,400	190	1,450	1,400	180	170	160	20	i
Medical equipment and supplies	3391	820	780	120	820	780	110	100	100	20	
Other miscellaneous manufacturing	3399	640	620	80	640	620	80	70	70	10	i
Nonmanufacturing industries	21-23, 42-81	16,020	15,050	2,580	15,880	14,890	2,520	1,900	1,800	140	i
Mining, quarrying, oil and gas extraction, and support activities	21	180	170	20	180	170	20	20	10	10	
Utilities	22	40	40	10	40	40	10	10	10	0	
Wholesale trade	42	1,830	1,760	220	1,810	1,720	220	180	180	0	i
Electronic shopping and electronic auctions	454111-12	180	180	20	180	180	20	20	20	0	r
Transportation and warehousing	48-49	80	80	10	80	80	10	10	10	10	
Information	51	3,530	3,470	260	3,450	3,380	230	960	920	50	r
Publishing	511	1,480	1,470	150	1,420	1,410	120	340	310	40	r
Newspaper, periodical, book, and directory publishers	5111	60	60	20	60	60	20	10	10	0	i
Software publishers	5112	1,430	1,410	130	1,370	1,350	100	340	310	40	r
Telecommunications	517	170	160	10	170	160	10	20	20	0	
Data processing, hosting, and related services	518	1,700	1,660	100	1,700	1,660	100	520	520	10	i
Other information	other 51	200	200	10	180	180	10	80	80	10	r
Finance and insurance	52	530	530	10	530	530	10	80	80	10	
Real estate and rental and leasing	53	50	50	10	50	50	10	10	10	0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	10	10	0	10	10	0	10	10	0	
Other real estate and rental and leasing	other 53	40	40	10	40	40	10	10	10	0	
Professional, scientific, and technical services	54	7,080	6,320	1,630	7,050	6,290	1,610	600	550	80	i
Architectural, engineering, and related services	5413	1,440	1,270	360	1,430	1,260	360	30	30	10	
Computer systems design and related services	5415	3,410	3,230	400	3,390	3,220	390	380	360	30	i
Scientific research and development services	5417	1,370	1,030	740	1,370	1,020	730	120	90	50	i
Research and development in nanotechnology	541713	70	60	30	70	60	30	10	10	0	
Research and development in biotechnology (except nanobiotechnology)	541714	310	240	150	310	240	150	40	30	20	

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: 2021  
(Number of companies)

Industry and company size	NAICS code	Worldwide R&D performance			Domestic R&D performance			Foreign R&D performance		
		Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others	Total	Paid for by the company	Paid for by others
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	980	730	550	980	720	550	80	60	40 i
Research and development in the social sciences and humanities	541720	30	20	20	30	20	20	10	0	10
Other professional, scientific, and technical services	other 54	880	800	150	870	800	150	80	80	10
Health care services	621–23	590 r	550 r	400 r	590 r	550 r	400 r	20	20	10 i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,980	1,960	40	1,980	1,960	40	40	40	10
All companies (number of domestic employees)	–	31,670	30,060	4,660	31,490	29,860	4,560	3,470	3,340	320 i
Small companies										
10–19 <sup>a</sup>	–	5,720	5,300	1,160	5,690	5,250	1,160	370 i	350 i	30 i
20–49	–	9,310	8,800	1,640	9,210	8,700	1,620	600	560	60 i
Medium companies										
50–99	–	5,770	5,530	630	5,760	5,520	600	510	480	40 r
100–249	–	5,590	5,350	550	5,570	5,330	540	510	490	40 i
Large companies										
250–499	–	2,060	1,980	220	2,050	1,970	210	370	370	30 i
500–999	–	1,290	1,230	160	1,290	1,230	160	290	290	20
1,000–4,999	–	1,350	1,310	180	1,350	1,300	160	510	510	50
5,000–9,999	–	270	270	60	270	260	50	150	140	20
10,000–24,999	–	210	200	60	210	200	60	130	120	40
25,000 or more	–	130	130	40	130	130	40	80	80	30

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

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. Statistics are based on companies in the United States that reported to the survey. No systematic item imputation was applied. Beginning in survey year 2018, these statistics include an adjustment to the weight to account for unit nonresponse; beginning in survey year 2019, these company count estimates reflect a change in rounding methodology.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 5

**Worldwide R&D paid for by the company and performed by the company and others, by industry and company size: 2021**

(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	709,663	648,075	61,588
Manufacturing industries	31–33	419,490	364,349	55,141
Food	311	6,569	6,151	418
Beverage and tobacco products	312	2,444	2,121	323
Textile, apparel, and leather products	313–16	1,000	987	14
Wood products	321	449 - 458	437 - 445	12
Paper	322	1,214	1,206	8
Printing and related support activities	323	235	223 - 232	3 - 12
Petroleum and coal products	324	1,386	1,127	259
Chemicals	325	161,924	120,516	41,408
Basic chemicals	3251	3,647	3,553	95
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,921	1,844 - 1,889	32 - 78
Pesticide, fertilizer, and other agricultural chemicals	3253	1,186	1,025 - 1,069	117 - 162
Pharmaceuticals and medicines	3254	149,811	109,180	40,631
Soap, cleaning compound, and toilet preparations	3256	3,837	3,392	445
Paint, coating, adhesive, and other chemicals	3255, 3259	1,522	1,477	45
Plastics and rubber products	326	3,658	3,564	94
Nonmetallic mineral products	327	1,714	1,700	14
Primary metals	331	952	936	17
Fabricated metal products	332	4,317	4,225	92
Machinery	333	22,307	21,951	356
Agricultural implement	33311	2,834	2,707	127
Semiconductor machinery	333242	6,463	6,460	3
Engine, turbine, and power transmission equipment	3336	1,785	1,772	13
Other machinery	other 333	11,225	11,012	213
Computer and electronic products	334	129,897	125,475	4,423
Communications equipment	3342	15,879	14,731	1,148
Semiconductor and other electronic components	3344	62,330	61,900	430
Navigational, measuring, electromedical, and control instruments	3345	13,854	13,480	374
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,384	3,291	93
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	2,715	2,628	88
Other measuring and controlling devices	other 3345	7,754	7,561	193
Other computer and electronic products	other 334	37,836	35,364	2,472
Electrical equipment, appliances, and components	335	6,957	6,847	110
Transportation equipment	336	47,162	41,228	5,933
Motor vehicles, bodies, trailers, and parts	3361–63	34,173	28,824	5,349
Aerospace products and parts	3364	10,955	10,448	507
Aircraft, aircraft engine, and aircraft parts	336411–13	10,267	9,822	445
Guided missile, space vehicle, and related parts	336414–15, 336419	688	626	62
Military armored vehicle, tank, and tank components	336992	23	23	*
Other transportation	other 336	2,011	1,934	77
Furniture and related products	337	490	460	30
Miscellaneous	339	26,798 - 26,816	25,181	1,617 - 1,635
Medical equipment and supplies	3391	23,656	22,146	1,510
Other miscellaneous manufacturing	3399	3,142 - 3,161	3,035	106 - 125
Nonmanufacturing industries	21–23, 42–81	290,173	283,726	6,447

TABLE 5

**Worldwide R&D paid for by the company and performed by the company and others, by industry and company size: 2021**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Performed by the company	Performed by others
Mining, quarrying, oil and gas extraction, and support activities	21	1,278	1,150	128
Utilities	22	134 - 19,767	134 - 19,090	0 - 677
Wholesale trade	42	1,944	1,770	174
Electronic shopping and electronic auctions	454111-12	10,533 - 30,171	10,533 - 29,498	0 - 677
Transportation and warehousing	48-49	7,321	7,272	49
Information	51	179,320	175,699	3,621
Publishing	511	50,404	48,429	1,975
Newspaper, periodical, book, and directory publishers	5111	88	81	7
Software publishers	5112	50,316	48,349	1,968
Telecommunications	517	4,390 - 4,460	3,813 - 3,883	577
Data processing, hosting, and related services	518	55,275	54,442	833
Other information	other 51	69,181 - 69,252	68,944 - 69,014	237
Finance and insurance	52	23,499	23,323	176
Real estate and rental and leasing	53	2,202 - 2,204	2,197 - 2,200	4
Lessors of nonfinancial intangible assets (except copyrighted works)	533	8	7	1
Other real estate and rental and leasing	other 53	2,193 - 2,196	2,190 - 2,193	3
Professional, scientific, and technical services	54	38,872	37,506	1,366
Architectural, engineering, and related services	5413	2,698	2,590	108
Computer systems design and related services	5415	22,192	21,779	413
Scientific research and development services	5417	7,271	6,476	795
Research and development in nanotechnology	541713	195	170	24
Research and development in biotechnology (except nanobiotechnology)	541714	2,110	1,800	310
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	4,929	4,467	461
Research and development in the social sciences and humanities	541720	38	38	0
Other professional, scientific, and technical services	other 54	6,711	6,660	50
Health care services	621-23	2,298	2,045	253
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	3,137 - 3,815	3,135	3 - 680
All companies (number of domestic employees)	-	709,663	648,075	61,588
Small companies				
10-19 <sup>a</sup>	-	5,358	4,611	747
20-49	-	15,920	13,501	2,419
Medium companies				
50-99	-	16,454	13,300	3,154
100-249	-	25,209	22,233	2,976
Large companies				
250-499	-	27,270	24,185	3,085
500-999	-	30,373	27,917	2,456
1,000-4,999	-	110,128	103,779	6,349
5,000-9,999	-	71,968	67,394	4,575
10,000-24,999	-	119,637	103,153	16,484
25,000 or more	-	287,345	268,001	19,344

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

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 6

**Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2021**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	Amount	
All business activities	21100–81000	709,663	
Oil and gas extraction	21100	950	
Mining	21200	102	i
Support activities for mining, including oil and gas	21300	660	
Utilities	22100	0 - 5,917	
Construction	23000	780	
Food manufacturing	31100	6,512	
Beverage manufacturing	31210	941	
Tobacco manufacturing	31220	999	
Textile, apparel, and leather products manufacturing	31990	942	
Wood products manufacturing	32100	506	
Paper manufacturing	32200	1,841	
Printing and related support activities	32300	371	
Petroleum refineries	32401	537	
Asphalt paving, roofing, and saturated materials manufacturing	32402	174	
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	220	
Basic chemicals manufacturing	32510	4,033	
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	1,756	
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	1,830	
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing	32541	92,561	
In vitro diagnostic substances manufacturing	32542	2,035	
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	52,963	
Soap, cleaning compound, and toilet preparations manufacturing	32591	3,212	
Paint, adhesive, and other chemical manufacturing	32592	1,765	
Plastics and rubber products manufacturing	32600	3,804	
Clay and glass products manufacturing	32710	1,598	
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	435	
Primary metal manufacturing	33100	1,095	
Fabricated metal products manufacturing	33200	4,705	
Agricultural machinery and equipment manufacturing	33311	2,303	
Construction machinery manufacturing	33312	1,895	
Mining, oil, and gas field machinery and equipment manufacturing	33319	1,476	
Semiconductor machinery manufacturing	33321	6,409	
Industrial machinery manufacturing (except semiconductor machinery)	33322	1,373	
Photographic and photocopying equipment manufacturing	33331	77	
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	2,401	
Digital cameras manufacturing	33333	447	
Engine, turbine, and power transmission equipment manufacturing	33360	2,761	
Metalworking and other general purpose machinery manufacturing	33390	3,165	
Computers and peripheral equipment manufacturing and magnetic and optical media	33412	35,035	
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	10,454	
Radio, television, and wireless communication equipment manufacturing	33422	3,939	
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	838	
Audio and video equipment manufacturing	33430	1,945	
Semiconductor and other electronic components manufacturing	33440	62,109	
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	4,877	
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	1,897	
Measuring and control instruments manufacturing (not listed elsewhere)	33459	6,091	
Electrical equipment, appliances, and components manufacturing	33500	6,601	
Motor vehicles manufacturing	33610	24,829	



TABLE 6

**Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2021**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	Amount	
Motor vehicle body and trailer manufacturing	33620	189	
Motor vehicle parts manufacturing	33630	9,420	
Aircraft manufacturing	33641	5,205	
Aircraft engine and engine parts manufacturing	33642	3,223	
Other aircraft parts and auxiliary equipment manufacturing	33643	1,302	
Guided missiles, space vehicles, and related parts manufacturing	33644	950	
Railroad rolling stock manufacturing	33651	247	
Ship and boat building	33660	161	
Motorcycle, bicycle, and parts manufacturing	33691	548	
Military armored vehicle, tank, and tank components manufacturing	33692	437	i
All other transportation equipment manufacturing	33699	534	
Furniture and related products manufacturing	33700	519	
Medical equipment and supplies manufacturing	33910	22,134	
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	3,798	
Merchant wholesalers, durable goods	42300	1,330	i
Merchant wholesalers, nondurable goods	42400	739	i
Wholesale electronic markets and agents and brokers (business to business)	42500	52	
Retail trade (except electronic shopping and electronic auctions)	44000	361 - 4,960	i
Electronic shopping and electronic auctions	45411	11,931 - 16,530	i
Transportation	48000	5,995	
Couriers, messengers, and express delivery services	49200	1,114 - 5,713	
Warehousing and storage	49300	0 - 5,917	
Newspaper, periodical, book, and directory publishers (except Internet)	51110	109	
Software publishers (except Internet)	51120	37,337	
Motion picture and sound recording (except Internet)	51200	0 - 5,917	
Broadcasting (except Internet)	51500	0 - 5,917	
Wired telecommunications carriers	51710	598	
Wireless telecommunications carriers (except satellite)	51720	2,974	
Satellite telecommunications	51740	529	
Other telecommunications (not listed elsewhere)	51790	379	
Data processing, hosting, and related services	51800	15,110	
Cloud computing applications and Internet-based software services	51801	53,118	
Other information services, including Internet publishing, broadcasting, and Web search portals	51910	73,561	
Finance: banking and credit intermediation	52200	14,212	
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	5,150	
Insurance carriers and related activities	52400	4,015	
Real estate	53100	0 - 5,917	
Rental and leasing services	53200	1,525	
Lessors of nonfinancial intangible assets, including patent licensing	53300	95	
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	2,960	
Architectural, engineering, and related services	54130	3,097	
Specialized design services	54140	97	
Computer systems design and related services	54150	20,106	
Management, scientific, and technical consulting services	54160	3,036	
Research and development services in the social sciences and humanities	54172	38	
Research and development services in biotechnology	54173	2,526	
Research and development services in the physical, engineering, and life sciences (except biotechnology)	54174	5,054	
Research and development services in nanotechnology	54175	173	

TABLE 6

**Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2021**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	Amount	
Advertising and related services	54180	2,495	i
Professional, scientific, and technical services (not listed elsewhere)	54190	1,419	
Management of companies and enterprises	55100	0 - 5,917	
Administrative and support services	56100	3,400	
Waste management and remediation services	56200	513	r
Offices of physicians	62110	248	
Medical and diagnostic laboratories	62150	2,336	
Other ambulatory health care services (ambulance, dental, home health care)	62199	307	
Hospitals and nursing care facilities	62200	0 - 5,917	
Social assistance services	62400	0 - 5,917	
Arts, entertainment, and recreation	71000	90	
Accommodation and food services	72000	115	
Other services (not listed elsewhere)	81000	8,635	i
Undistributed	–	0	

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

<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 2017 North American Industry Classification System industry definitions.

**Note(s):**

Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 7

**Worldwide R&D paid for by others and performed by the company and others, by industry and company size: 2021**

(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	97,766	89,837	7,929
Manufacturing industries	31–33	45,406	40,100	5,306
Food	311	313	305	8
Beverage and tobacco products	312	22	19	4
Textile, apparel, and leather products	313–16	11	11	*
Wood products	321	2 - 10	2 - 10	0
Paper	322	*	* i	* i
Printing and related support activities	323	0 - 7	0 - 7	0
Petroleum and coal products	324	6	5	1
Chemicals	325	16,543	12,715	3,828
Basic chemicals	3251	170	157	12
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	126	81 - 125 i	2 - 45 i
Pesticide, fertilizer, and other agricultural chemicals	3253	211 - 254	211 - 254 i	0 - 6
Pharmaceuticals and medicines	3254	15,744	11,976	3,768
Soap, cleaning compound, and toilet preparations	3256	224	219	5
Paint, coating, adhesive, and other chemicals	3255, 3259	27 - 71	28	0 - 43
Plastics and rubber products	326	192	188	4
Nonmetallic mineral products	327	33	31	3
Primary metals	331	27 i	27 i	*
Fabricated metal products	332	453	444	9
Machinery	333	1,156	1,121	35
Agricultural implement	33311	66 - 82	67	0 - 15
Semiconductor machinery	333242	190	189	2
Engine, turbine, and power transmission equipment	3336	160	147	13
Other machinery	other 333	722 - 740	718	4 - 22
Computer and electronic products	334	7,288	7,123	165
Communications equipment	3342	1,252	1,237 i	15 i
Semiconductor and other electronic components	3344	2,075	2,018	57
Navigational, measuring, electromedical, and control instruments	3345	3,831	3,740	90
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	270	263	8
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	3,344	3,267	76
Other measuring and controlling devices	other 3345	217	210	6
Other computer and electronic products	other 334	131	128	3
Electrical equipment, appliances, and components	335	532	527	5
Transportation equipment	336	18,419	17,195	1,224
Motor vehicles, bodies, trailers, and parts	3361–63	4,555	4,287	268
Aerospace products and parts	3364	12,687 i	11,731 i	956
Aircraft, aircraft engine, and aircraft parts	336411–13	11,667 i	10,716 i	951
Guided missile, space vehicle, and related parts	336414–15, 336419	1,021	1,016	5
Military armored vehicle, tank, and tank components	336992	1	1	0
Other transportation	other 336	1,175	1,175	*
Furniture and related products	337	4	3	* i
Miscellaneous	339	403	383	20
Medical equipment and supplies	3391	313	298	15
Other miscellaneous manufacturing	3399	89	85	5
Nonmanufacturing industries	21–23, 42–81	52,360 i	49,736 i	2,623
Mining, quarrying, oil and gas extraction, and support activities	21	197 i	189 i	8 i

TABLE 7

**Worldwide R&D paid for by others and performed by the company and others, by industry and company size: 2021**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Performed by the company	Performed by others
Utilities	22	42	35 i	7 i
Wholesale trade	42	90	84	6
Electronic shopping and electronic auctions	454111-12	8 r	4 - 8	0 - 4
Transportation and warehousing	48-49	9	9	0
Information	51	1,565	1,414	151
Publishing	511	709	656	54
Newspaper, periodical, book, and directory publishers	5111	23 r	23 r	0
Software publishers	5112	687	633	54
Telecommunications	517	31 - 100	30 - 98	1
Data processing, hosting, and related services	518	726	630	95
Other information	other 51	29 - 100	29 - 99	*
Finance and insurance	52	88	86	2
Real estate and rental and leasing	53	0 - 1	0 - 1	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0
Other real estate and rental and leasing	other 53	0 - 1	0 - 1	0
Professional, scientific, and technical services	54	50,153 i	47,753 i	2,400 i
Architectural, engineering, and related services	5413	2,379	2,008	372
Computer systems design and related services	5415	3,363	3,262	101
Scientific research and development services	5417	43,130 i	41,296 i	1,834 i
Research and development in nanotechnology	541713	84	73 i	11 i
Research and development in biotechnology (except nanobiotechnology)	541714	11,807	11,641	166
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	30,653 i	29,052 i	1,601 i
Research and development in the social sciences and humanities	541720	586	530	56
Other professional, scientific, and technical services	other 54	1,281	1,187	93
Health care services	621-23	104	95	9 r
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	100 - 108	65	35 - 44
All companies (number of domestic employees)	-	97,766	89,837	7,929
Small companies				
10-19 <sup>a</sup>	-	1,375	1,226	150
20-49	-	2,698	2,468	230
Medium companies				
50-99	-	2,311	2,106	206
100-249	-	4,785	4,172	612
Large companies				
250-499	-	4,186	3,407	779
500-999	-	4,393	4,043	349
1,000-4,999	-	12,697	11,500	1,197
5,000-9,999	-	11,999	10,995 i	1,005 i
10,000-24,999	-	32,298 i	29,935 i	2,363
25,000 or more	-	21,024	19,986	1,038

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

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: 2021  
(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	17,410,590	13,097,756	4,312,834	17,076,511	12,781,213	4,295,299
Manufacturing industries	31–33	9,474,183	6,550,600	2,923,583	9,431,968	6,518,061	2,913,906
Food	311	959,114	699,100	260,015	955,137	695,249	259,888
Beverage and tobacco products	312	312,090	184,855	127,235	311,910	184,675	127,235
Textile, apparel, and leather products	313–16	101,340	72,498	28,842	101,102	72,260	28,842
Wood products	321	72,241	69,069	3,172	72,241	69,069	3,172
Paper	322	117,593	94,660	22,933	117,492	94,559	22,933
Printing and related support activities	323	37,320	32,908	4,411	36,710	32,299	4,411
Petroleum and coal products	324	540,836	300,799	240,037	540,836	300,799	240,037
Chemicals	325	1,857,937	1,309,684	548,253	1,853,741	1,305,639	548,101
Basic chemicals	3251	407,786	326,148	81,638	407,738	326,100	81,638
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	122,736	66,698	56,038	122,591	66,552	56,038
Pesticide, fertilizer, and other agricultural chemicals	3253	113,700	108,341	5,359	111,526	106,167	5,359
Pharmaceuticals and medicines	3254	897,407	624,341	273,066	895,578	622,664	272,915
Soap, cleaning compound, and toilet preparations	3256	217,969	123,539	94,429	217,969	123,539	94,429
Paint, coating, adhesive, and other chemicals	3255, 3259	98,340	60,617	37,722	98,340	60,617	37,722
Plastics and rubber products	326	288,759	233,565	55,194	287,024	231,851	55,173
Nonmetallic mineral products	327	70,128	54,266	15,862	61,346	48,569	12,777
Primary metals	331	127,688	107,737	19,950	125,962	106,436	19,526
Fabricated metal products	332	473,815	406,687	67,128	466,610	402,537	64,073
Machinery	333	699,771	427,096	272,674	698,394	425,720	272,674
Agricultural implement	33311	89,329	57,353	31,976	88,681	56,705	31,976
Semiconductor machinery	333242	68,200	29,820	38,380	68,200	29,820	38,380
Engine, turbine, and power transmission equipment	3336	78,832	45,538	33,294	78,832	45,538	33,294
Other machinery	other 333	463,410	294,385	169,025	462,682	293,657	169,025
Computer and electronic products	334	1,405,542	778,262	627,280	1,403,818	777,689	626,129
Communications equipment	3342	147,980	103,649	44,331	146,541	103,288	43,253
Semiconductor and other electronic components	3344	407,635	232,353	175,282	407,534	232,292	175,242
Navigational, measuring, electromedical, and control instruments	3345	227,762	156,383	71,378	227,649	156,279	71,370
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	23,039	16,544	6,495	23,039	16,544	6,495
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	61,156	45,973	15,184	61,063	45,888	15,175
Other measuring and controlling devices	other 3345	143,567	93,867	49,700	143,547	93,847	49,700
Other computer and electronic products	other 334	622,165	285,877	336,288	622,094	285,830	336,264

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: 2021  
(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
Electrical equipment, appliances, and components	335	236,964	156,050	80,914	234,638	154,016	80,622
Transportation equipment	336	1,350,804	1,014,159	336,645	1,346,440	1,010,848	335,592
Motor vehicles, bodies, trailers, and parts	3361–63	888,822	623,254	265,569	884,606 - 885,787	620,088 - 621,269	264,518
Aerospace products and parts	3364	365,918	311,988	53,930	365,878	311,948	53,930
Aircraft, aircraft engine, and aircraft parts	336411–13	354,143	300,727	53,416	354,106	300,690	53,416
Guided missile, space vehicle, and related parts	336414–15, 336419	11,775	11,260	515	11,772	11,257	515
Military armored vehicle, tank, and tank components	336992	1,177	1,177	0	0 - 1,178	0 - 1,178	0
Other transportation	other 336	94,886	77,740	17,146	94,777	77,633	17,144
Furniture and related products	337	49,326	42,479	6,847	45,673	39,141	6,532
Miscellaneous	339	772,915	566,725	206,190	772,896	566,705	206,190
Medical equipment and supplies	3391	571,023	428,400	142,624	571,023	428,400	142,624
Other miscellaneous manufacturing	3399	201,891	138,325	63,567	201,872	138,306	63,567
Nonmanufacturing industries	21–23, 42–81	7,936,408	6,547,157	1,389,251	7,644,544	6,263,152	1,381,392
Mining, quarrying, oil and gas extraction, and support activities	21	359,564	197,599	161,965	359,368	197,404	161,965
Utilities	22	353,090	347,098	5,992	298,643	292,651	5,992
Wholesale trade	42	888,356 i	828,436 i	59,920 i	868,502 i	808,930 i	59,572 i
Electronic shopping and electronic auctions	454111–12	415,397 - 642,325	415,398	0 - 226,927	415,397 - 642,325	415,398	0 - 226,927
Transportation and warehousing	48–49	320,872	247,004	73,868	320,779	246,912	73,868
Information	51	2,304,582	1,703,835	600,747	2,301,822	1,701,144	600,678
Publishing	511	488,248	305,155	183,093	487,057 - 487,093	304,035	183,022 - 183,057
Newspaper, periodical, book, and directory publishers	5111	2,092	2,021	71	1,893 - 1,929	1,857	37 - 72
Software publishers	5112	486,157	303,134	183,022	485,164	302,178	182,985
Telecommunications	517	514,506	503,320	11,186	513,155	501,969	11,186
Data processing, hosting, and related services	518	717,610	562,172	155,438	717,610	562,172	155,438
Other information	other 51	584,218	333,189	251,030	583,963 - 583,999	332,968	250,996 - 251,030
Finance and insurance	52	1,628,377	1,537,769	90,608	1,427,487	1,343,646	83,841
Real estate and rental and leasing	53	51,379	45,471	5,908	51,324	45,416	5,908
Lessors of nonfinancial intangible assets (except copyrighted works)	533	54 - 51,380	45,472	0 - 5,909	0 - 51,325	0 - 45,417	0 - 5,909
Other real estate and rental and leasing	other 53	0 - 51,325	0 - 45,417	0 - 5,909	0 - 51,325	0 - 45,417	0 - 5,909
Professional, scientific, and technical services	54	645,708	483,784	161,924	643,207	481,659	161,547

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: 2021  
(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	
Architectural, engineering, and related services	5413	95,539	77,750	17,788	94,278	76,775	17,503	
Computer systems design and related services	5415	287,374	199,429	87,945	286,829	198,923	87,907	
Scientific research and development services	5417	104,259	82,907	21,352	104,038	82,720	21,318	
Research and development in nanotechnology	541713	450	425	26	267	265	2	
Research and development in biotechnology (except nanobiotechnology)	541714	33,560	27,137	6,423	33,552	27,129	6,423	
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	68,852	53,949	14,902	68,822	53,929	14,892	
Research and development in the social sciences and humanities	541720	1,397	1,396	1	1,397	1,396	1	
Other professional, scientific, and technical services	other 54	158,536	123,698	34,838	158,061	123,242	34,819	
Health care services	621–23	101,646	100,547	1,099	101,497	100,398	1,099	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	640,509 - 867,441	640,216	293 - 227,225	629,593 - 856,521	629,594	0 - 226,927	
All companies (number of domestic employees)	–	17,410,590	13,097,756	4,312,834	17,076,511	12,781,213	4,295,299	
Small companies								
10–19 <sup>c</sup>	–	36,642	35,815	827	34,129	33,639	490	
20–49	–	113,461	104,550	8,912	109,909	101,049	8,860	
Medium companies								
50–99	–	153,948	146,296	7,652	151,367	143,787	7,580	
100–249	–	441,632	381,256	60,376	432,115	373,353	58,761	
Large companies								
250–499	–	430,278	371,747	58,531	419,326	362,389	56,937	
500–999	–	588,411	499,161	89,251	571,432	482,516	88,916	
1,000–4,999	–	2,525,746	2,000,807	524,939	2,508,165	1,985,494	522,670	
5,000–9,999	–	1,945,126	1,536,766	408,360	1,903,310	1,499,137	404,173	
10,000–24,999	–	3,283,908	2,240,551	1,043,357	3,280,288	2,237,247	1,043,041	
25,000 or more	–	7,891,437	5,780,807	2,110,630	7,666,471	5,562,602	2,103,868	

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

NAICS = 2017 North American Industry Classification System.

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



**Note(s):**  
Domestic sales are the amount of sales that originated from domestic operations. Foreign sales are the amount of sales that originated from foreign operations. Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 9

**Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2021**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	Sales		
		Worldwide	Domestic	Foreign
All business activities	21100–81000	17,410,590	13,097,756	4,312,834
Oil and gas extraction	21100	189,343	118,647	70,696
Mining	21200	85,707 i	37,647 i	48,060 i
Support activities for mining, including oil and gas	21300	45,307	30,030	15,276
Utilities	22100	344,086	340,381	3,705
Construction	23000	84,600	80,164	4,437
Food manufacturing	31100	919,547	676,826	242,721
Beverage manufacturing	31210	206,419	141,303	65,115
Tobacco manufacturing	31220	59,978	22,846	37,132
Textile, apparel, and leather products manufacturing	31990	91,292	64,054	27,238
Wood products manufacturing	32100	68,558	63,266	5,291
Paper manufacturing	32200	151,395	118,821	32,573
Printing and related support activities	32300	35,800	30,837	4,963
Petroleum refineries	32401	588,711	367,747	220,963
Asphalt paving, roofing, and saturated materials manufacturing	32402	24,933	20,762	4,171
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	14,687	11,595	3,091
Basic chemicals manufacturing	32510	331,658	229,364	102,294
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	133,227	76,117	57,110
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	78,109	68,671	9,438
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing	32541	839,753	615,406	224,347
In vitro diagnostic substances manufacturing	32542	19,811	10,883	8,928
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	155,385	118,135	37,250
Soap, cleaning compound, and toilet preparations manufacturing	32591	181,410	103,084	78,326
Paint, adhesive, and other chemical manufacturing	32592	126,384	80,271	46,113
Plastics and rubber products manufacturing	32600	271,663	202,034	69,629
Clay and glass products manufacturing	32710	41,741	26,769	14,972
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	44,069	36,887	7,183
Primary metal manufacturing	33100	137,595	115,715	21,880
Fabricated metal products manufacturing	33200	484,400	408,141 r	76,258
Agricultural machinery and equipment manufacturing	33311	68,463	43,538	24,924
Construction machinery manufacturing	33312	76,105	46,519	29,585
Mining, oil, and gas field machinery and equipment manufacturing	33319	51,236	28,140	23,096
Semiconductor machinery manufacturing	33321	67,019	28,910	38,109
Industrial machinery manufacturing (except semiconductor machinery)	33322	60,068	47,208	12,860
Photographic and photocopying equipment manufacturing	33331	1,389	1,196	194
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	113,315	78,388	34,927
Digital cameras manufacturing	33333	2,079	1,987	92
Engine, turbine, and power transmission equipment manufacturing	33360	129,923	67,284	62,639
Metalworking and other general purpose machinery manufacturing	33390	123,723	85,232	38,491
Computers and peripheral equipment manufacturing and magnetic and optical media	33412	544,417	240,413	304,004
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	72,948	40,402	32,546
Radio, television, and wireless communication equipment manufacturing	33422	44,090	36,858	7,231

TABLE 9

**Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2021**

(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	11,023	8,182	2,841
Audio and video equipment manufacturing	33430	12,414	9,270	3,145
Semiconductor and other electronic components manufacturing	33440	451,443	236,165	215,279
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	41,958	27,944	14,014
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	36,390	33,469	2,921
Measuring and control instruments manufacturing (not listed elsewhere)	33459	109,876	70,193	39,683
Electrical equipment, appliances, and components manufacturing	33500	204,520	132,548	71,971
Motor vehicles manufacturing	33610	482,782	348,358	134,424
Motor vehicle body and trailer manufacturing	33620	40,201	35,524	4,676
Motor vehicle parts manufacturing	33630	289,837	174,755	115,082
Aircraft manufacturing	33641	112,168	105,780	6,387
Aircraft engine and engine parts manufacturing	33642	101,036	70,572	30,464
Other aircraft parts and auxiliary equipment manufacturing	33643	59,199	50,612	8,587
Guided missiles, space vehicles, and related parts manufacturing	33644	45,508	42,741	2,767
Railroad rolling stock manufacturing	33651	14,276	10,646	3,630
Ship and boat building	33660	20,558	18,408	2,150
Motorcycle, bicycle, and parts manufacturing	33691	13,464	6,788	6,676
Military armored vehicle, tank, and tank components manufacturing	33692	17,819	16,026	1,793
All other transportation equipment manufacturing	33699	18,746	16,621	2,124
Furniture and related products manufacturing	33700	53,564	46,172	7,392
Medical equipment and supplies manufacturing	33910	354,587	233,592	120,995
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	148,520	100,515	48,004
Merchant wholesalers, durable goods	42300	273,073	246,611	26,461
Merchant wholesalers, nondurable goods	42400	1,244,756	1,047,955	196,801
Wholesale electronic markets and agents and brokers (business to business)	42500	26,909	26,624	285
Retail trade (except electronic shopping and electronic auctions)	44000	612,483	564,943	47,540
Electronic shopping and electronic auctions	45411	177,183 - 451,673	177,184	0 - 274,489
Transportation	48000	262,617	206,420	56,197
Couriers, messengers, and express delivery services	49200	77,787 - 352,277	77,788	0 - 274,489
Warehousing and storage	49300	3,820 - 278,310	3,821	0 - 274,489
Newspaper, periodical, book, and directory publishers (except Internet)	51110	7,116	5,427	1,690
Software publishers (except Internet)	51120	261,541	163,090	98,450
Motion picture and sound recording (except Internet)	51200	37,689	36,551	1,138
Broadcasting (except Internet)	51500	161,160	125,414	35,746
Wired telecommunications carriers	51710	156,938	153,019	3,919
Wireless telecommunications carriers (except satellite)	51720	275,173	274,485	688
Satellite telecommunications	51740	34,165	32,956	1,208
Other telecommunications (not listed elsewhere)	51790	15,314	14,546	767
Data processing, hosting, and related services	51800	139,242	91,782	47,460
Cloud computing applications and Internet-based software services	51801	347,399	253,071	94,328
Other information services, including Internet publishing, broadcasting, and Web search portals	51910	337,368	184,891	152,477
Finance: banking and credit intermediation	52200	647,339	581,988	65,351

TABLE 9

**Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2021**

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	Sales		
		Worldwide	Domestic	Foreign
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	160,242	127,753	32,489
Insurance carriers and related activities	52400	956,121	938,357	17,764
Real estate	53100	28,907	28,905	1
Rental and leasing services	53200	35,633	25,953	9,680
Lessors of nonfinancial intangible assets, including patent licensing	53300	8,950	7,112	1,838
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	30,913	28,216	2,697
Architectural, engineering, and related services	54130	122,015	106,100	15,915
Specialized design services	54140	543	489	55
Computer systems design and related services	54150	276,104	196,449	79,654
Management, scientific, and technical consulting services	54160	72,593	66,367	6,226
Research and development services in the social sciences and humanities	54172	1,545	1,543	1
Research and development services in biotechnology	54173	18,474	12,334	6,140
Research and development services in the physical, engineering, and life sciences (except biotechnology)	54174	61,543	46,153	15,390 i
Research and development services in nanotechnology	54175	317	315	2
Advertising and related services	54180	136,087 - 410,577	136,088	0 - 274,489
Professional, scientific, and technical services (not listed elsewhere)	54190	31,870	28,758	3,112
Management of companies and enterprises	55100	13,688 i	13,584 i	104 i
Administrative and support services	56100	63,477	54,124	9,353
Waste management and remediation services	56200	18,548 r	17,919 r	629
Offices of physicians	62110	46,737	46,737	0
Medical and diagnostic laboratories	62150	59,662	54,021	5,641 i
Other ambulatory health care services (ambulance, dental, home health care)	62199	35,085	28,942	6,143
Hospitals and nursing care facilities	62200	20,567	20,567	0
Social assistance services	62400	98	98	0
Arts, entertainment, and recreation	71000	17,999	16,119	1,880
Accommodation and food services	72000	66,202	43,144	23,058
Other services (not listed elsewhere)	81000	245,169	172,482	72,687
Less: intersegment eliminations	–	242,276	146,835	95,441
Undistributed	–	0	0	0

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

<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 2017 North American Industry Classification System industry definitions.

**Note(s):**

Domestic sales are the amount of sales that originated from domestic operations. Foreign sales are the amount of sales that originated from foreign operations. Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 10  
Domestic R&D paid for by the company and others and performed by the company, by type of cost, industry, and company size: 2021  
(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	602,499	329,637	61,476	26,923	9,205	41,249	8,911	21,180	3,731	21,489	78,698
Manufacturing industries	31–33	326,060	171,569	18,953	13,858	3,806	32,689	4,822	13,686	2,982	11,936	51,759
Food	311	5,266	3,143	37	201	29	808	72	250	25	152	549
Beverage and tobacco products	312	1,247	637	12	66	2	105	5	68	0	54	297
Textile, apparel, and leather products	313–16	829	648	7	17	3	57	5	15	3	16	56
Wood products	321	444	224	0	34	5	131	14	2	0	1	32
Paper	322	1,139	451	3	8	20	542	5	7	2	3	99
Printing and related support activities	323	204	144	1	7	1	19	4	11	*	10	8
Petroleum and coal products	324	957	511	*	15	1	46	4	43	2	170	165
Chemicals	325	109,490	46,372	6,605	8,162	965	9,963	2,160	4,349	1,485	6,943	22,485
Basic chemicals	3251	2,713	1,557	35	41	17	314	64	178	39	191	276
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,389	880	11	57	1 - 15	119	19	99	12	52	120 - 143
Pesticide, fertilizer, and other agricultural chemicals	3253	1,157	662	1	93	2	147	46	79	23	13	91
Pharmaceuticals and medicines	3254	100,220	40,747	6,537	7,880	924	9,153	1,986	3,825	1,406	6,635	21,130
Soap, cleaning compound, and toilet preparations	3256	2,740	1,598	17	75	1	149	36	121	5	29	708
Paint, coating, adhesive, and other chemicals	3255, 3259	1,271	928	5	16	5 - 22	81	9	48	*	23	135 - 160
Plastics and rubber products	326	3,144	1,834	31	88	43	452	18	117	11	98	452
Nonmetallic mineral products	327	1,533	969	13	47	3	80	15	89	*	49	268
Primary metals	331	912	328	1	4	1	356	4	21	*	132	64
Fabricated metal products	332	4,291	2,389	44	169	56	1,081	49	92	7	156	249
Machinery	333	17,730	10,264	364	784	137	2,430	302	714	49	560	2,125
Agricultural implement	33311	1,867	1,028	1	79	7	218	9	59	2	139	326
Semiconductor machinery	333242	5,349	2,742	278	56	37	584	186	390	9	173	896
Engine, turbine, and power transmission equipment	3336	1,374	853	7	36	12	106	25	46	7	113	169
Other machinery	other 333	9,140	5,642	79	614	80	1,523	82	219	31	136	734
Computer and electronic products	334	101,063	57,021	10,716	1,713	1,649	7,263	1,562	5,582	857	1,059	13,641
Communications equipment	3342	12,557	7,340	888	434	138	309	787	502	25	145	1,989
Semiconductor and other electronic components	3344	47,396	25,270	5,017	830	333	4,068	247	2,477	435	281	8,438
Navigational, measuring, electromedical, and control instruments	3345	13,644	8,538	339	264	124	1,453	117	467	26	471	1,846
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,087	1,886	200	70	17	203	29	67	19	166	429

TABLE 10  
Domestic R&D paid for by the company and others and performed by the company, by type of cost, industry, and company size: 2021  
(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
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	5,301	3,230	47	99	35	792	39	224	1	104	731
Other measuring and controlling devices	other 3345	5,256	3,421	92	95	73	458	49	176	6	200	686
Other computer and electronic products	other 334	27,465	15,873	4,472	184	1,055	1,433	410	2,137	372	161	1,368
Electrical equipment, appliances, and components	335	5,494	3,440	134	238	51	446	82	134	47	198	725
Transportation equipment	336	50,760	31,136	390	1,397	637	7,049	323	1,534	457	1,229	6,609
Motor vehicles, bodies, trailers, and parts	3361-63	26,391	16,671	298	1,072	536	3,219	238	1,085	389	514	2,369
Aerospace products and parts	3364	21,468	12,662	55	246	71	3,254	63	385	17 - 69	642	4,017 - 4,073
Aircraft, aircraft engine, and aircraft parts	336411-13	19,845	11,653	54	204	65	2,836	61	380	17 - 69	621	3,901 - 3,957
Guided missile, space vehicle, and related parts	336414-15, 336419	1,623	1,010	1	43	6	418	3	6	0	21	115
Military armored vehicle, tank, and tank components	336992	21 - 25	12	0	2	1	*	*	2	0 - 2	1	0 - 9
Other transportation	other 336	2,875 - 2,880	1,790	37	76	29	575	22	61	0 - 52	73	158 - 218
Furniture and related products	337	426	299	2	11	6	43	2	10	3	22	29
Miscellaneous	339	21,133	11,761	593	898	198	1,819	197	647	32	1,082	3,906
Medical equipment and supplies	3391	18,438	10,031	561	857	171	1,419	138	599	21	1,011	3,629
Other miscellaneous manufacturing	3399	2,695	1,729	32	41	27	400	58	48	12	71	278
Nonmanufacturing industries	21-23, 42-81	276,439	158,068	42,523	13,064	5,399	8,560	4,089	7,494	749	9,553	26,939
Mining, quarrying, oil and gas extraction, and support activities	21	1,260 - 1,334	700	8	9	36	93	54	20	8	335	1 - 76
Utilities	22	168 - 17,997	7 - 11,048	2	16	1	2 - 311	2	9	3	4 - 82	15 - 6,521
Wholesale trade	42	1,745 - 1,855	1,295	4	52	2	192	5	33	10	13	136 - 252
Electronic shopping and electronic auctions	454111-12	5,936 - 24,040	2 - 11,043	3,694 - 4,337	147	0 - 341	0 - 311	169	1,224	*	26	0 - 6,505
Transportation and warehousing	48-49	7,208	3,119	819	152	290	1,002	204	223	45	437	918
Information	51	147,855	87,928	29,392	7,617	2,947	1,104	1,959	2,924	365	3,171	10,448
Publishing	511	39,152	25,248	5,299	1,834	370	621	402	486	149	1,551	3,190
Newspaper, periodical, book, and directory publishers	5111	103	90	0	2	*	2	*	*	0	7	3
Software publishers	5112	39,049	25,159	5,299	1,832	370	619	402	486	149	1,544	3,187
Telecommunications	517	3,835	2,928	31	111	15	53	18	9	11	633	26
Data processing, hosting, and related services	518	45,192	28,653	7,886	1,180	691	326	669	551	182	803	4,251

TABLE 10  
Domestic R&D paid for by the company and others and performed by the company, by type of cost, industry, and company size: 2021  
(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 information	other 51	59,676	31,099	16,176	4,493	1,871	103	870	1,878	22	183	2,981
Finance and insurance	52	20,947	11,128	4,792	2,012	658	193	157	643	52	301	1,011
Real estate and rental and leasing	53	2,096	1,034	669	0 - 228	27	4	6	20	0 - 29	8	68 - 332
Lessors of nonfinancial intangible assets (except copyrighted works)	533	5 - 8	1	0	*	0 - 6	1	0	0	0	1	0 - 6
Other real estate and rental and leasing	other 53	2,088 - 2,091	1,033	669	0 - 228	20 - 28	3	6	20	0 - 29	7	63 - 332
Professional, scientific, and technical services	54	66,496	38,220	2,372	2,727	1,088	5,376	1,433	2,349	223	5,087	7,621
Architectural, engineering, and related services	5413	4,560	3,454	9	97	20	441	36	14	1	123	365
Computer systems design and related services	5415	20,409	13,569	1,379	950	432	610	255	660	67	341	2,147
Scientific research and development services	5417	34,142	17,018	729	1,164	492	3,847	740	1,388	67	4,293	4,405
Research and development in nanotechnology	541713	228	124	1	9	3	26	7	6	1	6	44
Research and development in biotechnology (except nanobiotechnology)	541714	9,039	3,977	216	262	31	610	133	236	17	1,974	1,581
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	24,312	12,487	493	860	459	3,165	596	1,141	49	2,292	2,771
Research and development in the social sciences and humanities	541720	563	429	19	32	*	46	4	5	0	21	8
Other professional, scientific, and technical services	other 54	7,385	4,180	255	516	144	478	403	286	88	330	704
Health care services	621-23	2,060 - 2,138	1,090	133	109	13	279	59	40	19	98	217 - 301
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	2,564 - 3,199	2,507	0 - 634	0 - 228	0 - 341	7 - 319	40	10	0 - 29	0 - 77	0 - 637
All companies (number of domestic employees)	-	602,499	329,637	61,476	26,923	9,205	41,249	8,911	21,180	3,731	21,489	78,698
Small companies												
10-19 <sup>a</sup>	-	5,477	3,243	87	208	209	617	120	99	36	335	523
20-49	-	15,061	9,036	312	557	153	2,246	301	255	199	733	1,270
Medium companies												
50-99	-	14,540	8,573	669	709	187	1,697	360	295	71	547	1,432
100-249	-	24,023	15,114	1,146	840	298	2,289	417	530	177	931	2,281
Large companies												
250-499	-	23,932	13,306	1,893	1,187	274	1,797	532	512	224	1,345	2,864
500-999	-	27,432	15,383	1,914	1,177	267	2,473	498	903	391	889	3,536

TABLE 10  
Domestic R&D paid for by the company and others and performed by the company, by type of cost, industry, and company size: 2021  
(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
1,000–4,999	–	94,615	50,489	13,881	3,601	1,763	5,393	1,232	2,911	624	3,917	10,804
5,000–9,999	–	62,817	35,433	5,961	2,643	783	4,706	1,326	2,629	363	2,251	6,722
10,000–24,999	–	104,607	55,936	6,261	5,669	993	7,941	1,326	4,680	567	6,571 i	14,664
25,000 or more	–	229,995	123,125	29,353	10,332	4,279	12,090	2,798	8,367	1,080	3,970	34,602

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.



TABLE 11  
Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2021  
(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
All industries	21–23, 31–33, 42–81	602,499	5,477		15,061		14,540		24,023	23,932	27,432	94,615	62,817	104,607	229,995
Manufacturing industries	31–33	326,060	1,898		7,104		7,841		11,861	13,782	15,336	48,714	38,038	74,022	107,464
Food	311	5,266	3		89		223		234	171	299	569	519	2,225	934
Beverage and tobacco products	312	1,247	3	r	15		23		26	19	18	175	305	66	595
Textile, apparel, and leather products	313–16	829	*		23		34	i	65	19	54	182	209	242	0
Wood products	321	444	179	r	0 - 50		11		12	7	12	73	104	0 - 50	0
Paper	322	1,139	5		5	r	6		32	28	19	197	78	349	i 420
Printing and related support activities	323	204	i		1		6		26	24	25	3	13	28	78 i 0
Petroleum and coal products	324	957	3		4		42		15	19	33	23	73	124	622
Chemicals	325	109,490	736		3,258		3,839		5,448	7,703	5,516	15,920	10,896	35,401	20,773
Basic chemicals	3251	2,713	5		66		74		250	146	154	931	657	430	i 0
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,389	i		6	i	20		101	82	53	170	i 0	616	i 313
Pesticide, fertilizer, and other agricultural chemicals	3253	1,157	3		21		30		33	0 - 103	i 0 - 129	535	i 20 - 65	247 - 518	0
Pharmaceuticals and medicines	3254	100,220	690		3,088		3,586		4,862	7,336	5,097	13,515	9,911	33,022	19,114
Soap, cleaning compound, and toilet preparations	3256	2,740	0 - 35		21		35		110	35	86	376	i 264 - 307	551	1,224
Paint, coating, adhesive, and other chemicals	3255, 3259	1,271	0 - 35		44		85		92	3 - 107	0 - 129	394	0	262 - 533	123
Plastics and rubber products	326	3,144	25		93		110		192	233	244	921	692	367	266
Nonmetallic mineral products	327	1,533	12		47		85		64	23	179	48	95	981	0
Primary metals	331	912	0		18		67		72	29	32	249	418	27	0
Fabricated metal products	332	4,291	310	r	865		330		705	419	345	970	170	177	0
Machinery	333	17,730	104		673		803		1,053	714	754	2,263	3,801	4,742	2,823
Agricultural implement	33311	1,867	0 - 87		28		0 - 663		62	0 - 613	63	167	531	0	0 - 1,019
Semiconductor machinery	333242	5,349	3		30		66	i	76	53	315	832	1,735	2,239	0
Engine, turbine, and power transmission equipment	3336	1,374	5		24		43		95	43	42	51	423	648	0
Other machinery	other 333	9,140	9 - 98		590		31 - 696		819	6 - 620	335	1,213	1,111	1,855	1,804 - 2,824
Computer and electronic products	334	101,063	261		1,170		1,140		1,565	2,891	3,629	13,343	14,349	14,666	i 48,047
Communications equipment	3342	12,557	0 - 74		0 - 131		145		0 - 937	0 - 568	1,000	2,416	0 - 4,116	0	3,171 - 9,998
Semiconductor and other electronic components	3344	47,396	93		580		65 - 612		0 - 937	1,766	1,622	6,387	6,322	i 13,381	i 15,693 - 17,182

TABLE 11  
Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2021  
(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	
Navigational, measuring, electromedical, and control instruments	3345	13,644	96	460	385	629	558	1,007	1,444	3,913	353	4,800	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,087	30	219	130	253	168	i 437	155	1,695	0	0	
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	5,301	14	92	22 - 97	164	102	0 - 495	227	0 - 2,219	0	2,044 - 4,683	
Other measuring and controlling devices	other 3345	5,256	53	148	157 - 234	212	288	75 - 571	1,061	0 - 2,219	353	117 - 2,757	
Other computer and electronic products	other 334	27,465	0 - 74	i 0 - 131	i 0 - 546	0 - 794	0 - 568	0 - 1,001	3,097	0 - 4,116	i 932	i 16,205 - 23,437	
Electrical equipment, appliances, and components	335	5,494	78	r 129	288	374	264	843	1,907	582	1,028	0	
Transportation equipment	336	50,760	37	225	290	1,099	594	1,961	7,804	2,332	8,793	27,625	i
Motor vehicles, bodies, trailers, and parts	3361–63	26,391	17	53	120	467	297	1,167	5,615	1,385	4,405	12,866	
Aerospace products and parts	3364	21,468	i 19	131	102	551	266	577	i 1,801	635	4,269	13,117	i
Aircraft, aircraft engine, and aircraft parts	336411–13	19,845	i 0 - 20	122	96	299	28 - 264	341 - 578	i 680	635	4,033 - 4,270	13,117	i
Guided missile, space vehicle, and related parts	336414–15, 336419	1,623	0 - 20	9	6	252	i 2 - 238	0 - 235	1,121	0	0 - 235	0	
Military armored vehicle, tank, and tank components	336992	21 - 25	0	0 - 6	4	5	0	11	0	0	0	0	
Other transportation	other 336	2,875 - 2,880	1	34 - 42	65	75	30	206	389	313	119	i 1,642	
Furniture and related products	337	426	2	r 9	12	67	20	17	110	178	11	0	
Miscellaneous	339	21,133	140	417 - 484	512	814	604	1,377	3,946	3,208	4,687 - 4,753	5,358	
Medical equipment and supplies	3391	18,438	103	330	398	562	408	918	2,780	3,177	4,521	5,242	
Other miscellaneous manufacturing	3399	2,695	36	87 - 154	114	252	196	459	1,167	32	166 - 233	116	
Nonmanufacturing industries	21–23, 42–81	276,439	3,579	7,957	6,699	12,162	10,150	12,096	45,901	24,779	30,585	i 122,530	
Mining, quarrying, oil and gas extraction, and support activities	21	1,260 - 1,334	4	144	r 107	i 94	i 283	59	i 322	i 0 - 94	324	0	
Utilities	22	168 - 17,997	11	3 - 168	0	*	0	0 - 279	1 - 1,608	11	0 - 529	27 - 17,969	i
Wholesale trade	42	1,745 - 1,855	i 172	394	263	512	i 215	i 85	i 0 - 111	i 4	i 25	78	i
Electronic shopping and electronic auctions	454111–12	5,936 - 24,040	i 9	23	r 20	r 29	109	46	29	0 - 2,839	0 - 529	2,300 - 22,477	i
Transportation and warehousing	48–49	7,208	0	163	r 27	46	96	57	2,711	0 - 1,869	2,243	i 0 - 1,869	

TABLE 11  
Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2021  
(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
Information	51	147,855	746	1,686	1,950	4,094	4,589	5,832	27,722	9,872	7,846	83,517
Publishing	511	39,152	388	690	5 - 639	1,832	1,165	1,172	8,633	3,235	1,240 - 1,880	20,156
Newspaper, periodical, book, and directory publishers	5111	103	0	34	r 6	3	60	i 1	0	0	0	0
Software publishers	5112	39,049	388	656	0 - 633	1,829	1,105	1,171	8,633	3,235	1,240 - 1,880	20,156
Telecommunications	517	3,835	46	r 94	35	106	13	178	50	31	31	3,252
Data processing, hosting, and related services	518	45,192	298	834	1,259	1,825	3,221	3,076	14,090	5,665	4,465	i 10,459
Other information	other 51	59,676	14	68	19 - 652	331	190	1,407	4,950	941	1,469 - 2,109	49,650
Finance and insurance	52	20,947	115	351	r 111	292	335	1,179	7,147	3,042	i 2,740	5,636
Real estate and rental and leasing	53	2,096	*	5	4	25	11	37	3 - 1,609	0 - 2,014	0	0 - 2,014
Lessors of nonfinancial intangible assets (except copyrighted works)	533	5 - 8	0	0	1 - 4	0	0	0	4	0	0	0
Other real estate and rental and leasing	other 53	2,088 - 2,091	*	5	0 - 4	25	11	37	0 - 1,605	0 - 2,014	0	0 - 2,014
Professional, scientific, and technical services	54	66,496	2,390	4,979	3,957	6,016	4,017	3,983	5,353	8,219	i 16,880	i 10,701
Architectural, engineering, and related services	5413	4,560	233	772	586	809	468	227	683	76	705	0
Computer systems design and related services	5415	20,409	892	1,982	1,297	1,202	1,412	1,411	1,520	1,455	4,578	4,661
Scientific research and development services	5417	34,142	i 1,134	1,895	1,658	3,030	1,617	2,050	2,478	i 6,640	i 9,778	i 3,863
Research and development in nanotechnology	541713	228	69	73	42	i 44	i 0	0	0	0	0	0
Research and development in biotechnology (except nanobiotechnology)	541714	9,039	355	462	591	944	124	231	0	0	2,469	3,863
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	24,312	i 704	1,342	1,024	1,987	1,467	1,820	2,471	i 6,188	i 7,308	i 0
Research and development in the social sciences and humanities	541720	563	6	17	0	56	26	0	7	452	0	0
Other professional, scientific, and technical services	other 54	7,385	132	331	415	974	520	294	672	49	1,819	2,178
Health care services	621–23	2,060 - 2,138	12	45 - 132	106	285	318	535	648	9	1	97
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2,564 - 3,199	118	r 2 - 167	150 - 253	768	r 177	6 - 288	362	786	0 - 529	0 - 831

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

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: 2021  
(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	602,499	40,130	86,485	475,884
Manufacturing industries	31–33	326,060	28,607	49,870	247,583
Food	311	5,266	478	1,052	3,735
Beverage and tobacco products	312	1,247	78	182	987
Textile, apparel, and leather products	313–16	829	73	92	664
Wood products	321	444	21	29	394
Paper	322	1,139	137	322	680
Printing and related support activities	323	204 i	8	32	164 i
Petroleum and coal products	324	957	268	290	398
Chemicals	325	109,490	18,290	20,650	70,550
Basic chemicals	3251	2,713	287	775	1,651
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,389 i	224 i	351 i	813 i
Pesticide, fertilizer, and other agricultural chemicals	3253	1,157	212	443	501
Pharmaceuticals and medicines	3254	100,220	17,335	18,529	64,356
Soap, cleaning compound, and toilet preparations	3256	2,740	137	288	2,315
Paint, coating, adhesive, and other chemicals	3255, 3259	1,271	94	264	913
Plastics and rubber products	326	3,144	218	590	2,337
Nonmetallic mineral products	327	1,533	248	329	956
Primary metals	331	912	31	78	803
Fabricated metal products	332	4,291	224	807	3,260
Machinery	333	17,730	1,383	2,269	14,078
Agricultural implement	33311	1,867	134	212	1,520
Semiconductor machinery	333242	5,349	605	709	4,035
Engine, turbine, and power transmission equipment	3336	1,374	30 i	201 i	1,143
Other machinery	other 333	9,140	614	1,146	7,379
Computer and electronic products	334	101,063	2,995	10,874	87,194
Communications equipment	3342	12,557	359	1,127	11,071
Semiconductor and other electronic components	3344	47,396	1,504 i	3,255 i	42,638 i
Navigational, measuring, electromedical, and control instruments	3345	13,644	587	2,671	10,386
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,087	117 i	1,174 i	1,796 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	5,301	57	625	4,619
Other measuring and controlling devices	other 3345	5,256	414	871	3,971
Other computer and electronic products	other 334	27,465	545	3,821	23,099
Electrical equipment, appliances, and components	335	5,494	344	616	4,533
Transportation equipment	336	50,760	2,938 i	9,020	38,803
Motor vehicles, bodies, trailers, and parts	3361–63	26,391	1,100	6,673	18,618

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: 2021  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
Aerospace products and parts	3364	21,468 i	1,778 i	2,056 i	17,634
Aircraft, aircraft engine, and aircraft parts	336411–13	19,845 i	1,758 i	1,974 i	16,112 i
Guided missile, space vehicle, and related parts	336414–15, 336419	1,623	20	82	1,522
Military armored vehicle, tank, and tank components	336992	21 - 25	4	3	13 - 19
Other transportation	other 336	2,875 - 2,880	55 i	288	2,531 - 2,538
Furniture and related products	337	426	35	126	266
Miscellaneous	339	21,133	839	2,514	17,780
Medical equipment and supplies	3391	18,438	650	2,216	15,572
Other miscellaneous manufacturing	3399	2,695	189	298	2,208
Nonmanufacturing industries	21–23, 42–81	276,439	11,522	36,615	228,301
Mining, quarrying, oil and gas extraction, and support activities	21	1,260 - 1,334	89	185 i	987 - 1,061 i
Utilities	22	168 - 17,997	13	4 - 1,510	27 - 17,980
Wholesale trade	42	1,745 - 1,855 i	193 i	375 i	1,176 - 1,288 i
Electronic shopping and electronic auctions	454111–12	5,936 - 24,040 i	175	3,999 - 5,510 i	252 - 19,865 i
Transportation and warehousing	48–49	7,208	103	483	6,622 i
Information	51	147,855	4,210	9,043	134,602
Publishing	511	39,152	1,306	1,986	35,861
Newspaper, periodical, book, and directory publishers	5111	103	3 r	6 r	95 i
Software publishers	5112	39,049	1,303	1,980	35,766
Telecommunications	517	3,835	294	832	2,708
Data processing, hosting, and related services	518	45,192	1,553	3,366	40,273
Other information	other 51	59,676	1,057	2,859	55,760
Finance and insurance	52	20,947	423	2,193	18,332
Real estate and rental and leasing	53	2,096	0 - 583	380 - 965	1,132
Lessors of nonfinancial intangible assets (except copyrighted works)	533	5 - 8	1	4	0 - 4
Other real estate and rental and leasing	other 53	2,088 - 2,091	0 - 583	376 - 961	1,128 - 1,133
Professional, scientific, and technical services	54	66,496	5,567	17,895 i	43,034
Architectural, engineering, and related services	5413	4,560	293	710	3,557
Computer systems design and related services	5415	20,409	1,891	4,384	14,134
Scientific research and development services	5417	34,142 i	2,842	11,072 i	20,229 i
Research and development in nanotechnology	541713	228	23 i	59 i	146 i

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: 2021  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
Research and development in biotechnology (except nanobiotechnology)	541714	9,039	1,145	633	7,261 i
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	24,312 i	1,192	10,357 i	12,764 i
Research and development in the social sciences and humanities	541720	563	482	24	58 i
Other professional, scientific, and technical services	other 54	7,385	542 i	1,729 i	5,114
Health care services	621–23	2,060 - 2,138	166	510	1,383 - 1,463
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2,564 - 3,199	4 - 587	21 - 1,546	1,012 - 3,156
All companies (number of domestic employees)	–	602,499	40,130	86,485	475,884
Small companies					
10–19 <sup>a</sup>	–	5,477	496	1,172	3,810
20–49	–	15,061	1,281	3,287	10,493
Medium companies					
50–99	–	14,540	1,361	3,256	9,923
100–249	–	24,023	2,160	4,344	17,519
Large companies					
250–499	–	23,932	2,621	4,534	16,778
500–999	–	27,432	2,224	4,077	21,131
1,000–4,999	–	94,615	6,893	12,973	74,749
5,000–9,999	–	62,817	4,338	11,658 i	46,821
10,000–24,999	–	104,607	8,354	16,366	79,888
25,000 or more	–	229,995	10,403	24,819	194,772

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

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 13

**Domestic R&D paid for by the company and others and performed by the company, by source of funds and state: 2021**

(Millions of U.S. dollars)

State	Total			Paid for by the company	Paid for by others		
					Total	Federal	Nonfederal
All states	602,499			527,804	74,695	23,582	51,113
Alabama	2,910			1,383	1,528	1,209	319
Alaska	207	i		188	18	0 - 19	0 - 19
Arizona	9,386			6,947	2,440	1,645	795
Arkansas	497			452	45	0 - 46	0 - 46
California	211,615			199,157	12,458	3,847	8,611
Colorado	8,098			7,213	886	599	286
Connecticut	8,429			6,887	1,543	1,356	187
Delaware	3,592			2,137	1,455	11	1,444
District of Columbia	744			652	92	57	35
Florida	9,688			7,545	2,143	1,310	834
Georgia	6,448			5,249	1,199	101	1,098
Hawaii	409			372	38	0 - 38	0 - 38
Idaho	2,258			2,203	54	5	49
Illinois	16,485			15,398	1,087	60	1,027
Indiana	9,514	i		7,888	1,627	123	1,504
Iowa	3,045			2,338	707	0 - 708	0 - 708
Kansas	2,748			1,960	788	29	760
Kentucky	1,486			897	590	265	325
Louisiana	530			444	86	45	41
Maine	499			444	55	37	18
Maryland	6,432			4,550	1,882	1,218	664
Massachusetts	39,749			33,937	5,812	1,554	4,258
Michigan	22,381			19,420	2,962	299	2,663
Minnesota	8,248			7,754	494	128	365
Mississippi	343			307	36	0 - 37	0 - 37
Missouri	7,060			4,927	2,133	0 - 2,134	0 - 2,134
Montana	261			237	24	3	21
Nebraska	1,067			1,004	62	12	50
Nevada	1,033			757	276	20	256
New Hampshire	3,183			1,461	1,723	1,391	332
New Jersey	25,049			20,091	4,958	95	4,863
New Mexico	1,693			1,351	342	314	28
New York	26,319			23,939	2,379	634	1,746
North Carolina	15,490			9,812	5,678	140	5,537
North Dakota	343			330	12	2	10
Ohio	11,545			7,814	3,730	820	2,911
Oklahoma	1,056			969	87	54	33
Oregon	11,292			10,954	338	107	230
Pennsylvania	17,555			14,541	3,014	290	2,725
Rhode Island	837			689	149	121	28
South Carolina	1,857			1,601	256	125	131
South Dakota	221			213	8	1	7
Tennessee	2,776	i		1,802	974	72	902
Texas	28,264			24,495	3,770	1,035	2,735
Utah	3,962			3,730	232	62	170
Vermont	456			434	22	0 - 23	0 - 23
Virginia	8,179			6,330	1,849	1,342	506
Washington	49,083			47,644	1,440	190	1,250
West Virginia	522	i		435	86	74	12



TABLE 13

**Domestic R&D paid for by the company and others and performed by the company, by source of funds and state: 2021**

(Millions of U.S. dollars)

State	Total		Paid for by the company		Paid for by others				
					Total		Federal		Nonfederal
Wisconsin	6,781		5,723		1,058		61		997
Wyoming	93		88		5	i	2	i	2
Undistributed <sup>a</sup>	780		712		67		0 - 68		0 - 68

e = more than 50% of value is modeled—see "[Technical Notes](#)"; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

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

**Note(s):**

Detail may not add to total because of rounding. For a given estimate in this table, if the conditions are satisfied for both the "i" and "e" flags, the e flag is assigned because the imputation rate may be found in the corresponding table of imputation rates (available from the Survey Manager upon request). Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 14

**Domestic R&D paid for by the company and others and performed by the company, by source of funds and core-based statistical area: 2021**

(Millions of U.S. dollars)

Core-based statistical area (CBSA)	CBSA code	Total	Paid for by the company	Paid for by others
All locations		602,499	527,804	74,695
San Jose-Sunnyvale-Santa Clara, CA	41940	90,418	86,522	3,896
San Francisco-Oakland-Hayward, CA	41860	71,969	70,114	1,855
Seattle-Tacoma-Bellevue, WA	42660	47,360	46,029	1,331
New York-Newark-Jersey City, NY-NJ-PA	35620	40,089	35,657	4,432
Boston-Cambridge-Newton, MA-NH	14460	36,881	31,435	5,446
San Diego-Carlsbad, CA	41740	19,403 i	16,898 i	2,505 i
Los Angeles-Long Beach-Anaheim, CA	31080	18,844	15,646	3,198
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	37980	17,302	13,187	4,115 i
Detroit-Warren-Dearborn, MI	19820	17,103	15,133	1,970
Chicago-Naperville-Elgin, IL-IN-WI	16980	13,765	12,883	882 i
Portland-Vancouver-Hillsboro, OR-WA	38900	11,023	10,703	320
Dallas-Fort Worth-Arlington, TX	19100	9,985 i	7,951	2,033 i
Washington-Arlington-Alexandria, DC-VA-MD-WV	47900	9,680	6,772	2,908
Austin-Round Rock, TX	12420	9,350 i	8,860 i	491 i
Minneapolis-St. Paul-Bloomington, MN-WI	33460	7,641	7,120	521
Durham-Chapel Hill, NC	20500	7,508 i	3,213	4,296 i
Phoenix-Mesa-Scottsdale, AZ	38060	7,024 i	5,876 i	1,148
Indianapolis-Carmel-Anderson, IN	26900	6,978 i	5,529 i	1,449
Houston-The Woodlands-Sugar Land, TX	26420	5,638	4,661	976 i
St. Louis, MO-IL	41180	5,610	3,499	2,112 i
Atlanta-Sandy Springs-Roswell, GA	12060	5,425	4,389	1,036 i
Trenton, NJ	45940	5,178	3,431	1,747
Cincinnati, OH-KY-IN	17140	4,638	2,956	1,683 i
Norwich-New London, CT	35980	3,953	2,449 - 3,954	0 - 1,504
Denver-Aurora-Lakewood, CO	19740	3,927	3,638	288 i
Raleigh, NC	39580	3,635	2,697	938 i
Miami-Fort Lauderdale-West Palm Beach, FL	33100	3,058	2,646	412 i
Kansas City, MO-KS	28140	3,037	2,271	766 i
Sacramento-Roseville-Arden-Arcade, CA	40900	2,875 i	2,741 i	134
Baltimore-Columbia-Towson, MD	12580	2,854	2,408	445
Madison, WI	31540	2,583	1,760	823 i
Oxnard-Thousand Oaks-Ventura, CA	37100	2,518	2,108	410 i
Tampa-St. Petersburg-Clearwater, FL	45300	2,446	1,618	828
Pittsburgh, PA	38300	2,403	2,226	177 i
Manchester-Nashua, NH	31700	2,324	713	1,612
Columbus, OH	18140	2,320	1,189 i	1,131
Salt Lake City, UT	41620	2,177	2,123	54 i
Milwaukee-Waukesha-West Allis, WI	33340	2,160	2,078	82
Providence-Warwick, RI-MA	39300	2,158	1,989	170 i
Riverside-San Bernardino-Ontario, CA	40140	2,008 i	1,891 i	117 i
Tucson, AZ	46060	1,945 i	670 i	1,275 i
Boulder, CO	14500	1,925 i	1,828 i	96
Boise City, ID	14260	1,898	1,863	35
Kalamazoo-Portage, MI	28020	1,867	1,445	422
Hartford-West Hartford-East Hartford, CT	25540	1,865	1,255	610
Charlotte-Concord-Gastonia, NC-SC	16740	1,811	1,661	149
Cleveland-Elyria, OH	17460	1,700	1,559	142 i
Bridgeport-Stamford-Norwalk, CT	14860	1,607	1,556	51
Albuquerque, NM	10740	1,564	1,243	321 i

TABLE 14

**Domestic R&D paid for by the company and others and performed by the company, by source of funds and core-based statistical area: 2021**

(Millions of U.S. dollars)

Core-based statistical area (CBSA)	CBSA code	Total	Paid for by the company	Paid for by others
Huntsville, AL	26620	1,553	365	1,189
Worcester, MA-CT	49340	1,553	1,317	236
Orlando-Kissimmee-Sanford, FL	36740	1,550 i	1,241 i	309 i
Nashville-Davidson-Murfreesboro-Franklin, TN	34980	1,311 i	578 i	732 i
Albany-Schenectady-Troy, NY	10580	1,215	780	435
Provo-Orem, UT	39340	1,209	1,119	91
Brownsville-Harlingen, TX	15180	1,126	1,125	1 i
Colorado Springs, CO	17820	1,003 i	916 i	88
Palm Bay-Melbourne-Titusville, FL	37340	993 i	594 i	399 i
Des Moines-West Des Moines, IA	19780	980	932	48
Columbus, IN	18020	968	899	69
Santa Maria-Santa Barbara, CA	42200	948 i	773 i	175 i
Corning, NY	18500	930	929	1 i
Rochester, NY	40380	928 i	854 i	74
Peoria, IL	37900	895 i	878 i	18 i
Grand Rapids-Wyoming, MI	24340	879	647	232
Cedar Rapids, IA	16300	864 i	0 - 865 i	0 - 865 i
New Haven-Milford, CT	35300	863 i	0 - 864 i	0 - 864
Richmond, VA	40060	822 i	742 i	80
Akron, OH	10420	822	724	98 i
Greensboro-High Point, NC	24660	813 i	798 i	14 i
San Antonio-New Braunfels, TX	41700	812 i	628 i	184 i
Omaha-Council Bluffs, NE-IA	36540	812	767	45
Buffalo-Cheektowaga-Niagara Falls, NY	15380	752 i	512	240 i
Bloomington, IL	14010	741	607	134
Allentown-Bethlehem-Easton, PA-NJ	10900	736	709	28 i
Ann Arbor, MI	11460	684	458	226
Jacksonville, FL	27260	678	629	49 i
Santa Rosa, CA	42220	647 i	636 i	11 i
Fort Collins, CO	22660	632 i	593 i	39
Memphis, TN-MS-AR	32820	618	535	83
Dayton, OH	19380	615	307 i	308
Las Vegas-Henderson-Paradise, NV	29820	556 i	547 i	9 e
Louisville-Jefferson County, KY-IN	31140	534	277	257
Wichita, KS	48620	530	504	26
Virginia Beach-Norfolk-Newport News, VA-NC	47260	474	314	160
Oshkosh-Neenah, WI	36780	454	452	3
Charleston-North Charleston, SC	16700	449	252	197
Syracuse, NY	45060	446	361	86 i
Portland-South Portland, ME	38860	438	386	52
Davenport-Moline-Rock Island, IA-IL	19340	395	390	5
Birmingham-Hoover, AL	13820	389 i	357 i	32 i
Reno, NV	39900	389	130 i	259
Pueblo, CO	39380	383 i	22 i	360 i
Oklahoma City, OK	36420	381	330	50 i
Winston-Salem, NC	49180	369 i	305	65 i
Corpus Christi, TX	18580	367	365	2 e
Bakersfield, CA	12540	350	309	41 i
Warsaw, IN	47700	349	348	2
Ogden-Clearfield, UT	36260	348 i	274 i	74

TABLE 14

**Domestic R&D paid for by the company and others and performed by the company, by source of funds and core-based statistical area: 2021**

(Millions of U.S. dollars)

Core-based statistical area (CBSA)	CBSA code	Total	Paid for by the company	Paid for by others
Santa Cruz-Watsonville, CA	42100	346	0 - 347	0 - 347 i
All other CBSAs		29,262	25,647	3,615 i
Locations outside a CBSA		3,129	2,729	400 i
Undistributed <sup>a</sup>		780	712	67

e = more than 50% of value is modeled—see "[Technical Notes](#)"; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

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

**Note(s):**

Detail may not add to total because of rounding. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. For a given estimate in this table, if the conditions are satisfied for both the "i" and "e" flags, the e flag is assigned because the imputation rate may be found in the corresponding table of imputation rates (available from the Survey Manager upon request). 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 Census Bureau, Business Enterprise Research and Development Survey, 2021.

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: 2021  
(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	602,499	5,575	33,829	47,434	28,847	486,814
Manufacturing industries	31–33	326,060	2,963	14,972	25,850	18,339	263,936
Food	311	5,266	202	659	902	751	2,752
Beverage and tobacco products	312	1,247	25	124	67	179	851
Textile, apparel, and leather products	313–16	829	65	200	288	79	197
Wood products	321	444	26	269	149	0	0
Paper	322	1,139	21	119	163	147	688
Printing and related support activities	323	204	31	92	82	0	0
Petroleum and coal products	324	957	19	70	174	72	622
Chemicals	325	109,490	344	2,802	8,975	6,128	91,240
Basic chemicals	3251	2,713	54	233	860	634	931
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,389	0 - 34	170	209	50 - 84	928
Pesticide, fertilizer, and other agricultural chemicals	3253	1,157	16	75	113	0	953
Pharmaceuticals and medicines	3254	100,220	98	1,941	7,354	5,295	85,532
Soap, cleaning compound, and toilet preparations	3256	2,740	78	153	176	0	2,334
Paint, coating, adhesive, and other chemicals	3255, 3259	1,271	61 - 100	231	264	114 - 151	562
Plastics and rubber products	326	3,144	206	690	1,063	171	1,014
Nonmetallic mineral products	327	1,533	96	211	137	109	981
Primary metals	331	912	63	184	297	0	368
Fabricated metal products	332	4,291	511	1,870	949	628	334
Machinery	333	17,730	387	2,123	2,412	1,646	11,162
Agricultural implement	33311	1,867	0 - 53	119	164	50 - 103	1,483
Semiconductor machinery	333242	5,349	7	50	212	369	4,711
Engine, turbine, and power transmission equipment	3336	1,374	11	82	188	225	868
Other machinery	other 333	9,140	315 - 370	1,872	1,848	948 - 1,003	4,100
Computer and electronic products	334	101,063	382	2,306	3,608	3,622	91,145
Communications equipment	3342	12,557	59	277	412	722	11,087
Semiconductor and other electronic components	3344	47,396	87	832	1,251	1,408	43,819
Navigational, measuring, electromedical, and control instruments	3345	13,644	212	835	1,559	1,110	9,927
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,087	39	228	552	338	1,930
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	5,301	46	93	248	342	4,573
Other measuring and controlling devices	other 3345	5,256	127	514	759	431	3,424
Other computer and electronic products	other 334	27,465	25	362	386	381	26,312

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: 2021  
(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
Electrical equipment, appliances, and components	335	5,494	95	577	1,225	754	2,842
Transportation equipment	336	50,760	198	1,054	2,722	2,323	44,463
Motor vehicles, bodies, trailers, and parts	3361–63	26,391	94	444	1,635	1,358	22,860
Aerospace products and parts	3364	21,468	i 47	408	914	729	19,371
Aircraft, aircraft engine, and aircraft parts	336411–13	19,845	i 42	381	586	359 - 463	18,371 - 18,478
Guided missile, space vehicle, and related parts	336414–15, 336419	1,623	4	27	328	265 - 369	893 - 1,000
Military armored vehicle, tank, and tank components	336992	21 - 25	2 - 6	19	0	0	0
Other transportation	other 336	2,875 - 2,880	50 - 56	184	173	236	2,232
Furniture and related products	337	426	40	145	241	0	0
Miscellaneous	339	21,133	253	1,476	2,395	1,731	15,278
Medical equipment and supplies	3391	18,438	112	923	1,778	1,293	14,331
Other miscellaneous manufacturing	3399	2,695	141	553	617	438	947
Nonmanufacturing industries	21–23, 42–81	276,439	2,612	18,858	21,583	10,508	222,878
Mining, quarrying, oil and gas extraction, and support activities	21	1,260 - 1,334	20	321	i 155 - 233	270	i 492
Utilities	22	168 - 17,997	3	5 - 1,399	10 - 935	50 - 134	i 100 - 17,928
Wholesale trade	42	1,745 - 1,855	i 424	1,271	i 49 - 160	i 0	0
Electronic shopping and electronic auctions	454111–12	5,936 - 24,040	i 4 - 405	44	10 - 935	50 - 134	4,419 - 23,494
Transportation and warehousing	48–49	7,208	0 - 59	97	537	50 - 109	i 6,467
Information	51	147,855	512	5,218	9,329	4,475	128,320
Publishing	511	39,152	265	1,914	2,891	1,384	32,698
Newspaper, periodical, book, and directory publishers	5111	103	9	38	r 56	i 0	0
Software publishers	5112	39,049	256	1,876	2,835	1,384	32,698
Telecommunications	517	3,835	14	182	390	75	i 3,175
Data processing, hosting, and related services	518	45,192	222	2,786	5,357	2,572	34,254
Other information	other 51	59,676	11	336	692	444	58,193
Finance and insurance	52	20,947	10	739	1,134	809	18,256
Real estate and rental and leasing	53	2,096	0 - 60	43	10 - 70	0	1,985
Lessors of nonfinancial intangible assets (except copyrighted works)	533	5 - 8	0 - 2	6	0	0	0

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: 2021  
(Millions of U.S. dollars)

Industry	NAICS code	R&D program size						
		All companies	Less than \$1 million	\$1 million–\$9.999 million	\$10 million–\$49.999 million	\$50 million–\$99.999 million	\$100 million or more	
Other real estate and rental and leasing	other 53	2,088 - 2,091	0 - 60	37	10 - 70	0	1,985	
Professional, scientific, and technical services	54	66,496	1,187	9,478	9,032	3,889	42,909	
Architectural, engineering, and related services	5413	4,560	252	1,655	1,756	234	663	
Computer systems design and related services	5415	20,409	626	3,824	2,329	1,320	12,309	
Scientific research and development services	5417	34,142	146	2,723	3,503	2,049	25,721	
Research and development in nanotechnology	541713	228	10	148	70	0	0	
Research and development in biotechnology (except nanobiotechnology)	541714	9,039	25	674	785	847	6,708	
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	24,312	108	1,869	2,573	1,202	18,561	
Research and development in the social sciences and humanities	541720	563	3	32	76	0	452	
Other professional, scientific, and technical services	other 54	7,385	162	1,276	1,444	286	4,216	
Health care services	621–23	2,060 - 2,138	50 - 132	239	348	663	758	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2,564 - 3,199	4 - 405	10 - 1,404	45 - 971	171	100 - 2,965	
All companies (number of domestic employees)	–	602,499	5,575	33,829	47,434	28,847	486,814	
Small companies								
10–19 <sup>a</sup>	–	5,477	1,301	3,487	506	50 - 85	100 - 135	
20–49	–	15,061	1,781	9,188	3,769	116 - 159	162 - 205	
Medium companies								
50–99	–	14,540	1,119	5,911	6,504	1,006	0	
100–249	–	24,023	869	7,306	9,433	4,984	1,431	
Large companies								
250–499	–	23,932	266	3,366	7,555	4,039	8,707	
500–999	–	27,432	126	2,159	6,181	5,902	13,065	
1,000–4,999	–	94,615	101	2,001	9,259	7,521	75,734	
5,000–9,999	–	62,817	11	171	2,460	2,292	57,882	
10,000–24,999	–	104,607	2	177	1,172	2,217	101,039	
25,000 or more	–	229,995	*	64	594	682	228,655	

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. R&D program size classifications are based on R&D performance. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.



TABLE 16

**Domestic R&D paid for by the company and others and performed by the company, by business activity: 2021**

(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	602,499	527,804	74,695
Oil and gas extraction	21100	813	793	21 i
Mining	21200	89	89 i	0
Support activities for mining, including oil and gas	21300	651	499 i	152 i
Utilities	22100	34 - 1,538	1,503	35 i
Construction	23000	783	750	32
Food manufacturing	31100	5,235	4,961	273
Beverage manufacturing	31210	740	740	* r
Tobacco manufacturing	31220	233	215	18
Textile, apparel, and leather products manufacturing	31990	775	764	11
Wood products manufacturing	32100	476	472	4
Paper manufacturing	32200	1,534	1,534	*
Printing and related support activities	32300	307 - 1,044	308	0 - 735
Petroleum refineries	32401	392	388	3
Asphalt paving, roofing, and saturated materials manufacturing	32402	138	138	0
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	91	91	*
Basic chemicals manufacturing	32510	3,048	2,892	156
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	1,284 - 2,021	1,285	0 - 735 i
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	1,266 - 2,003	1,267	0 - 735
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing	32541	58,651	51,255	7,396
In vitro diagnostic substances manufacturing	32542	1,622	1,609	13
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	38,166	34,222	3,944
Soap, cleaning compound, and toilet preparations manufacturing	32591	2,238 - 2,975	2,239	0 - 735
Paint, adhesive, and other chemical manufacturing	32592	1,325 - 2,062	1,326	0 - 735
Plastics and rubber products manufacturing	32600	3,226	3,076	149 i
Clay and glass products manufacturing	32710	1,376	1,367	9
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	418	363	54 i
Primary metal manufacturing	33100	1,023	988	35 i
Fabricated metal products manufacturing	33200	4,861	4,195	666
Agricultural machinery and equipment manufacturing	33311	1,475 - 2,212	1,476	0 - 735
Construction machinery manufacturing	33312	1,384	1,374	11
Mining, oil, and gas field machinery and equipment manufacturing	33319	1,223	1,160	63
Semiconductor machinery manufacturing	33321	5,308	5,133	175
Industrial machinery manufacturing (except semiconductor machinery)	33322	1,411	1,090	321
Photographic and photocopying equipment manufacturing	33331	70	69	1 r
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	1,907	1,828	79
Digital cameras manufacturing	33333	398 - 1,135	399	0 - 735
Engine, turbine, and power transmission equipment manufacturing	33360	2,050	1,926	124

TABLE 16

**Domestic R&D paid for by the company and others and performed by the company, by business activity: 2021**

(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
Metalworking and other general purpose machinery manufacturing	33390	2,532	2,444	88
Computers and peripheral equipment manufacturing and magnetic and optical media	33412	24,633	24,562	71
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	7,853 - 8,590	7,854	0 - 735
Radio, television, and wireless communication equipment manufacturing	33422	3,313	2,239	1,074 i
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	681	620	61 i
Audio and video equipment manufacturing	33430	1,517	1,515	2
Semiconductor and other electronic components manufacturing	33440	46,882	45,046	1,837
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	4,358	4,109	249
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	3,918	1,729	2,189
Measuring and control instruments manufacturing (not listed elsewhere)	33459	4,273	4,098	175
Electrical equipment, appliances, and components manufacturing	33500	5,420	4,925	495
Motor vehicles manufacturing	33610	18,365	16,249	2,116
Motor vehicle body and trailer manufacturing	33620	137	137	* r
Motor vehicle parts manufacturing	33630	7,728	6,343	1,385
Aircraft manufacturing	33641	9,707 i	4,959	4,748 i
Aircraft engine and engine parts manufacturing	33642	8,246 i	2,842	5,404 i
Other aircraft parts and auxiliary equipment manufacturing	33643	1,491	1,073	418
Guided missiles, space vehicles, and related parts manufacturing	33644	2,426	878	1,548
Railroad rolling stock manufacturing	33651	212 i	163 i	48
Ship and boat building	33660	858	158	700
Motorcycle, bicycle, and parts manufacturing	33691	447	447	1
Military armored vehicle, tank, and tank components manufacturing	33692	731	364 i	367
All other transportation equipment manufacturing	33699	559	443	115
Furniture and related products manufacturing	33700	456	449	8
Medical equipment and supplies manufacturing	33910	16,924	16,669	255
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	3,193	2,981	212
Merchant wholesalers, durable goods	42300	1,301 i	1,242 i	59 i
Merchant wholesalers, nondurable goods	42400	660 i	627 i	33 i
Wholesale electronic markets and agents and brokers (business to business)	42500	50	49	1
Retail trade (except electronic shopping and electronic auctions)	44000	362	362	* r
Electronic shopping and electronic auctions	45411	11,931 - 12,668 i	11,932 i	0 - 735
Transportation	48000	5,929 i	5,918 i	11
Couriers, messengers, and express delivery services	49200	1,115	1,115	0
Warehousing and storage	49300	0 - 2,201	1,503	0 - 735
Newspaper, periodical, book, and directory publishers (except Internet)	51110	127 i	104	23 r
Software publishers (except Internet)	51120	27,969	26,996	973
Motion picture and sound recording (except Internet)	51200	0 - 1,503	1,503	* r
Broadcasting (except Internet)	51500	0 - 2,201 i	1,503 i	0 - 735 i
Wired telecommunications carriers	51710	599	592	6
Wireless telecommunications carriers (except satellite)	51720	2,492	2,432	60
Satellite telecommunications	51740	510	505	5
Other telecommunications (not listed elsewhere)	51790	304	285 i	19
Data processing, hosting, and related services	51800	13,122	13,053	69

TABLE 16

**Domestic R&D paid for by the company and others and performed by the company, by business activity: 2021**

(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
Cloud computing applications and Internet-based software services	51801	43,204	42,679	525
Other information services, including Internet publishing, broadcasting, and Web search portals	51910	63,299	63,159	140
Finance: banking and credit intermediation	52200	12,777	12,734	43
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	4,427	4,424	2
Insurance carriers and related activities	52400	3,661	3,661	0
Real estate	53100	0 - 2,201	1,503	0 - 735
Rental and leasing services	53200	1,423	1,423	* i
Lessors of nonfinancial intangible assets, including patent licensing	53300	0 - 831	0 - 96	0 - 735
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	2,674	2,673	1
Architectural, engineering, and related services	54130	4,900	2,918	1,982
Specialized design services	54140	170	85	85
Computer systems design and related services	54150	18,843	16,074	2,769
Management, scientific, and technical consulting services	54160	3,761	2,810	951
Research and development services in the social sciences and humanities	54172	562	38	524
Research and development services in biotechnology	54173	8,686	1,965	6,720
Research and development services in the physical, engineering, and life sciences (except biotechnology)	54174	24,511 i	4,415	20,096 i
Research and development services in nanotechnology	54175	231	157	74 i
Advertising and related services	54180	2,096 i	2,095 i	1
Professional, scientific, and technical services (not listed elsewhere)	54190	1,714	1,243	471
Management of companies and enterprises	55100	0 - 1,503	1,503	0
Administrative and support services	56100	3,293	3,288	4
Waste management and remediation services	56200	530 r	512 r	18
Offices of physicians	62110	298	222	77
Medical and diagnostic laboratories	62150	2,721	1,879	842
Other ambulatory health care services (ambulance, dental, home health care)	62199	300	299	1
Hospitals and nursing care facilities	62200	0 - 1,503	1,503	* i
Social assistance services	62400	0 - 1,503	1,503	0
Arts, entertainment, and recreation	71000	64 r	64 r	0
Accommodation and food services	72000	103	103	0
Other services (not listed elsewhere)	81000	6,736 i	6,638 i	99
Undistributed	-	0	0	0

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50% .

<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 2017 North American Industry Classification System industry definitions.

**Note(s):**

Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

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: 2021**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)		Percentage of domestic sales of R&D performers or funders <sup>a</sup>	Percentage of domestic sales of R&D performers <sup>b</sup>
All industries	21–23, 31–33, 42–81	602,499		4.6	4.7
Manufacturing industries	31–33	326,060		5.0	5.0
Food	311	5,266		0.8	0.8
Beverage and tobacco products	312	1,247		0.7	0.7
Textile, apparel, and leather products	313–16	829		1.1	1.1
Wood products	321	444		0.6	0.6
Paper	322	1,139		1.2	1.2
Printing and related support activities	323	204	i	0.6	0.6
Petroleum and coal products	324	957		0.3	0.3
Chemicals	325	109,490		8.4	8.4
Basic chemicals	3251	2,713		0.8	0.8
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,389	i	2.1	2.1
Pesticide, fertilizer, and other agricultural chemicals	3253	1,157		1.1	1.1
Pharmaceuticals and medicines	3254	100,220		16.1	16.1
Soap, cleaning compound, and toilet preparations	3256	2,740		2.2	2.2
Paint, coating, adhesive, and other chemicals	3255, 3259	1,271		2.1	2.1
Plastics and rubber products	326	3,144		1.3	1.4
Nonmetallic mineral products	327	1,533		2.8	3.2
Primary metals	331	912		0.8	0.9
Fabricated metal products	332	4,291		1.1	1.1
Machinery	333	17,730		4.2	4.2
Agricultural implement	33311	1,867		3.3	3.3
Semiconductor machinery	333242	5,349		17.9	17.9
Engine, turbine, and power transmission equipment	3336	1,374		3.0	3.0
Other machinery	other 333	9,140		3.1	3.1
Computer and electronic products	334	101,063		13.0	13.0
Communications equipment	3342	12,557		12.1	12.2
Semiconductor and other electronic components	3344	47,396		20.4	20.4
Navigational, measuring, electromedical, and control instruments	3345	13,644		8.7	8.7
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,087		18.7	18.7
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	5,301		11.5	11.6
Other measuring and controlling devices	other 3345	5,256		5.6	5.6
Other computer and electronic products	other 334	27,465		9.6	9.6
Electrical equipment, appliances, and components	335	5,494		3.5	3.6
Transportation equipment	336	50,760		5.0	5.0
Motor vehicles, bodies, trailers, and parts	3361–63	26,391		4.2	D
Aerospace products and parts	3364	21,468	i	6.9	6.9
Aircraft, aircraft engine, and aircraft parts	336411–13	19,845	i	6.6	6.6
Guided missile, space vehicle, and related parts	336414–15, 336419	1,623		14.4	14.4
Military armored vehicle, tank, and tank components	336992	21 - 25		D	D
Other transportation	other 336	2,875 - 2,880		D	D
Furniture and related products	337	426		1.0	1.1
Miscellaneous	339	21,133		3.7	3.7

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: 2021**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)		Percentage of domestic sales of R&D performers or funders <sup>a</sup>	Percentage of domestic sales of R&D performers <sup>b</sup>
Medical equipment and supplies	3391	18,438		4.3	4.3
Other miscellaneous manufacturing	3399	2,695		1.9	1.9
Nonmanufacturing industries	21–23, 42–81	276,439		4.2	4.4
Mining, quarrying, oil and gas extraction, and support activities	21	1,260 - 1,334		D	D
Utilities	22	168 - 17,997		D	D
Wholesale trade	42	1,745 - 1,855	i	D	D
Electronic shopping and electronic auctions	454111–12	5,936 - 24,040	i	D	D
Transportation and warehousing	48–49	7,208		2.9	2.9
Information	51	147,855		8.7	8.7
Publishing	511	39,152		12.8	12.9
Newspaper, periodical, book, and directory publishers	5111	103		5.1	5.6
Software publishers	5112	39,049		12.9	12.9
Telecommunications	517	3,835		0.8	0.8
Data processing, hosting, and related services	518	45,192		8.0	8.0
Other information	other 51	59,676		17.9	17.9
Finance and insurance	52	20,947		1.4	1.6
Real estate and rental and leasing	53	2,096		4.6	4.6
Lessors of nonfinancial intangible assets (except copyrighted works)	533	5 - 8		D	D
Other real estate and rental and leasing	other 53	2,088 - 2,091		D	D
Professional, scientific, and technical services	54	66,496		13.7	13.8
Architectural, engineering, and related services	5413	4,560		5.9	5.9
Computer systems design and related services	5415	20,409		10.2	10.3
Scientific research and development services	5417	34,142	i	41.2	41.3
Research and development in nanotechnology	541713	228		53.7	85.9
Research and development in biotechnology (except nanobiotechnology)	541714	9,039		33.3	33.3
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	24,312	i	45.1	45.1
Research and development in the social sciences and humanities	541720	563		40.4	40.4
Other professional, scientific, and technical services	other 54	7,385		6.0	6.0
Health care services	621–23	2,060 - 2,138		D	D
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2,564 - 3,199		D	D
All companies (number of domestic employees)	–	602,499		4.6	4.7
Small companies					
10–19 <sup>c</sup>	–	5,477		15.3	16.3
20–49	–	15,061		14.4	14.9
Medium companies					
50–99	–	14,540		9.9	10.1
100–249	–	24,023		6.3	6.4

TABLE 17

**Domestic R&D paid for by the company and others and performed by the company as a percentage of domestic net sales, by industry and company size: 2021**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percentage of domestic sales of R&D performers or funders <sup>a</sup>	Percentage of domestic sales of R&D performers <sup>b</sup>
Large companies				
250–499	–	23,932	6.4	6.6
500–999	–	27,432	5.5	5.7
1,000–4,999	–	94,615	4.7	4.8
5,000–9,999	–	62,817	4.1	4.2
10,000–24,999	–	104,607	4.7	4.7
25,000 or more	–	229,995	4.0	4.1

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

NAICS = 2017 North American Industry Classification System.

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

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

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

**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

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: 2021**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percentage of domestic sales of R&D performers or funders <sup>a</sup>	Percentage of domestic sales of R&D performers only <sup>b</sup>
All industries	21–23, 31–33, 42–81	659,458	5.0	5.2
Manufacturing industries	31–33	374,920	5.7	5.7
Food	311	5,535	0.8	0.8
Beverage and tobacco products	312	1,425	0.8	0.8
Textile, apparel, and leather products	313–16	840	1.2	1.2
Wood products	321	456	0.7	0.7
Paper	322	1,145	1.2	1.2
Printing and related support activities	323	207 - 216	i D	0.6
Petroleum and coal products	324	1,158	0.4	0.4
Chemicals	325	145,882	11.1	11.2
Basic chemicals	3251	2,787	0.9	0.9
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,420 - 1,457	i D	D
Pesticide, fertilizer, and other agricultural chemicals	3253	1,255	1.2	1.2
Pharmaceuticals and medicines	3254	136,048	21.8	21.8
Soap, cleaning compound, and toilet preparations	3256	3,035	2.5	2.5
Paint, coating, adhesive, and other chemicals	3255, 3259	1,298 - 1,339	D	D
Plastics and rubber products	326	3,208	1.4	1.4
Nonmetallic mineral products	327	1,550	2.9	3.2
Primary metals	331	921 - 925	D	D
Fabricated metal products	332	4,380	1.1	1.1
Machinery	333	18,067	4.2	4.2
Agricultural implement	33311	1,981 - 2,005	D	D
Semiconductor machinery	333242	5,352	17.9	17.9
Engine, turbine, and power transmission equipment	3336	1,399	3.1	3.1
Other machinery	other 333	9,310 - 9,336	D	D
Computer and electronic products	334	105,039	13.5	13.5
Communications equipment	3342	13,657	13.2	13.2
Semiconductor and other electronic components	3344	47,753	20.6	20.6
Navigational, measuring, electromedical, and control instruments	3345	13,986	8.9	8.9
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,171	19.2	19.2
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	5,430	11.8	11.8
Other measuring and controlling devices	other 3345	5,384	5.7	5.7
Other computer and electronic products	other 334	29,642	10.4	10.4
Electrical equipment, appliances, and components	335	5,569	3.6	3.6
Transportation equipment	336	56,589	5.6	5.6
Motor vehicles, bodies, trailers, and parts	3361–63	30,744	4.9	D
Aerospace products and parts	3364	22,883	7.3	D
Aircraft, aircraft engine, and aircraft parts	336411–13	21,193	7.0	7.0
Guided missile, space vehicle, and related parts	336414–15, 336419	1,690	15.0	D
Military armored vehicle, tank, and tank components	336992	21 - 25	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: 2021**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percentage of domestic sales of R&D performers or funders <sup>a</sup>	Percentage of domestic sales of R&D performers only <sup>b</sup>
Other transportation	other 336	2,936 - 2,941	D	D
Furniture and related products	337	443	1.0	1.1
Miscellaneous	339	22,493 - 22,512	D	D
Medical equipment and supplies	3391	19,706	4.6	4.6
Other miscellaneous manufacturing	3399	2,787 - 2,807	D	D
Nonmanufacturing industries	21–23, 42–81	284,538	4.3	4.5
Mining, quarrying, oil and gas extraction, and support activities	21	1,275 - 1,468	D	D
Utilities	22	175 - 18,681	D	D
Wholesale trade	42	1,923	i 0.2	0.2
Electronic shopping and electronic auctions	454111–12	5,939 - 24,697	i D	D
Transportation and warehousing	48–49	7,257	2.9	2.9
Information	51	151,148	8.9	8.9
Publishing	511	40,846	13.4	13.4
Newspaper, periodical, book, and directory publishers	5111	110	5.5	5.8
Software publishers	5112	40,735	13.4	13.5
Telecommunications	517	4,411	0.9	0.9
Data processing, hosting, and related services	518	45,991	8.2	8.2
Other information	other 51	59,901	18.0	18.0
Finance and insurance	52	21,087	1.4	1.6
Real estate and rental and leasing	53	2,101	4.6	4.6
Lessors of nonfinancial intangible assets (except copyrighted works)	533	6 - 9	D	D
Other real estate and rental and leasing	other 53	2,092 - 2,095	D	D
Professional, scientific, and technical services	54	69,929	14.5	14.5
Architectural, engineering, and related services	5413	5,037	6.5	6.5
Computer systems design and related services	5415	20,836	10.4	10.5
Scientific research and development services	5417	36,548	i 44.1	44.2
Research and development in nanotechnology	541713	255	60.0	91.2
Research and development in biotechnology (except nanobiotechnology)	541714	9,445	34.8	34.8
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	26,228	i 48.6	48.6
Research and development in the social sciences and humanities	541720	620	44.4	44.4
Other professional, scientific, and technical services	other 54	7,508	6.1	6.1
Health care services	621–23	2,321 - 2,400	D	D
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2,602 - 3,921	D	D
All companies (number of domestic employees)	–	659,458	5.0	5.2
Small companies				
10–19 <sup>c</sup>	–	6,166	17.2	18.1

TABLE 18

**Domestic R&D paid for by the company and others and performed by the company and others as a percentage of domestic net sales, by industry and company size: 2021**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percentage of domestic sales of R&D performers or funders <sup>a</sup>	Percentage of domestic sales of R&D performers only <sup>b</sup>
20–49	–	17,270	16.5	17.0
Medium companies				
50–99	–	17,325	11.8	12.0
100–249	–	27,061	7.1	7.2
Large companies				
250–499	–	27,252	7.3	7.5
500–999	–	30,043	6.0	6.2
1,000–4,999	–	100,682	5.0	5.1
5,000–9,999	–	67,637	4.4	4.5
10,000–24,999	–	120,197	5.4	5.4
25,000 or more	–	245,826	4.3	4.4

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

NAICS = 2017 North American Industry Classification System.

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

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

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

**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

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: 2021  
(Millions of U.S. dollars and number of companies)

Industry and company size	NAICS code	Domestic R&D		Software products and embedded software R&D											
				Total		Paid for by the company		Paid for by others							
		Total						Federally funded							
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount				
All industries	21–23, 31–33, 42–81	31,490	602,499	14,140	i 257,030	i 13,380	i 243,879	i 1,540	i 13,151	i 700	i 5,468				
Manufacturing industries	31–33	15,620	326,060	4,330	i 50,012	i 4,170	i 45,884	i 360	i 4,128	i 80	i 2,675	i			
Food	311	890	5,266	80	i 279	i 80	i 275	i 10	i 4	i 0	i 0				
Beverage and tobacco products	312	190	1,247	10	i 1	i 10	i 1	i 0	i 0	i 0	i 0				
Textile, apparel, and leather products	313–16	310	829	20	i 29	i 20	i 29	i 0	i 0	i 0	i 0				
Wood products	321	150	444	10	i 0 - 297	i 10	i 0 - 297	i 0	i 0	i 0	i 0				
Paper	322	120	1,139	10	i 65	i 10	i 65	i 0	i 0	i 0	i 0				
Printing and related support activities	323	170	204	i 70	i 120	i 70	i 120	i 0	i 0	i 0	i 0				
Petroleum and coal products	324	110	957	10	i 17	i 10	i 17	i 0	i 0	i 0	i 0				
Chemicals	325	2,250	109,490	220	i 1,442	i 190	i 1,385	i 40	r 58	i 10	i 6				
Basic chemicals	3251	250	2,713	10	i 11	i 10	i 6	i 10	i 4	i 0	i 0				
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	130	1,389	i 20	i 0 - 109	i 20	i 0 - 109	i 0	i 0	i 0	i 0				
Pesticide, fertilizer, and other agricultural chemicals	3253	100	1,157	10	i 0 - 126	i 10	i 0 - 109	i 10	i 0 - 18	i 0	i 0				
Pharmaceuticals and medicines	3254	1,210	100,220	130	i 1,290	i 100	i 1,254	i 40	r 36	r 10	i 5				
Soap, cleaning compound, and toilet preparations	3256	290	2,740	20	i 16 - 36	i 10	i 17	i 10	i 0 - 18	i 0	i 0				
Paint, coating, adhesive, and other chemicals	3255, 3259	300	1,271	60	i 0 - 111	i 60	i 0 - 109	i 10	i 1	i 10	i 1				
Plastics and rubber products	326	920	3,144	130	i 181	i 130	i 181	i 10	i *	i 0	i 0				
Nonmetallic mineral products	327	340	1,533	40	i 39	i 40	i 39	i 0	i 0	i 0	i 0				
Primary metals	331	260	912	20	i 0 - 297	i 20	i 0 - 297	i 0	i 0	i 0	i 0				
Fabricated metal products	332	2,310	4,291	480	i 169	i 450	i 162	i 50	i 7	i 0	i 0				
Machinery	333	2,170	17,730	880	i 2,392	i 870	i 2,350	i 30	i 42	i 10	i 26				
Agricultural implement	33311	150	1,867	50	i 106	i 50	i 106	i 10	i *	i 10	i *	i			
Semiconductor machinery	333242	60	5,349	40	i 768	i 40	i 758	i 10	i 10	i 10	i 4	i			
Engine, turbine, and power transmission equipment	3336	80	1,374	30	i 156	i 30	i 140	i 10	i 17	i 10	i 17				
Other machinery	other 333	1,900	9,140	770	i 1,362	i 770	i 1,347	i 20	i 15	i 10	i 5				
Computer and electronic products	334	2,130	101,063	1,370	i 32,906	i 1,310	i 31,252	i 140	i 1,654	i 40	i 680	i			
Communications equipment	3342	280	12,557	210	i 7,283	i 210	i 7,229	i 10	i 54	i 10	i 0 - 55				
Semiconductor and other electronic components	3344	660	47,396	300	i 9,270	i 240	i 8,816	i 90	i 454	i 10	r 9	i			
Navigational, measuring, electromedical, and control instruments	3345	960	13,644	710	i 4,081	i 700	i 2,993	i 40	i 1,088	i 20	i 618	i			
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	180	3,087	110	i 482	i 110	i 394	i 10	i 88	i 10	i *	i			
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	190	5,301	150	i 2,086	i 150	i 1,154	i 20	i 932	i 20	i 549 - 619	i			

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: 2021  
(Millions of U.S. dollars and number of companies)

Industry and company size	NAICS code	Domestic R&D		Software products and embedded software R&D									
				Total		Paid for by the company		Paid for by others					
		Total						Federally funded					
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount		
Other measuring and controlling devices	other 3345	600	5,256	450	i 1,512	450	i 1,445	20	67	10	0 - 68		
Other computer and electronic products	other 334	240	27,465	170	i 12,271	170	i 12,214	10	58	10	i 0 - 55		
Electrical equipment, appliances, and components	335	580	5,494	300	i 1,200	290	i 1,094	20	i 107	10	1		
Transportation equipment	336	1,150	50,760	350	i 7,717	340	i 5,485	60	2,231	20	1,955		
Motor vehicles, bodies, trailers, and parts	3361-63	570	26,391	190	i 4,254	170	i 4,084	40	i 170	10	3		
Aerospace products and parts	3364	350	21,468	i 110	i 3,363	i 110	i 1,333	20	2,030	i 10	1,950		
Aircraft, aircraft engine, and aircraft parts	336411-13	310	19,845	i 100	i 3,317	i 100	i 1,290	20	2,026	i 10	1,946		
Guided missile, space vehicle, and related parts	336414-15, 336419	40	1,623	20	i 46	20	i 43	10	3	i 10	3		
Military armored vehicle, tank, and tank components	336992	20	r 21 - 25	0	0	0	0	0	0	0	0		
Other transportation	other 336	220	2,875 - 2,880	60	i 101	60	i 69	10	31	10	2		
Furniture and related products	337	230	426	40	i 105	40	i 105	0	0	0	0		
Miscellaneous	339	1,450	21,133	390	i 3,059 - 3,357	370	i 3,034 - 3,332	40	i 25	20	i 7		
Medical equipment and supplies	3391	820	18,438	300	i 3,057	290	i 3,035	40	i 22	20	i 7		
Other miscellaneous manufacturing	3399	640	2,695	90	2 - 301	90	0 - 297	10	3	10	*		
Nonmanufacturing industries	21-23, 42-81	15,880	276,439	9,820	i 207,017	i 9,210	i 197,995	i 1,180	i 9,022	i 620	i 2,792		
Mining, quarrying, oil and gas extraction, and support activities	21	180	i 1,260 - 1,334	50	i 245	40	i 218	10	i 27	0	0		
Utilities	22	40	168 - 17,997	30	3 - 17,966	20	0 - 17,961	10	i 4	0	0		
Wholesale trade	42	1,810	1,745 - 1,855	i 420	i 229	420	i 215	10	i 14	0	0		
Electronic shopping and electronic auctions	454111-12	180	5,936 - 24,040	i 160	i 0 - 24,034	i 160	i 0 - 24,034	0	0	0	0		
Transportation and warehousing	48-49	80	7,208	30	0 - 7,200	30	0 - 7,200	0	0	0	0		
Information	51	3,450	147,855	3,270	i 134,216	i 3,210	i 133,195	i 190	i 1,021	40	220		
Publishing	511	1,420	39,152	1,370	i 32,932	1,350	i 32,341	100	i 590	i 10	13		
Newspaper, periodical, book, and directory publishers	5111	60	103	10	i 5	10	i 5	0	0	0	0		
Software publishers	5112	1,370	39,049	1,360	i 32,926	1,350	i 32,336	100	i 590	i 10	13		
Telecommunications	517	170	3,835	140	1,503	140	1,405 - 1,502	10	1 - 98	10	2		
Data processing, hosting, and related services	518	1,700	45,192	1,630	43,677	1,600	43,343	90	i 334	30	r 204		

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: 2021  
(Millions of U.S. dollars and number of companies)

Industry and company size	NAICS code	Domestic R&D				Software products and embedded software R&D									
						Total		Paid for by the company		Paid for by others					
		Companies <sup>a</sup>		Amount		Companies <sup>b</sup>		Companies <sup>b</sup>		Total		Federally funded			
		(number)				(number)	Amount	(number)	Amount	Companies <sup>b</sup>	Amount	Companies <sup>b</sup>	Amount	(number)	Amount
Other information	other 51	180		59,676		140	56,104	i	140	56,007 - 56,105	i	10	0 - 97	0	0
Finance and insurance	52	530	r	20,947		490	18,558	r	490	18,525		10	32	0	0
Real estate and rental and leasing	53	50		2,096		20	1,922		20	1,922		0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	10		5 - 8		10	1		10	1		0	0	0	0
Other real estate and rental and leasing	other 53	40		2,088 - 2,091		20	1,921		20	1,921		0	0	0	0
Professional, scientific, and technical services	54	7,050		66,496		5,090	25,158	i	4,560	17,239	i	970	7,919	580	2,572
Architectural, engineering, and related services	5413	1,430		4,560		490	746	i	330	375	i	230	372	160	294
Computer systems design and related services	5415	3,390		20,409		3,320	12,875	i	3,160	10,006	i	380	2,869	170	442
Scientific research and development services	5417	1,370		34,142	i	560	5,733	i	390	1,723	i	300	4,010	220	1,304
Research and development in nanotechnology	541713	70		228		20	9	i	20	8	i	10	1	10	1
Research and development in biotechnology (except nanobiotechnology)	541714	310		9,039		50	81	i	40	27	i	20	54	10	5
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	980		24,312	i	490	5,614	i	340	1,681	i	280	3,933	210	1,276
Research and development in the social sciences and humanities	541720	30		563		10	29		10	6		10	23	10	23
Other professional, scientific, and technical services	other 54	870		7,385		730	5,804	i	690	5,136	i	70	668	40	531
Health care services	621-23	590	r	2,060 - 2,138		80	318	i	80	318	i	0	0	0	0
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,980		2,564 - 3,199		230	4 - 3,141		230	0 - 3,136		10	5	10	1
All companies (number of domestic employees)	-	31,490		602,499		14,140	257,030	i	13,380	243,879	i	1,540	13,151	700	5,468
Small companies															
10-19 <sup>c</sup>	-	5,690		5,477		2,870	1,824	i	2,640	1,558	i	470	267	230	126
20-49	-	9,210		15,061		4,630	4,658	i	4,390	4,172	i	470	486	230	232
Medium companies															
50-99	-	5,760		14,540		2,340	4,407	i	2,220	3,816	i	210	591	100	259
100-249	-	5,570		24,023		2,030	7,692	i	1,930	6,640	i	190	1,053	80	561
Large companies															
250-499	-	2,050		23,932		840	8,358		810	7,330		70	1,028	30	379
500-999	-	1,290		27,432		530	10,663		510	9,839		40	824	20	441

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: 2021  
(Millions of U.S. dollars and number of companies)

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	
		Total												Federally funded	
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount				
1,000–4,999	–	1,350	94,615	610	44,879	600	44,147	60	732	i	20	178			
5,000–9,999	–	270	62,817	140	22,484	130	21,526	30	958	i	10	100			
10,000–24,999	–	210	104,607	120	25,201	i	110	21,388	i	30	3,814	20	458		
25,000 or more	–	130	229,995	80	126,862	i	70	123,464	i	20	3,398	i	10	2,734	i

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

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

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. Companies could report R&D in one, more than one, or no application area. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

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: 2021  
(Millions of U.S. dollars and number of companies)

Industry and company size	NAICS code	Domestic R&D		Biotechnology R&D							
				Total		Paid for by the company		Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount
All industries	21–23, 31–33, 42–81	31,490	602,499	2,840	i 102,513	2,440	i 81,585	730	i 20,928		
Manufacturing industries	31–33	15,620	326,060	1,910	i 85,389	1,750	i 76,968	370		8,422	
Food	311	890	5,266	90	i 522	90	i 493	10		29	
Beverage and tobacco products	312	190	1,247	10	23	10	23	0		0	
Textile, apparel, and leather products	313–16	310	829	30	i 9	30	i 9	0		0	
Wood products	321	150	444	10	0 - 8	10	0 - 8	0		0	
Paper	322	120	1,139	10	2	10	2	0		0	
Printing and related support activities	323	170	204	i 0	0	0	0	0		0	
Petroleum and coal products	324	110	957	10	103 - 110	10	104	10		0 - 5	
Chemicals	325	2,250	109,490	1,000	79,551	930	71,611	250		7,940	
Basic chemicals	3251	250	2,713	70	i 310	60	i 218	30	i 92		
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	130	1,389	i 20	i 0 - 217	i 20	i 0 - 148	i 10	i 0 - 76	i	
Pesticide, fertilizer, and other agricultural chemicals	3253	100	1,157	30	i 0 - 217	i 30	i 0 - 148	10	i 0 - 76	i	
Pharmaceuticals and medicines	3254	1,210	100,220	830	78,889	780	71,154	220		7,736	
Soap, cleaning compound, and toilet preparations	3256	290	2,740	60	i 131	60	i 93	10		38	
Paint, coating, adhesive, and other chemicals	3255, 3259	300	1,271	10	6	10	0 - 7	10		0 - 7	
Plastics and rubber products	326	920	3,144	70	i 82	i 70	i 82	i 0		0	
Nonmetallic mineral products	327	340	1,533	10	1	10	1	10		*	
Primary metals	331	260	912	10	0 - 8	10	0 - 8	0		0	
Fabricated metal products	332	2,310	4,291	180	i 225	r 180	i 225	r 0		0	
Machinery	333	2,170	17,730	30	114	i 30	110	i 10		4	
Agricultural implement	33311	150	1,867	10	0 - 58	i 10	0 - 58	i 0		0	
Semiconductor machinery	333242	60	5,349	10	i 54	10	i 53	10		*	
Engine, turbine, and power transmission equipment	3336	80	1,374	0	0	0	0	0		0	
Other machinery	other 333	1,900	9,140	30	3 - 61	i 20	0 - 58	i 10		4	
Computer and electronic products	334	2,130	101,063	240	i 2,344	i 200	i 1,969	i 50	i 375	i	
Communications equipment	3342	280	12,557	0	0	0	0	0		0	
Semiconductor and other electronic components	3344	660	47,396	50	i 41	20	r 0 - 42	40	i 0 - 42	i	
Navigational, measuring, electromedical, and control instruments	3345	960	13,644	190	i 2,254 - 2,299	i 180	i 1,925	i 10		329 - 373	i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	180	3,087	70	i 1,247	i 70	i 1,152	i 10		96	
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	190	5,301	20	i 364	i 20	i 89 - 136	10	i 229 - 274	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: 2021  
(Millions of U.S. dollars and number of companies)

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				
Other measuring and controlling devices	other 3345	600		5,256	100	i	642 - 688	i	100	i	637 - 685	i	10	r	4	i
Other computer and electronic products	other 334	240		27,465	10		4 - 49		10		1 - 45		10			3
Electrical equipment, appliances, and components	335	580		5,494	40	i	54		40	i	54		0			0
Transportation equipment	336	1,150		50,760	10	i	4 - 14		10	i	5		10			0 - 9
Motor vehicles, bodies, trailers, and parts	3361–63	570		26,391	0		0		0		0		0			0
Aerospace products and parts	3364	350		21,468	i	10	i	4 - 14		10	i	5		10		0 - 9
Aircraft, aircraft engine, and aircraft parts	336411–13	310		19,845	i	0		0		0		0		0		0
Guided missile, space vehicle, and related parts	336414–15, 336419	40		1,623	10	i	4 - 14		10	i	5		10			0 - 9
Military armored vehicle, tank, and tank components	336992	20	r	21 - 25	0		0		0		0		0			0
Other transportation	other 336	220		2,875 - 2,880	0		0		0		0		0			0
Furniture and related products	337	230		426	0		0		0		0		0			0
Miscellaneous	339	1,450		21,133	250	i	2,347		200	i	2,279		70	i		68
Medical equipment and supplies	3391	820		18,438	240	i	2,338		190	i	2,270		70	i		68
Other miscellaneous manufacturing	3399	640		2,695	10		9		10		9		10			*
Nonmanufacturing industries	21–23, 42–81	15,880		276,439	940	i	17,123	i	700	i	4,617		360	i		12,506
Mining, quarrying, oil and gas extraction, and support activities	21	180	i	1,260 - 1,334	10		6		10		4		10			2
Utilities	22	40		168 - 17,997	10		2		10		2		0			0
Wholesale trade	42	1,810		1,745 - 1,855	i	70	i	72	i	70	i	72	i	0		0
Electronic shopping and electronic auctions	454111–12	180		5,936 - 24,040	i	0		0		0		0		0		0
Transportation and warehousing	48–49	80		7,208	10	i	0 - 15	i	10	i	0 - 15	i	0			0
Information	51	3,450		147,855	30		198		30		198		0			0
Publishing	511	1,420		39,152	20		110		20		110		0			0
Newspaper, periodical, book, and directory publishers	5111	60		103	0		0		0		0		0			0
Software publishers	5112	1,370		39,049	20		110		20		110		0			0
Telecommunications	517	170		3,835	10	i	*	i	10	i	*	i	0			0
Data processing, hosting, and related services	518	1,700		45,192	20		87		20		87		0			0
Other information	other 51	180		59,676	10		1		10		1		0			0
Finance and insurance	52	530	r	20,947	10		4		10		4		0			0



TABLE 20  
Companies with domestic R&D paid for by the company and others and performed by the company in the biotechnology focus area, by industry and company size: 2021  
(Millions of U.S. dollars and number of companies)

Industry and company size	NAICS code	Domestic R&D		Biotechnology R&D							
				Total		Paid for by the company		Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount
Real estate and rental and leasing	53	50	2,096	10	2	10	2	0	0		
Lessors of nonfinancial intangible assets (except copyrighted works)	533	10	5 - 8	10	2	10	2	0	0		
Other real estate and rental and leasing	other 53	40	2,088 - 2,091	0	0	0	0	0	0		
Professional, scientific, and technical services	54	7,050	66,496	770 i	15,504 i	530 i	3,020	360 i	12,484 i		
Architectural, engineering, and related services	5413	1,430	4,560	80 i	119	40 i	44 i	40 i	75		
Computer systems design and related services	5415	3,390	20,409	30 i	39 i	10	10	20 i	29 i		
Scientific research and development services	5417	1,370	34,142 i	600 i	15,190 i	460 i	2,895	260 i	12,295 i		
Research and development in nanotechnology	541713	70	228	20 i	70 i	20 i	52 i	10	19 i		
Research and development in biotechnology (except nanobiotechnology)	541714	310	9,039	290 i	6,570	230 i	1,585	130 i	4,985		
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	980	24,312 i	300 i	8,550 i	210 i	1,258	130 i	7,292 i		
Research and development in the social sciences and humanities	541720	30	563	0	0	0	0	0	0		
Other professional, scientific, and technical services	other 54	870	7,385	80 i	156 i	40 i	71 i	40 i	85		
Health care services	621-23	590 r	2,060 - 2,138	70 i	1,325	70 i	1,305	10 i	20 i		
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,980	2,564 - 3,199	10	0 - 15	10	0 - 15	0	0		
All companies (number of domestic employees)	-	31,490	602,499	2,840 i	102,513	2,440 i	81,585	730 i	20,928		
Small companies											
10-19 <sup>c</sup>	-	5,690	5,477	610 i	1,343	500 i	1,039	190 i	304 i		
20-49	-	9,210	15,061	880 i	4,144	770 i	3,412	200 i	732		
Medium companies											
50-99	-	5,760	14,540	460 i	4,840	400 i	4,237	120	604		
100-249	-	5,570	24,023	410 i	6,603	350 i	5,622	110 i	981 i		
Large companies											
250-499	-	2,050	23,932	200	7,751	180	6,752	60 i	999		
500-999	-	1,290	27,432	110	5,246	100	4,639	30	607		
1,000-4,999	-	1,350	94,615	120	12,804	110	9,530	30	3,275 i		
5,000-9,999	-	270	62,817	40	13,635 i	30	9,085 i	10	4,550 i		
10,000-24,999	-	210	104,607	40	28,301	30	21,566	20	6,735		
25,000 or more	-	130	229,995	20	17,844	20	15,703	10	2,142		

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

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

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

**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. Companies could report R&D in one, more than one, or no application area. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

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: 2021  
(Millions of U.S. dollars and number of companies)

Industry and company size	NAICS code	Domestic R&D		Nanotechnology R&D									
				Total		Paid for by the company				Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount
All industries	21–23, 31–33, 42–81	31,490	602,499	1,030	i 32,718	i 930	i 31,371	i 170	i 1,347	i			
Manufacturing industries	31–33	15,620	326,060	750	i 27,805	i 710	i 27,096	i 70		709			
Food	311	890	5,266	10	24	10	23	10		1			
Beverage and tobacco products	312	190	1,247	10	i 6	10	i 6	0		0			
Textile, apparel, and leather products	313–16	310	829	10	1	10	1	0		0			
Wood products	321	150	444	0	0	0	0	0		0			
Paper	322	120	1,139	10	5	i 10	5	i 0		0			
Printing and related support activities	323	170	204	i 0	0	0	0	0		0			
Petroleum and coal products	324	110	957	0	0	0	0	0		0			
Chemicals	325	2,250	109,490	160	i 619	160	i 586	20		33			
Basic chemicals	3251	250	2,713	50	i 218	50	i 208	10		10			
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	130	1,389	i 30	r 8 - 108	i 20	r 0 - 98	i 10	i 9				
Pesticide, fertilizer, and other agricultural chemicals	3253	100	1,157	20	i 0 - 98	i 20	i 0 - 98	i 0		0			
Pharmaceuticals and medicines	3254	1,210	100,220	30	292	30	281	10		12			
Soap, cleaning compound, and toilet preparations	3256	290	2,740	10	1	10	1	0		0			
Paint, coating, adhesive, and other chemicals	3255, 3259	300	1,271	50	i 1 - 101	50	i 0 - 98	10		2			
Plastics and rubber products	326	920	3,144	60	i 114	60	i 110	10		5			
Nonmetallic mineral products	327	340	1,533	20	i 11	20	i 0 - 12	10		0 - 12			
Primary metals	331	260	912	10	i 0 - 9	i 10	i 0 - 9	i 0		0			
Fabricated metal products	332	2,310	4,291	50	r 30	r 50	r 30	r 0		0			
Machinery	333	2,170	17,730	50	2,318	50	2,189	10		129			
Agricultural implement	33311	150	1,867	0	0	0	0	0		0			
Semiconductor machinery	333242	60	5,349	20	i 2,279	20	i 2,154	10		125			
Engine, turbine, and power transmission equipment	3336	80	1,374	10	1	10	1	0		0			
Other machinery	other 333	1,900	9,140	40	38	30	34	10		4			
Computer and electronic products	334	2,130	101,063	320	i 23,907	i 300	i 23,534	i 30	i 374				
Communications equipment	3342	280	12,557	20	i 47	i 20	i 47	i 0		0			
Semiconductor and other electronic components	3344	660	47,396	160	i 23,549	i 150	i 23,187	i 20	i 363				
Navigation, measuring, electromedical, and control instruments	3345	960	13,644	150	i 95 - 312	150	i 85 - 301	10		11			
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	180	3,087	20	i 50	i 20	i 49	i 10		1	i		
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	190	5,301	20	i 42	20	i 37	10		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: 2021  
(Millions of U.S. dollars and number of companies)

Industry and company size	NAICS code	Domestic R&D		Nanotechnology R&D									
				Total		Paid for by the company				Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount
Other measuring and controlling devices	other 3345	600	5,256	120	i 4 - 221	110	i 0 - 216	10		5	r		
Other computer and electronic products	other 334	240	27,465	10	0 - 216	10	0 - 216	0		0			
Electrical equipment, appliances, and components	335	580	5,494	20	16	20	16	0		0			
Transportation equipment	336	1,150	50,760	10	226 i	10	i 61 - 82 i	10		144 - 165	i		
Motor vehicles, bodies, trailers, and parts	3361-63	570	26,391	10	3	10	1	10		2			
Aerospace products and parts	3364	350	21,468	i 10 i	223 i	10	i 59 - 81 i	10	i	141 - 163	i		
Aircraft, aircraft engine, and aircraft parts	336411-13	310	19,845	i 10 i	223 i	10	i 59 - 81 i	10	i	141 - 163	i		
Guided missile, space vehicle, and related parts	336414-15, 336419	40	1,623	10	i *	10	i *	0		0			
Military armored vehicle, tank, and tank components	336992	20	r 21 - 25	0	0	0	0	0		0			
Other transportation	other 336	220	2,875 - 2,880	10	1	10	0 - 2	10		0 - 2			
Furniture and related products	337	230	426	0	0	0	0	0		0			
Miscellaneous	339	1,450	21,133	70	i 525 - 534	60	i 520	20	i	5 - 14			
Medical equipment and supplies	3391	820	18,438	60	i 477	60	i 471	20	i	6			
Other miscellaneous manufacturing	3399	640	2,695	10	48 - 57 i	10	49 i	10		0 - 9			
Nonmanufacturing industries	21-23, 42-81	15,880	276,439	290	i 4,913 i	220	i 4,276 i	100	i	638	i		
Mining, quarrying, oil and gas extraction, and support activities	21	180	i 1,260 - 1,334	10	2	10	1	10		1			
Utilities	22	40	168 - 17,997	0	0	0	0	0		0			
Wholesale trade	42	1,810	1,745 - 1,855	i 10 i	2 i	10	i 2 i	0		0			
Electronic shopping and electronic auctions	454111-12	180	5,936 - 24,040	i 0	0	0	0	0		0			
Transportation and warehousing	48-49	80	7,208	0	0	0	0	0		0			
Information	51	3,450	147,855	20	i 3,417 i	20	i 3,417 i	0		0			
Publishing	511	1,420	39,152	20	i 3,365 i	20	i 3,365 i	0		0			
Newspaper, periodical, book, and directory publishers	5111	60	103	0	0	0	0	0		0			
Software publishers	5112	1,370	39,049	20	i 3,365 i	20	i 3,365 i	0		0			
Telecommunications	517	170	3,835	0	0	0	0	0		0			

TABLE 21  
Companies with domestic R&D paid for by the company and others and performed by the company in the nanotechnology focus area, by industry and company size: 2021  
(Millions of U.S. dollars and number of companies)

Industry and company size	NAICS code	Domestic R&D		Nanotechnology R&D									
				Total		Paid for by the company				Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount
Data processing, hosting, and related services	518	1,700	45,192	10	i 51	10	i 51	0		0		0	
Other information	other 51	180	59,676	10		10		0		0		0	
Finance and insurance	52	530	20,947	0		0		0		0		0	
Real estate and rental and leasing	53	50	2,096	0		0		0		0		0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	10	5 - 8	0		0		0		0		0	
Other real estate and rental and leasing	other 53	40	2,088 - 2,091	0		0		0		0		0	
Professional, scientific, and technical services	54	7,050	66,496	260	i 1,458	190	i 821	100	i 637				
Architectural, engineering, and related services	5413	1,430	4,560	60	i 37	50	i 31	10		6	i		
Computer systems design and related services	5415	3,390	20,409	40	i 758	30	i 475	20	i 283				
Scientific research and development services	5417	1,370	34,142	i 150	i 518	110	i 182	i 70	i 337				
Research and development in nanotechnology	541713	70	228	60	i 156	50	i 127	20		29			
Research and development in biotechnology (except nanobiotechnology)	541714	310	9,039	20		10		4		6			
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	980	24,312	i 80	i 353	50	i 51	i 50	i 302				
Research and development in the social sciences and humanities	541720	30	563	0		0		0		0			
Other professional, scientific, and technical services	other 54	870	7,385	30	i 144	20	i 134	20	i 11				
Health care services	621-23	590	2,060 - 2,138	10	i 34	10	i 34	0		0			
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1,980	2,564 - 3,199	0		0		0		0			
All companies (number of domestic employees)	-	31,490	602,499	1,030	i 32,718	930	i 31,371	170	i 1,347				
Small companies													
10-19 <sup>c</sup>	-	5,690	5,477	220	i 222	190	i 171	50	i 51				
20-49	-	9,210	15,061	340	i 527	310	i 395	50	i 132				
Medium companies													
50-99	-	5,760	14,540	150	i 228	130	i 161	30	i 67				
100-249	-	5,570	24,023	140	i 384	130	i 338	30	i 46				
Large companies													
250-499	-	2,050	23,932	60	i 737	60	i 669	10		68	i		
500-999	-	1,290	27,432	40		40		10		98			
1,000-4,999	-	1,350	94,615	70		60		10		319			

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: 2021  
(Millions of U.S. dollars and number of companies)

Industry and company size	NAICS code	Domestic R&D		Nanotechnology R&D							
				Total		Paid for by the company		Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount	Companies <sup>b</sup> (number)	Amount
5,000–9,999	–	270	62,817	30	4,375 i	30	4,234 i	10		141	i
10,000–24,999	–	210	104,607	20	9,746 i	20	9,480 i	10		266	i
25,000 or more	–	130	229,995	10	10,805 i	10	10,646 i	10		159	i

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

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

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. Companies could report R&D in one, more than one, or no application area. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 22  
Companies with domestic R&D paid for by the company and others and performed by the company in the artificial intelligence technology focus area, by industry and company size: 2021  
(Millions of U.S. dollars and number of companies)

Industry and company size	NAICS code	Domestic R&D		Artificial intelligence R&D											
		Companies <sup>a</sup> (number)	Amount	Total		Paid for by the company				Paid for by others					
				Companies <sup>a</sup> (number)	Amount	Companies <sup>a</sup> (number)	Amount	Companies <sup>a</sup> (number)	Amount	Companies <sup>a</sup> (number)	Amount				
All industries	21–23, 31–33, 42–81	31,490	602,499	3,790	i	28,875	i	3,380	i	25,267	i	610	i	3,609	i
Manufacturing industries	31–33	15,620	326,060	1,220	i	10,716	i	1,180	i	10,079	i	90		637	
Food	311	890	5,266	40	i	48		40	i	47		10		1	
Beverage and tobacco products	312	190	1,247	0		0		0		0		0		0	
Textile, apparel, and leather products	313–16	310	829	10	r	16	r	10	r	16	r	0		0	
Wood products	321	150	444	10		0 - 28		10		0 - 28		0		0	
Paper	322	120	1,139	10	i	32	i	10	i	32	i	0		0	
Printing and related support activities	323	170	204	i	10	0 - 28		10		0 - 28		0		0	
Petroleum and coal products	324	110	957	0		0		0		0		0		0	
Chemicals	325	2,250	109,490	60	i	448	i	50	i	444	i	10		4	
Basic chemicals	3251	250	2,713	10		15		10		12		10		3	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	130	1,389	i	10	0 - 36	i	10		0 - 36	i	0		0	
Pesticide, fertilizer, and other agricultural chemicals	3253	100	1,157	10		1		10		1		0		0	
Pharmaceuticals and medicines	3254	1,210	100,220	30		397	i	20		397	i	10		*	
Soap, cleaning compound, and toilet preparations	3256	290	2,740	10		1		10		1		0		0	
Paint, coating, adhesive, and other chemicals	3255, 3259	300	1,271	30	i	0 - 37		30	i	0 - 36		10		1	
Plastics and rubber products	326	920	3,144	20		6		20		6		10	i	*	i
Nonmetallic mineral products	327	340	1,533	20	i	37	i	20	i	37	i	0		0	
Primary metals	331	260	912	10		0 - 28	i	10		0 - 28	i	0		0	
Fabricated metal products	332	2,310	4,291	300	i	72		300	i	72		0		0	
Machinery	333	2,170	17,730	170	i	834		170	i	817		10		17	
Agricultural implement	33311	150	1,867	30	i	54		30	i	54		0		0	
Semiconductor machinery	333242	60	5,349	20	i	581		20	i	572		10		10	
Engine, turbine, and power transmission equipment	3336	80	1,374	20	i	27	i	20	i	24	i	10		2	
Other machinery	other 333	1,900	9,140	120	i	172		120	i	167		10		5	
Computer and electronic products	334	2,130	101,063	400	i	6,874	i	380	i	6,522	i	40	i	352	
Communications equipment	3342	280	12,557	20		68 - 207		20		69		10	i	0 - 137	
Semiconductor and other electronic components	3344	660	47,396	140	i	4,115	i	130	i	3,907	i	30	i	208	
Navigation, measuring, electromedical, and control instruments	3345	960	13,644	200	i	441 - 580		200	i	434	i	20		8 - 145	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	180	3,087	40	i	195	i	40	i	188	i	10		7	
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	190	5,301	50	i	203		50	i	65 - 204		10		0 - 137	

TABLE 22  
Companies with domestic R&D paid for by the company and others and performed by the company in the artificial intelligence technology focus area, by industry and company size: 2021  
(Millions of U.S. dollars and number of companies)

Industry and company size	NAICS code	Domestic R&D		Artificial intelligence R&D									
				Total		Paid for by the company				Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>a</sup> (number)	Amount	Companies <sup>a</sup> (number)	Amount	Companies <sup>a</sup> (number)	Amount	Companies <sup>a</sup> (number)	Amount	Companies <sup>a</sup> (number)	Amount
Other measuring and controlling devices	other 3345	600	5,256	120	i 43 - 183	i 120	i 41 - 181	i 10	2				
Other computer and electronic products	other 334	240	27,465	50	i 2,111 - 2,236	i 50	i 2,112	i 10	0 - 124				
Electrical equipment, appliances, and components	335	580	5,494	90	i 321	i 90	i 236	i 10	i 85	i			
Transportation equipment	336	1,150	50,760	50	1,525	i 50	i 1,350	i 10	175	i			
Motor vehicles, bodies, trailers, and parts	3361-63	570	26,391	30	1,147	i 30	i 1,129	i 10	18				
Aerospace products and parts	3364	350	21,468	i 20	i 373	i 20	i 215	i 10	i 157	i			
Aircraft, aircraft engine, and aircraft parts	336411-13	310	19,845	i 20	i 372	i 20	i 214	i 10	i 157	i			
Guided missile, space vehicle, and related parts	336414-15, 336419	40	1,623	i 10	i 1	i 10	i 1	i 0	0				
Military armored vehicle, tank, and tank components	336992	20	r 21 - 25	0	0	i 0	0	i 0	0				
Other transportation	other 336	220	2,875 - 2,880	20	i 5	i 20	i 5	i 0	0				
Furniture and related products	337	230	426	10	i 1	i 10	i 1	i 0	0				
Miscellaneous	339	1,450	21,133	100	i 480 - 509	i 90	i 477 - 506	i 20	i 3				
Medical equipment and supplies	3391	820	18,438	90	i 481	i 80	i 477	i 20	i 3				
Other miscellaneous manufacturing	3399	640	2,695	10	0 - 28	i 10	0 - 28	i 0	0				
Nonmanufacturing industries	21-23, 42-81	15,880	276,439	2,570	i 18,159	i 2,210	i 15,188	i 520	i 2,971	i			
Mining, quarrying, oil and gas extraction, and support activities	21	180	i 1,260 - 1,334	20	i 16	i 20	i 16	i 0	0				
Utilities	22	40	168 - 17,997	10	23	i 10	23	i 0	0				
Wholesale trade	42	1,810	1,745 - 1,855	i 20	i 6	i 20	i 6	i 0	0				
Electronic shopping and electronic auctions	454111-12	180	5,936 - 24,040	i 10	i 0 - 1,769	i 10	i 0 - 1,769	i 0	0				
Transportation and warehousing	48-49	80	7,208	10	0 - 1,769	i 10	0 - 1,769	i 0	0				
Information	51	3,450	147,855	910	i 9,982	i 870	i 9,868	i 80	i 114				
Publishing	511	1,420	39,152	400	i 2,364	i 380	i 2,316	i 50	i 48				
Newspaper, periodical, book, and directory publishers	5111	60	103	10	1	i 10	1	i 0	0				
Software publishers	5112	1,370	39,049	390	i 2,364	i 380	i 2,316	i 50	i 48				
Telecommunications	517	170	3,835	80	i 338	i 80	i 270 - 339	i 10	0 - 67				
Data processing, hosting, and related services	518	1,700	45,192	420	i 2,901	i 400	i 2,833 - 2,902	i 30	i 0 - 67				
Other information	other 51	180	59,676	30	4,379	i 30	4,311 - 4,380	i 10	0 - 67				



TABLE 22  
Companies with domestic R&D paid for by the company and others and performed by the company in the artificial intelligence technology focus area, by industry and company size: 2021  
(Millions of U.S. dollars and number of companies)

Industry and company size	NAICS code	Domestic R&D		Artificial intelligence R&D							
				Total		Paid for by the company		Paid for by others			
		Companies <sup>a</sup> (number)	Amount	Companies <sup>a</sup> (number)	Amount	Companies <sup>a</sup> (number)	Amount	Companies <sup>a</sup> (number)	Amount	Companies <sup>a</sup> (number)	Amount
Finance and insurance	52	530	r 20,947	120	r 853	120	r 847	10		6	
Real estate and rental and leasing	53	50	2,096	10	0 - 1,769	10	0 - 1,769	0		0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	10	5 - 8	0	0	0	0	0		0	
Other real estate and rental and leasing	other 53	40	2,088 - 2,091	10	0 - 1,769	10	0 - 1,769	0		0	
Professional, scientific, and technical services	54	7,050	66,496	1,460	i 5,487	i 1,130	i 2,636	i 450	i 2,850	i	
Architectural, engineering, and related services	5413	1,430	4,560	160	i 171	90	i 75	80	i 95		
Computer systems design and related services	5415	3,390	20,409	910	i 1,717	i 780	i 1,158	i 190	i 559	i	
Scientific research and development services	5417	1,370	34,142	i 260	i 2,739	i 160	i 643	i 160	i 2,096	i	
Research and development in nanotechnology	541713	70	228	10	i 13	i 10	i 13	i 10	i *	i	
Research and development in biotechnology (except nanobiotechnology)	541714	310	9,039	20	19	20	11	10		9	
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	980	24,312	i 230	i 2,665	i 130	i 617	i 150	i 2,048	i	
Research and development in the social sciences and humanities	541720	30	563	10	42	10	3	10		40	
Other professional, scientific, and technical services	other 54	870	7,385	140	i 860	i 120	i 760	i 40	i 101		
Health care services	621–23	590	r 2,060 - 2,138	20	i 27	20	i 27	0		0	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,980	2,564 - 3,199	30	0 - 1,769	30	0 - 1,769	0		0	
All companies (number of domestic employees)	–	31,490	602,499	3,790	i 28,875	i 3,380	i 25,267	i 610	i 3,609	i	
Small companies											
10–19 <sup>b</sup>	–	5,690	5,477	910	i 342	i 760	i 273	i 210	i 69	i	
20–49	–	9,210	15,061	1,280	i 779	1,160	i 652	180	i 128	i	
Medium companies											
50–99	–	5,760	14,540	540	i 848	490	i 692	80	i 156		
100–249	–	5,570	24,023	450	i 1,114	400	i 876	80	i 239		
Large companies											
250–499	–	2,050	23,932	190	i 1,436	170	i 858	30		577	
500–999	–	1,290	27,432	120	1,792	120	1,547	10	i 245		
1,000–4,999	–	1,350	94,615	190	2,449	180	2,367	20		82	
5,000–9,999	–	270	62,817	60	3,899	i 60	3,380	i 10		519	i
10,000–24,999	–	210	104,607	50	3,875	i 40	2,648	i 10		1,227	i
25,000 or more	–	130	229,995	40	12,341	i 40	11,974	i 10		367	

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

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

**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. Companies could report R&D in one, more than one, or no application area. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 23  
Foreign R&D paid for by the company and others and performed by the company, by type of R&D, industry, and company size: 2021  
(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	135,412	120,270	15,142 i	24,477	19,940	4,537 i	110,936	100,330	10,605 i
Manufacturing industries	31–33	78,389	76,683	1,706	14,143	13,865	279	64,245	62,818	1,427
Food	311	1,190	1,182 - 1,187	3 - 8	441	437 - 442	0 - 5	749	745	4 i
Beverage and tobacco products	312	893	893	0	202	202	0	691	691	0
Textile, apparel, and leather products	313–16	169	169	0	31	31	0	138	138	0
Wood products	321	4	4	0	0 - 4	0 - 4	0	0 - 4	0 - 4	0
Paper	322	67	67	* i	11	11	* i	57	57	* i
Printing and related support activities	323	27	27	0	2	2	0	25	25	0
Petroleum and coal products	324	175	175	0	40	40	0	135	135	0
Chemicals	325	23,741	23,419	322	5,980	5,875	105	17,761	17,544	217
Basic chemicals	3251	997	994	4	420	417	3	577	577	*
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	580 i	550 - 581 i	0 - 29	151	122 - 152 i	0 - 29	429 i	429 i	* i
Pesticide, fertilizer, and other agricultural chemicals	3253	123	94 - 123	0 - 29	39	10 - 40	0 - 29	84	84	0
Pharmaceuticals and medicines	3254	20,936	20,656	280	5,171	5,099	73	15,765	15,558	207
Soap, cleaning compound, and toilet preparations	3256	871	861	10	132	130	2	739	731	9
Paint, coating, adhesive, and other chemicals	3255, 3259	234	224 - 234	0 - 9	68	59 - 69	0 - 9	166	165	1
Plastics and rubber products	326	607	603	5	147	146	1 i	460	457	3 i
Nonmetallic mineral products	327	198	198	0	19	19	0	179	179	0
Primary metals	331	50 i	46 - 49 i	2 - 5	19 i	16 - 19 i	0 - 3	32 i	29 i	2
Fabricated metal products	332	378	346	32	103	97	6	275	250	25
Machinery	333	5,343	5,225	118	1,105	1,098	7	4,238	4,127	111
Agricultural implement	33311	907	899 - 907	0 - 8	161	160	*	746	739 - 747	0 - 8
Semiconductor machinery	333242	1,299	1,278	21	417	416	1	882	863	20
Engine, turbine, and power transmission equipment	3336	546	526 - 533	13 - 19 i	5	5	*	541	521 - 529	12 - 19
Other machinery	other 333	2,591	2,513	77	523	517	6	2,068	1,996	72
Computer and electronic products	334	31,535	31,264	271	4,028 i	3,993 i	36	27,506	27,271	235
Communications equipment	3342	3,411	3,392	19	430	428	2	2,980	2,964	17
Semiconductor and other electronic components	3344	16,521	16,384	137	2,265 i	2,262 i	4	14,256 i	14,122 i	134
Navigational, measuring, electromedical, and control instruments	3345	3,576	3,466	110	774	745	29	2,802	2,721	81
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	467	454	12	212 i	203 i	9	254 i	251 i	3 i

TABLE 23  
Foreign R&D paid for by the company and others and performed by the company, by type of R&D, industry, and company size: 2021  
(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
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	594	519	75	51	29 - 52	0 - 21	543	467 - 490	53 - 75
Other measuring and controlling devices	other 3345	2,516	2,493	23	511	490 - 512	0 - 21	2,004	1,981 - 2,003	2 - 24
Other computer and electronic products	other 334	8,027	8,022	5	559	558	1	7,468	7,464	4
Electrical equipment, appliances, and components	335	1,880	1,840	41	415	397	17	1,466	1,442	23
Transportation equipment	336	7,663	6,824	839	1,011	911	100	6,652	5,913	740
Motor vehicles, bodies, trailers, and parts	3361-63	6,720	6,070	650	782	723	59	5,938	5,347	591
Aerospace products and parts	3364	711	548	164	183	166	17	528	382	147
Aircraft, aircraft engine, and aircraft parts	336411-13	693	529	164	181	164	17	512	365	147
Guided missile, space vehicle, and related parts	336414-15, 336419	18	18	0	2	2	0	17	17	0
Military armored vehicle, tank, and tank components	336992	0 - 3	0 - 3	0	0 - 3	0 - 3	0	*	*	0
Other transportation	other 336	228 - 233	202 - 207	26	42 - 48	18 - 24	24	186	184	2
Furniture and related products	337	37	37	*	27	27	0	11	11	*
Miscellaneous	339	4,431	4,359	72	553 - 570	548 - 566	5	3,860 - 3,878	3,793 - 3,811	67
Medical equipment and supplies	3391	4,007	3,942	65	525	521	4	3,481	3,420	61
Other miscellaneous manufacturing	3399	424	418	7	27 - 45	26 - 45	1	379 - 397	373 - 391	6
Nonmanufacturing industries	21-23, 42-81	57,024	43,588	13,436	10,333	6,075	4,258	46,690	37,512	9,178
Mining, quarrying, oil and gas extraction, and support activities	21	5 - 79	0 - 73	6	0 - 73	0 - 73	0	5 - 79	0 - 73	6
Utilities	22	0 - 1,129	0 - 1,129	0	0 - 660	0 - 660	0	0 - 1,014	0 - 1,014	0
Wholesale trade	42	0 - 109	0 - 109	0	0 - 109	0 - 109	0	0 - 109	0 - 109	0
Electronic shopping and electronic auctions	454111-12	4,330 - 6,357	4,330 - 6,357	0	0 - 2,456	0 - 2,456	0	1,989 - 6,357	1,989 - 6,357	0
Transportation and warehousing	48-49	73	72 - 74	0 - 1	0 - 70	0 - 70	0	3 - 74	2 - 74	0 - 1
Information	51	29,258	29,210	48	2,835	2,831	5	26,423	26,380	43
Publishing	511	9,933	9,908	25	1,028	1,028	0	8,904	8,880	25
Newspaper, periodical, book, and directory publishers	5111	*	*	0	*	*	0	*	*	0
Software publishers	5112	9,933	9,908	25	1,028	1,028	0	8,904	8,880	25
Telecommunications	517	77	77	0	18	18	0	60	60	0
Data processing, hosting, and related services	518	9,881	9,858	23	986	981	5	8,895	8,876	19
Other information	other 51	9,367	9,367	*	803	803	*	8,564	8,564	*
Finance and insurance	52	2,461	2,421	40	35 - 2,421	0 - 2,386	36	40 - 2,426	35 - 2,422	5
Real estate and rental and leasing	53	103	103	0	0 - 104	0 - 104	0	0 - 104	0 - 104	0

TABLE 23  
Foreign R&D paid for by the company and others and performed by the company, by type of R&D, industry, and company size: 2021  
(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
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0 - 2	0 - 2	0	*	*	0	0 - 2	0 - 2	0
Other real estate and rental and leasing	other 53	100 - 104	100 - 104	0	0 - 104	0 - 104	0	0 - 104	0 - 104	0
Professional, scientific, and technical services	54	18,763 i	5,423	13,340 i	5,004 i	787	4,217 i	13,759 i	4,636	9,123 i
Architectural, engineering, and related services	5413	39 r	38 r	1	3	3	*	35 r	35 r	*
Computer systems design and related services	5415	4,632	4,591	42	699	679	20 i	3,933	3,911	22 i
Scientific research and development services	5417	13,630 i	353	13,277 i	4,232 i	36	4,196 i	9,398 i	317	9,081 i
Research and development in nanotechnology	541713	16	16	0	8	8	0	8	8	0
Research and development in biotechnology (except nanobiotechnology)	541714	4,402	136	4,267	493	5	488	3,910 i	131	3,779 i
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	9,207 i	201	9,005 i	3,726 i	23	3,703 i	5,480 i	178	5,302 i
Research and development in the social sciences and humanities	541720	5	0	5	5	0	5	0	0	0
Other professional, scientific, and technical services	other 54	463	442	21	70 i	69 i	1 i	392 i	373 i	20
Health care services	621-23	2 - 81	2 - 80	*	3 i	3	0	0 - 78	0 - 78	* i
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1 - 637	0 - 634	0 - 3	0 - 634	0 - 634	0	0 - 637	0 - 634	0 - 3
All companies (number of domestic employees)	-	135,412	120,270	15,142 i	24,477	19,940	4,537 i	110,936	100,330	10,605 i
Small companies										
10-19 <sup>a</sup>	-	359	353	6	59	57	2 i	300	296	4
20-49	-	909	875	34	170	165	5	739	710	29
Medium companies										
50-99	-	866	812	53	269	255	15	596	558	39
100-249	-	2,382	2,203	179	650	579	71	1,733	1,624	108
Large companies										
250-499	-	3,660	3,611	49 i	819	818	1 i	2,841	2,794	47
500-999	-	4,528	4,262	266	914	887	26	3,615	3,375	240 i
1,000-4,999	-	20,663	20,170	493 i	3,954	3,894	60	16,709	16,276	434 i
5,000-9,999	-	15,571	13,521	2,051	3,570	1,887	1,683	12,001	11,634	367 i
10,000-24,999	-	28,481	19,096	9,385 i	5,817 i	3,687	2,130 i	22,664 i	15,409	7,255 i
25,000 or more	-	57,992	55,367	2,625	8,255 i	7,712 i	543	49,737	47,656	2,082

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 24  
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: 2021  
(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	447,889	408,637		39,253	81,778		72,211	9,566	366,112	336,426	29,686	i			
Manufacturing industries	31–33	241,611	221,707		19,904	52,061		49,035	3,026	189,551	172,673	16,878				
Chemicals	325	70,881	67,369		3,512	24,777		24,010	767	46,104	43,360	2,745				
Pharmaceuticals and medicines	3254	64,473	61,427		3,046	22,710		22,221	488	41,763	39,206	2,557				
Other chemicals	other 325	6,408	5,942		466	2,067		1,788	278	4,341	4,154	188				
Computer and electronic products	334	92,533	87,707		4,825	12,156		11,289	867	80,377	76,418	3,959				
Semiconductor and other electronic components	3344	44,110	43,533		577	4,263	i	4,163	i	39,847	39,370	477				
Other computer and electronic products	other 334	48,423	44,175		4,249	7,893		7,126	767	40,530	37,049	3,481				
Nonmanufacturing industries	21–23, 42–81	206,278	186,929		19,349	29,717	i	23,177	6,540	176,561	163,753	12,808	i			
Information	51	128,547	128,006		541	9,619		9,608	11	118,928	118,398	530				
Software publishers	5112	34,285	33,756		529	2,435		2,423 - 2,435	0 - 12	31,850	31,320 - 31,334	517 - 530				
Other information	other 51	94,263	94,250		12	7,185	i	7,173 - 7,185	0 - 12	87,078	87,065 - 87,078	0 - 13	i			
Professional, scientific, and technical services	54	34,619	15,888		18,730	11,924	i	5,403	6,521	22,695	10,485	12,210	i			
Scientific research and development services	5417	19,068	i	1,001	18,067	i	6,461	i	367	6,095	i	635	11,972	i		
Other professional, scientific, and technical services	other 54	15,551		14,887	663	5,463		5,037	426	10,088	9,851	237				
Total foreign R&D performance																
All industries	21–23, 31–33, 42–81	135,412	120,270		15,142	i	24,477		19,940	4,537	i	110,936	100,330	10,605	i	
Manufacturing industries	31–33	78,389	76,683		1,706		14,143		13,865	279		64,245	62,818	1,427		
Chemicals	325	23,741	23,419		322		5,980		5,875	105		17,761	17,544	217		
Pharmaceuticals and medicines	3254	20,936	20,656		280		5,171		5,099	73		15,765	15,558	207		
Other chemicals	other 325	2,805	2,763		42		809		777	32		1,996	1,986	10		
Computer and electronic products	334	31,535	31,264		271		4,028	i	3,993	i	36	27,506	27,271	235		
Semiconductor and other electronic components	3344	16,521	16,384		137		2,265	i	2,262	i	4	14,256	14,122	134		
Other computer and electronic products	other 334	15,014	14,880		133		1,763		1,731	32		13,250	13,149	101		
Nonmanufacturing industries	21–23, 42–81	57,024	43,588		13,436	i	10,333	i	6,075	i	4,258	i	46,690	37,512	9,178	i
Information	51	29,258	29,210		48		2,835		2,831	5		26,423	26,380	43		
Software publishers	5112	9,933	9,908		25		1,028		1,028	0		8,904	8,880	25		
Other information	other 51	19,325	19,302		23		1,807		1,802	5		17,519	17,500	19		
Professional, scientific, and technical services	54	18,763	i	5,423	13,340	i	5,004	i	787	4,217	i	13,759	4,636	9,123	i	
Scientific research and development services	5417	13,630	i	353	13,277	i	4,232	i	36	4,196	i	9,398	317	9,081	i	
Other professional, scientific, and technical services	other 54	5,133		5,070	63		773		751	22	i	4,361	4,319	42		

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

NAICS = 2017 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 or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.



TABLE 25

**Foreign R&D paid for by the company and others and performed by the company, by type of R&D, selected industry, and location: 2021**

(Millions of U.S. dollars)

Industry and location	NAICS code	Total foreign R&D performance	Research (basic and applied)	Development
All locations				
All industries	21-23, 31-33, 42-81	135,412	24,477	110,936
Manufacturing industries	31-33	78,389	14,143	64,245
Chemicals	325	23,741	5,980	17,761
Pharmaceuticals and medicines	3254	20,936	5,171	15,765
Computer and electronic products	334	31,535	4,028 i	27,506
Semiconductor and other electronic components	3344	16,521	2,265 i	14,256 i
Nonmanufacturing industries	21-23, 42-81	57,024	10,333 i	46,690 i
Information	51	29,258	2,835	26,423
Software publishers	5112	9,933	1,028	8,904
Professional, scientific, and technical services	54	18,763 i	5,004 i	13,759 i
Scientific research and development services	5417	13,630 i	4,232 i	9,398 i
Africa				
All industries	21-23, 31-33, 42-81	605	113	492 i
Manufacturing industries	31-33	265	65	199
Chemicals	325	96	20	75
Pharmaceuticals and medicines	3254	80	4 - 21	59 - 76
Computer and electronic products	334	0 - 23	0 - 23	0 - 23
Semiconductor and other electronic components	3344	*	*	* i
Nonmanufacturing industries	21-23, 42-81	340 i	48 i	293 i
Information	51	67	5	62
Software publishers	5112	38	4	34
Professional, scientific, and technical services	54	166 i	4	162 i
Scientific research and development services	5417	147 i	2	144 i
Asia and Pacific				
All industries	21-23, 31-33, 42-81	45,196	7,026 i	38,170
Manufacturing industries	31-33	27,495	4,586	22,909
Chemicals	325	5,698	1,292	4,406
Pharmaceuticals and medicines	3254	4,903	1,123	3,780
Computer and electronic products	334	14,462	1,910 i	12,552 i
Semiconductor and other electronic components	3344	8,812	1,185 i	7,627 i
Nonmanufacturing industries	21-23, 42-81	17,701	2,441 i	15,261 i
Information	51	9,044	806	8,238
Software publishers	5112	3,826	354	3,471
Professional, scientific, and technical services	54	4,811 i	598	4,213 i
Scientific research and development services	5417	3,109 i	380	2,729 i
Canada				
All industries	21-23, 31-33, 42-81	9,283	1,561	7,721
Manufacturing industries	31-33	4,149	618	3,531
Chemicals	325	865	196	669
Pharmaceuticals and medicines	3254	820	186	634
Computer and electronic products	334	2,038	194	1,845 i
Semiconductor and other electronic components	3344	1,060	95 i	965 i
Nonmanufacturing industries	21-23, 42-81	5,134	944	4,190
Information	51	3,088	310	2,778
Software publishers	5112	1,554	148 i	1,405 i
Professional, scientific, and technical services	54	1,378	485	893 i
Scientific research and development services	5417	723	400	324 i
Europe				

TABLE 25

**Foreign R&D paid for by the company and others and performed by the company, by type of R&D, selected industry, and location: 2021**

(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	64,996		13,282		51,714	
Manufacturing industries	31-33	36,095		7,171		28,924	
Chemicals	325	15,345		4,012		11,333	
Pharmaceuticals and medicines	3254	13,612		3,459		10,153	
Computer and electronic products	334	9,057		1,243		7,814	
Semiconductor and other electronic components	3344	3,088		477	i	2,611	i
Nonmanufacturing industries	21-23, 42-81	28,901		6,111	i	22,790	i
Information	51	14,274		1,453		12,822	
Software publishers	5112	3,764		445		3,320	
Professional, scientific, and technical services	54	10,900	i	3,586	i	7,314	i
Scientific research and development services	5417	8,987	i	3,389	i	5,598	i
Latin America and other Western Hemisphere <sup>a</sup>							
All industries	21-23, 31-33, 42-81	5,376		846		4,530	i
Manufacturing industries	31-33	3,884		700		3,183	i
Chemicals	325	1,025		257		768	
Pharmaceuticals and medicines	3254	890		229		660	
Computer and electronic products	334	1,448 - 1,540	i	0 - 181	i	1,267 - 1,540	i
Semiconductor and other electronic components	3344	406 - 631		0 - 99	i	324 - 535	i
Nonmanufacturing industries	21-23, 42-81	1,492		145	i	1,347	i
Information	51	516		25		490	
Software publishers	5112	69 - 80		0 - 9		70	
Professional, scientific, and technical services	54	708	i	37		671	i
Scientific research and development services	5417	483	i	17		467	i
Middle East							
All industries	21-23, 31-33, 42-81	8,757		1,393	i	7,364	i
Manufacturing industries	31-33	5,465		780	i	4,685	i
Chemicals	325	548		138		410	
Pharmaceuticals and medicines	3254	504		124		380	
Computer and electronic products	334	4,059		503	i	3,556	i
Semiconductor and other electronic components	3344	2,931		412	i	2,519	i
Nonmanufacturing industries	21-23, 42-81	3,292		613		2,679	
Information	51	2,207		224		1,984	
Software publishers	5112	660		70		590	
Professional, scientific, and technical services	54	704		275		429	
Scientific research and development services	5417	149	i	40	i	109	i
Puerto Rico <sup>b</sup>							
All industries	21-23, 31-33, 42-81	743	i	123		619	i
Manufacturing industries	31-33	733	i	119		613	i
Chemicals	325	158		62		96	
Pharmaceuticals and medicines	3254	117 - 130		21 - 48		72 - 97	
Computer and electronic products	334	135 - 473	i	0 - 58	i	77 - 473	i
Semiconductor and other electronic components	3344	2		0		2	
Nonmanufacturing industries	21-23, 42-81	10		4		6	i
Information	51	2		*	i	2	i
Software publishers	5112	1		*		1	
Professional, scientific, and technical services	54	8		4		4	i
Scientific research and development services	5417	2		2		*	i

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

NAICS = 2017 North American Industry Classification System.

<sup>a</sup> Other Western Hemisphere is defined as Argentina, Brazil, Chile, Mexico, and other Latin America.

<sup>b</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 does not equal all locations due to the undistributed portion not being published. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and also performed foreign R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 26  
Domestic R&D paid for and performed by the company, by type of cost, industry, and company size: 2021  
(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	527,804	287,984	60,491	23,725	8,605	32,925	7,770	18,433	3,450	15,319	69,102
Manufacturing industries	31–33	287,666	149,421	18,527	11,917	3,564	27,881	4,399	12,251	2,760	10,105	46,842
Food	311	4,963 - 4,968	2,954	36	191	23	794	57	224 - 236	25	145	512
Beverage and tobacco products	312	1,228	624	12	62	2	105	5	67	0	54	297
Textile, apparel, and leather products	313–16	818	643	7	17	3	55	5	15	3	16	54
Wood products	321	433 - 442	221	0	34 r	5	131 r	14 r	2	0	1	25 - 33
Paper	322	1,139	451	3	8	20	542	5	7	2	3	99 i
Printing and related support activities	323	196 - 205 i	143	1 i	7 i	1 i	18 i	4	11 i	*	10 i	1 - 9 i
Petroleum and coal products	324	952	506	0	15	1	46	4	43	2	170	165
Chemicals	325	97,097	40,199	6,251	6,875	897	9,071	1,960	3,679	1,475	5,944	20,745
Basic chemicals	3251	2,559	1,442	35	28 - 42	4 - 18	302	64	165	39	187	263 - 277
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,291 - 1,320 i	824	11	57	2	76 - 120	0 - 20	73 - 100	12	52	91 - 143 i
Pesticide, fertilizer, and other agricultural chemicals	3253	915 - 946	528 - 560 i	1 i	71 - 88 i	2 i	80 - 148 i	14 - 47 i	53 - 80 i	23	13 i	91 i
Pharmaceuticals and medicines	3254	88,524	34,997	6,183	6,616	867	8,345	1,816	3,204	1,400	5,647	19,448
Soap, cleaning compound, and toilet preparations	3256	2,531	1,477	17	71	1	142	4 - 37	107	1	23	651 - 690
Paint, coating, adhesive, and other chemicals	3255, 3259	1,242 - 1,252	901 - 929	5	16	5 - 22	54 - 82	9	22 - 49	*	22	108 - 160
Plastics and rubber products	326	2,961	1,738	31	86	41	405	18	111	8	98	425
Nonmetallic mineral products	327	1,503	949	13	47	3	78	15	88	*	44	264
Primary metals	331	887 - 890	320	1	3	1	349	3	15 - 22	*	132	59
Fabricated metal products	332	3,879	2,243	43	158	43	981	42	79	7	43	240
Machinery	333	16,726	9,745	363	658	132	2,262	293	681	49	547	1,997
Agricultural implement	33311	1,799 - 1,807	967 - 1,029	1	78	7	211	8	41 - 60	2	127 - 140	265 - 327
Semiconductor machinery	333242	5,182	2,635	278	49	37	559 i	184	373	9	170	889
Engine, turbine, and power transmission equipment	3336	1,239 - 1,246	754	6	36	11	86	24	35 - 47	7	113	165
Other machinery	other 333	8,499	5,326 - 5,390	79	495	78	1,406	78	201 - 220	31	124 - 137	615 - 678

TABLE 26  
Domestic R&D paid for and performed by the company, by type of cost, industry, and company size: 2021  
(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	94,211	52,598	10,649	1,534	1,593	6,498	1,493	5,272	830	867	12,877
Communications equipment	3342	11,339	6,379	888	400	130	254	772	480	25 i	110	1,902
Semiconductor and other electronic components	3344	45,516	23,979	4,954	764	314	4,006	228	2,360	409	213	8,290
Navigational, measuring, electromedical, and control instruments	3345	10,014	6,460	336	196	101	808	84	299	25	383	1,320
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	2,837	1,733	200	43	17	183	23	64	19	160	395
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	2,109	1,411	47	70	15	178	15	65	*	50 i	259
Other measuring and controlling devices	other 3345	5,068	3,316	90	84	70	448	46	170	6	173	666
Other computer and electronic products	other 334	27,342	15,780	4,472	174	1,047	1,430	408	2,133	372	161	1,366
Electrical equipment, appliances, and components	335	5,007	3,146	134	195	45	384	75	113	39	185	690
Transportation equipment	336	34,405	21,041	389	1,133	550	4,359	209	1,181	285	758	4,500
Motor vehicles, bodies, trailers, and parts	3361-63	22,754	14,769	298	916	497	2,850	156	969	216 - 268	268	1,758 - 1,818
Aerospace products and parts	3364	9,900	5,176	55	158	32 i	1,109	43	177	18	458	2,675
Aircraft, aircraft engine, and aircraft parts	336411-13	9,293	4,893	54	138	28 i	903	40	171	18	438	2,610
Guided missile, space vehicle, and related parts	336414-15, 336419	608	283	1	20	4	206	3	6	0	20	65
Military armored vehicle, tank, and tank components	336992	20 - 24	12	0	2	1	*	*	2 r	0	1	0 - 8
Other transportation	other 336	1,726 - 1,731	1,084	37	56	20	399 i	9	33	0 - 52	31	2 - 63 i
Furniture and related products	337	423	296	2	11	6	43	2	10	3	22	28
Miscellaneous	339	20,822	11,603	590	885	197	1,759	195	644	32	1,066	3,851
Medical equipment and supplies	3391	18,204	9,919	559	844	171	1,377	137	597	21	1,004	3,576
Other miscellaneous manufacturing	3399	2,618	1,684	32 i	41	27	382	58	46	11	62	275
Nonmanufacturing industries	21-23, 42-81	240,138	138,563	41,964	11,808	5,041	5,044	3,372	6,182 i	690	5,214	22,260
Mining, quarrying, oil and gas extraction, and support activities	21	1,077 - 1,151	577	8	9	31	93 i	51	14	*	298	0 - 73 i
Utilities	22	133 - 17,961	0 - 11,040	1	14	*	0 - 308 i	2	9	3	0 - 77	0 - 6,505 i
Wholesale trade	42	1,661 - 1,770 i	1,232 i	*	51 i	2 i	192 i	5	30	10	10 i	125 - 241 i
Electronic shopping and electronic auctions	454111-12	5,931 - 24,034 i	0 - 11,040 i	3,694 - 4,337 i	147 i	0 - 341 i	0 - 308 i	169 i	1,222 i	* i	26 i	0 - 6,505 i

TABLE 26  
Domestic R&D paid for and performed by the company, by type of cost, industry, and company size: 2021  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Salaries, wages, and fringe benefits	Stock-based compensation	Temporary staffing	Expensed equipment	Materials and supplies	Lease and rental payments	Depreciation	Royalties and licensing fees	Other purchased services (except R&D)	Other
Transportation and warehousing	48-49	7,198 - 7,200	3,115	819	i 152	290	i 1,002	i 204	221 - 224	45	437	913
Information	51	146,488	86,859	29,350	7,579	2,943	1,046	1,942	2,893	357	3,151	10,368
Publishing	511	38,521	24,774	5,297	1,815	366	571	401	461	144	1,547	3,145
Newspaper, periodical, book, and directory publishers	5111	81	72	0	2	*	i *	i *	*	0	3	3 i
Software publishers	5112	38,441	24,701	5,297	1,813	366	571	401	460	144	1,544	3,142
Telecommunications	517	3,736 - 3,805	2,859 - 2,929	31	i 105	15	53	9 - 19	3 - 10	8	r 632	i 0 - 27
Data processing, hosting, and related services	518	44,585	28,126	7,844 - 7,880	1,171	690	318	661	549	182	796	4,214 - 4,250
Other information	other 51	59,577 - 59,647	31,030 - 31,100	16,141 - 16,177	4,488	1,871	103	861 - 871	i 1,872 - 1,879	i 22	176	2,946 - 2,982
Finance and insurance	52	20,902	11,083	4,792	2,012	658	193	157	643	52	301	i 1,011
Real estate and rental and leasing	53	2,095 - 2,097	1,034	669	0 - 228	27	4	6	20	0 - 29	8	67 - 332
Lessors of nonfinancial intangible assets (except copyrighted works)	533	5 - 8	1	0	*	0 - 6	1	0	0	0	1	0 - 6
Other real estate and rental and leasing	other 53	2,087 - 2,091	1,033	669	0 - 228	20 - 28	3	6	20	0 - 29	7	62 - 332
Professional, scientific, and technical services	54	32,083	20,135	1,860	1,513	742	1,936	741	1,081	179	823	3,073
Architectural, engineering, and related services	5413	2,553	2,199	5	28	13	184	7	9	1	i 10	97
Computer systems design and related services	5415	17,188	11,361	1,130	915	428	519	173	612	62	244	1,745
Scientific research and development services	5417	6,123	3,174	490	211	164	787	180	188	30	248	652
Research and development in nanotechnology	541713	154	88	1	i 8	3	i 19	6	6	1	i 4	i 18
Research and development in biotechnology (except nanobiotechnology)	541714	1,664	724	138	71	24	175	65	53	16	138	259
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	4,266	2,333	351	131	137	593	109	128	12	99	374
Research and development in the social sciences and humanities	541720	38	29	0	*	0	0	*	1	0	6	1
Other professional, scientific, and technical services	other 54	6,218	3,401	236	360	137	445	381	272	86	321	579
Health care services	621-23	1,965 - 2,043	1,035	132	108	12	275	56	39	19	86	200 - 285

TABLE 26  
Domestic R&D paid for and performed by the company, by type of cost, industry, and company size: 2021  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Salaries, wages, and fringe benefits	Stock-based compensation	Temporary staffing	Expensed equipment	Materials and supplies	Lease and rental payments	Depreciation	Royalties and licensing fees	Other purchased services (except R&D)	Other
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2,501 - 3,136	2,458	0 - 634	0 - 228	0 - 341 i	0 - 308	39	5 - 11	0 - 29	0 - 77	0 - 634
All companies (number of domestic employees)	–	527,804	287,984	60,491	23,725	8,605	32,925	7,770	18,433	3,450	15,319	69,102
Small companies												
10–19 <sup>a</sup>	–	4,258	2,605	76	i 185	191	r 435	89	83	35	180	380
20–49	–	12,626	7,749	291	436	119	1,790	244	226	189	625	958
Medium companies												
50–99	–	12,488	7,418	582	645	169	1,420	303	250	65	486	1,149
100–249	–	20,030	12,651	1,034	746	275	1,932	342	461	165	638	1,787
Large companies												
250–499	–	20,574	11,257	1,873	982	230	1,540	442	439	206	1,193	2,412
500–999	–	23,655	13,315	1,882	1,041	201	2,095	408	737	388	758	2,831
1,000–4,999	–	83,609	45,089	13,679	2,376	1,670	4,531	1,074	2,369	577	3,012	9,232
5,000–9,999	–	53,873	30,076	5,860	2,277	661	3,373	1,150	2,150	342	2,082	5,902
10,000–24,999	–	84,057	44,587	5,879	5,091	862	6,398	1,036	3,847	440	3,065	12,852
25,000 or more	–	212,634	113,236	29,336	9,947	4,226	9,409	2,682	7,872	1,044	3,282	31,599

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 27  
Domestic R&D paid for and performed by the company, by industry and company size: 2021  
(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	527,804	4,258	12,626	12,488	20,030	20,574	23,655	83,609	53,873	84,057	212,634
Manufacturing industries	31–33	287,666	1,498	6,215	7,139	10,514	12,235	13,729	39,457	35,843	66,080	94,956
Food	311	4,963 - 4,968	3	16 - 90	218	162 - 230	170	288	461 - 527	473 - 520	2,037 - 2,189	932 i
Beverage and tobacco products	312	1,228	3 r	15	23	26	19	18	157	305	66	595
Textile, apparel, and leather products	313–16	818	*	18	34 i	61	19	54	181	209	242	0
Wood products	321	433 - 442	179 r	0 - 50	11	12	7	1 - 10	73	104	0 - 50	0
Paper	322	1,139	5	5 r	6	32	28	19	197	78	349 i	420
Printing and related support activities	323	196 - 205 i	1	0 - 7	26	23	25	3	13	28	78 i	0
Petroleum and coal products	324	952	3	4	42	15	19	33	23	68 - 74	119 - 125	621
Chemicals	325	97,097	671	2,787	3,593	5,002	6,937	5,032	10,803	10,539	31,350	20,382
Basic chemicals	3251	2,559	0 - 6	65	74	237	142	145	823 - 834	638	428 i	0
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,291 - 1,320 i	0 - 7 i	16	24	90	73	53	98 - 139 i	0	616 i	311
Pesticide, fertilizer, and other agricultural chemicals	3253	915 - 946	3	20	30	33	0 - 103 i	0 - 129	293 - 326	20 - 65	247 - 518	0
Pharmaceuticals and medicines	3254	88,524	631	2,622	3,348	4,462	6,587	4,622	8,780	9,574	29,173	18,724
Soap, cleaning compound, and toilet preparations	3256	2,531	0 - 35	21	35	90	35	86	376 i	264 - 307	361 i	1,224
Paint, coating, adhesive, and other chemicals	3255, 3259	1,242 - 1,252	0 - 35 i	43	82	89	0 - 103	0 - 129	385 - 395	0	252 - 522	123
Plastics and rubber products	326	2,961	0 - 26	20 - 94	103	188	227	215	917	691	233 - 337	266
Nonmetallic mineral products	327	1,503	12	46	85	58	22	169	36	95	981	0
Primary metals	331	887 - 890	0	13 - 19	62	71	27	32	235	413 - 419	27	0
Fabricated metal products	332	3,879	61 - 115	846	327	685	399	341	868	124 - 171	177	0
Machinery	333	16,726	89	561	737	938	701	735	2,127	3,337	4,681	2,821
Agricultural implement	33311	1,799 - 1,807	0 - 87	28	0 - 663	0 - 63	0 - 613	63	167	463 - 532	0	0 - 1,019
Semiconductor machinery	333242	5,182	3	8	42	56	53	303	741	1,735	2,239	0
Engine, turbine, and power transmission equipment	3336	1,239 - 1,246	0 - 6	22	33	95	37	42	51	353	609	0
Other machinery	other 333	8,499	0 - 87	502	0 - 663	723 - 789	0 - 613	327	1,168	717 - 787	1,832	1,801 - 2,821



TABLE 27  
Domestic R&D paid for and performed by the company, by industry and company size: 2021  
(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)																
		All companies	10–19 <sup>a</sup>	20–49	50–99	100–249	250–499	500–999	1,000–4,999	5,000–9,999	10,000–24,999	25,000 or more						
Computer and electronic products	334	94,211	174 - 222	1,059	944	1,274	2,242	3,005	12,496	13,514	14,625 - 14,666	i	44,833					
Communications equipment	3342	11,339	0 - 74	0 - 131	71 - 146	0 - 794	0 - 568	0 - 1,000	2,366	0 - 4,116	0		2,145 - 8,903					
Semiconductor and other electronic components	3344	45,516	21 - 94	554	0 - 546	0 - 794	1,275	1,175	i	5,706	6,153 - 6,323	i	15,693 - 17,182					
Navigational, measuring, electromedical, and control instruments	3345	10,014	65 - 81	374 - 402	253 - 328	481	399 - 559	832		1,411	3,077 - 3,905		1,664 - 2,757					
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	2,837	27	182	72	209	168	i	339	155	1,685	0	0					
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	2,109	0 - 15	71	23	58 - 157	i	0 - 103		0 - 494	198	0 - 1,760	0 - 1,760					
Other measuring and controlling devices	other 3345	5,068	39	121 - 149	157 - 234	116 - 213	192 - 289	0 - 494		1,058	0 - 2,219	353	117 - 2,757					
Other computer and electronic products	other 334	27,342	0 - 74	i	0 - 131	i	0 - 546	0 - 794	0 - 568	0 - 1,000	3,013	0 - 4,116	i	893 - 933	i	16,205 - 23,437		
Electrical equipment, appliances, and components	335	5,007	78	r	110	284	331	256	823	1,778	582	765	0					
Transportation equipment	336	34,405	26		172	150	816	526	1,586	5,049	1,892	5,451	18,736					
Motor vehicles, bodies, trailers, and parts	3361–63	22,754	11		33	55	418	253	867	3,794	1,216	3,251	12,857					
Aerospace products and parts	3364	9,900	15		99	27	318	243	504	918	371	2,082	5,324	i				
Aircraft, aircraft engine, and aircraft parts	336411–13	9,293	0 - 16		98	26	65 - 300	7 - 244	268 - 505	328 - 681	371	2,082	5,324	i				
Guided missile, space vehicle, and related parts	336414–15, 336419	608	0 - 16		1	1	18 - 253	0 - 235	0 - 235	237 - 589	0	0	0					
Military armored vehicle, tank, and tank components	336992	20 - 24	0		0 - 6	3	5	0	11	0	0	0	0					
Other transportation	other 336	1,726 - 1,731	1		33 - 41	65	75	30	204	338	305	119	i	556				
Furniture and related products	337	423	2	r	7	11	67	20	17	110	178	11	0					
Miscellaneous	339	20,822	127		333 - 454	484	690 - 746	591	1,344 - 1,362	3,875 - 3,930	3,151	4,678 - 4,745	5,351					
Medical equipment and supplies	3391	18,204	91		300	374	493	407	911	2,763	3,120	4,512	5,235					
Other miscellaneous manufacturing	3399	2,618	36		34 - 154	110	197 - 253	185	433 - 452	1,112 - 1,167	32	166 - 233	116					
Nonmanufacturing industries	21–23, 42–81	240,138	2,759		6,412	5,349	9,516	8,339	9,926	44,152	18,030	17,978	117,678					
Mining, quarrying, oil and gas extraction, and support activities	21	1,077 - 1,151	4		143	r	0 - 94	i	68	i	283	59	i	198	i	0 - 94	305	0

TABLE 27  
Domestic R&D paid for and performed by the company, by industry and company size: 2021  
(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	
Utilities	22	133 - 17,961	11	0 - 164	0	*	0	0 - 279	0 - 1,605	11	0 - 529	0 - 17,940	i
Wholesale trade	42	1,661 - 1,770	i 145	370	262	480	i 215	i 85	i 0 - 111	i 4	i 25	i 78	i
Electronic shopping and electronic auctions	454111–12	5,931 - 24,034	i 3 - 8	23	r 18	r 29	109	46	29	0 - 2,839	0 - 529	2,300 - 22,477	i
Transportation and warehousing	48–49	7,198 - 7,200	0	155	r 27	46	96	54 - 58	2,711	0 - 1,869	2,243	i 0 - 1,869	
Information	51	146,488	696	1,573	1,830	3,822	4,352	5,789	27,720	9,862	7,584	83,259	
Publishing	511	38,521	385	624 - 668	5 - 599	1,608	1,100	1,153	8,633	3,235	1,240 - 1,880	19,898	
Newspaper, periodical, book, and directory publishers	5111	81	0	11	r 6	3	60	i 1	0	0	0	0	
Software publishers	5112	38,441	385	613 - 657	0 - 594	1,605	1,040	1,152	8,633	3,235	1,240 - 1,880	19,898	
Telecommunications	517	3,736 - 3,805	46	r 2 - 72	35	99	13	178	50	31	31	3,252	
Data processing, hosting, and related services	518	44,585	252	772 - 835	1,197 - 1,260	1,783	3,049	3,052	14,088	5,665	4,203	i 10,459	
Other information	other 51	59,577 - 59,647	14	68	0 - 594	331	190	1,407	4,950	932	1,469 - 2,109	49,650	
Finance and insurance	52	20,902	115	351	r 111	290	335	1,179	7,147	3,042	i 2,740	5,593	
Real estate and rental and leasing	53	2,095 - 2,097	0 - 1	5	4	25	11	37	3 - 1,609	0 - 2,014	0	0 - 2,014	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	5 - 8	0	0	1 - 4	0	0	0	4	0	0	0	
Other real estate and rental and leasing	other 53	2,087 - 2,091	0 - 1	5	0 - 4	25	11	37	0 - 1,605	0 - 2,014	0	0 - 2,014	
Professional, scientific, and technical services	54	32,083	1,651	3,624	2,757	3,713	2,480	1,874	3,758	1,494	4,555	6,177	
Architectural, engineering, and related services	5413	2,553	129	426	334	523	284	149	515	76	118	0	
Computer systems design and related services	5415	17,188	780	1,843	1,047	1,065	1,321	1,355	1,438	1,369	2,608	i 4,363	
Scientific research and development services	5417	6,123	670	1,108	1,104	1,364	431	236	1,142	0	10	i 58	
Research and development in nanotechnology	541713	154	44	51	15	44	i 0	0	0	0	0	0	
Research and development in biotechnology (except nanobiotechnology)	541714	1,664	253	343	506	402	75	27	0	0	0	58	
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	4,266	370	705	582	918	336	209	1,136	0	10	i 0	

TABLE 27  
Domestic R&D paid for and performed by the company, by industry and company size: 2021  
(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)										
		All companies	10–19 <sup>a</sup>	20–49	50–99	100–249	250–499	500–999	1,000–4,999	5,000–9,999	10,000–24,999	25,000 or more
Research and development in the social sciences and humanities	541720	38	3	8	0	0	20	0	7	0	0	0
Other professional, scientific, and technical services	other 54	6,218	72	247	273	761	444	134	663	49	1,819	1,757
Health care services	621–23	1,965 - 2,043	12	8 - 94	94	274	296	528	643	9	1	96
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2,501 - 3,136	114 - 119	0 - 164	148 - 250	768	r 162	0 - 279	341	772	0 - 529	0 - 831

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 28

**Domestic R&D paid for and performed by the company, by type of R&D, industry, and company size: 2021**

(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	527,804	32,763	69,130	425,912
Manufacturing industries	31–33	287,666	24,098	44,230	219,337
Food	311	4,963 - 4,968	409 - 415	970	3,584
Beverage and tobacco products	312	1,228	77	179	972
Textile, apparel, and leather products	313–16	818	73	90	655
Wood products	321	433 - 442	21	29	383 - 393
Paper	322	1,139	137	322	680
Printing and related support activities	323	196 - 205	0 - 9	24 - 33	164
Petroleum and coal products	324	952	266	288	398
Chemicals	325	97,097	15,468	19,049	62,580
Basic chemicals	3251	2,559	273	706	1,580
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,291 - 1,320	224	344	724 - 753
Pesticide, fertilizer, and other agricultural chemicals	3253	915 - 946	139 - 208	236 - 305	501
Pharmaceuticals and medicines	3254	88,524	14,599	17,210	56,715
Soap, cleaning compound, and toilet preparations	3256	2,531	97 - 138	248 - 289	2,144
Paint, coating, adhesive, and other chemicals	3255, 3259	1,242 - 1,252	66 - 94	236 - 264	885 - 914
Plastics and rubber products	326	2,961	201	546	2,214
Nonmetallic mineral products	327	1,503	247	324	932
Primary metals	331	887 - 890	29 - 32	76	781
Fabricated metal products	332	3,879	212	734	2,932
Machinery	333	16,726	1,366	2,190	13,170
Agricultural implement	33311	1,799 - 1,807	128 - 135	185 - 213	1,452 - 1,480
Semiconductor machinery	333242	5,182	600	696	3,886
Engine, turbine, and power transmission equipment	3336	1,239 - 1,246	22 - 30	174	1,043
Other machinery	other 333	8,499	601 - 615	1,106 - 1,136	6,760 - 6,789
Computer and electronic products	334	94,211	2,762	9,957	81,492
Communications equipment	3342	11,339	348	897	10,094
Semiconductor and other electronic components	3344	45,516	1,415	3,150	40,951
Navigational, measuring, electromedical, and control instruments	3345	10,014	477	2,121	7,416
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	2,837	104	1,118	1,614
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	2,109	35	177	1,896
Other measuring and controlling devices	other 3345	5,068	337	826	3,905
Other computer and electronic products	other 334	27,342	521	3,789	23,032
Electrical equipment, appliances, and components	335	5,007	332	585	4,090
Transportation equipment	336	34,405	1,620	6,256	26,528
Motor vehicles, bodies, trailers, and parts	3361–63	22,754	910	4,913	16,931
Aerospace products and parts	3364	9,900	650	1,165	8,085
Aircraft, aircraft engine, and aircraft parts	336411–13	9,293	644	1,116	7,532
Guided missile, space vehicle, and related parts	336414–15, 336419	608	6	49	553
Military armored vehicle, tank, and tank components	336992	20 - 24	4	3	12 - 18

TABLE 28

**Domestic R&D paid for and performed by the company, by type of R&D, industry, and company size: 2021**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
Other transportation	other 336	1,726 - 1,731	55 i	176	1,494 - 1,501
Furniture and related products	337	423	34	126	263
Miscellaneous	339	20,822	820 - 832	2,470 - 2,484	17,507 - 17,527
Medical equipment and supplies	3391	18,204	642	2,187	15,375
Other miscellaneous manufacturing	3399	2,618	178 - 189	283 - 296	2,133 - 2,153
Nonmanufacturing industries	21–23, 42–81	240,138	8,664	24,899	206,575
Mining, quarrying, oil and gas extraction, and support activities	21	1,077 - 1,151	87	137	852 - 927
Utilities	22	133 - 17,961	10	0 - 1,505	0 - 17,952
Wholesale trade	42	1,661 - 1,770 i	173 i	366 i	1,121 - 1,232 i
Electronic shopping and electronic auctions	454111–12	5,931 - 24,034 i	175	3,999 - 5,510 i	247 - 19,859 i
Transportation and warehousing	48–49	7,198 - 7,200	102	483	6,612 - 6,616 i
Information	51	146,488	4,078	8,919	133,492
Publishing	511	38,521	1,294	1,964	35,263
Newspaper, periodical, book, and directory publishers	5111	81	3 r	6 r	72
Software publishers	5112	38,441	1,291	1,958	35,191
Telecommunications	517	3,736 - 3,805	218 - 295	801 - 833	2,683 - 2,706
Data processing, hosting, and related services	518	44,585	1,507	3,293	39,785
Other information	other 51	59,577 - 59,647	981 - 1,058	2,828 - 2,860	55,737 - 55,761
Finance and insurance	52	20,902	422	2,191	18,288 i
Real estate and rental and leasing	53	2,095 - 2,097	0 - 583	380 - 965	1,130 - 1,133
Lessors of nonfinancial intangible assets (except copyrighted works)	533	5 - 8	1	4	0 - 4
Other real estate and rental and leasing	other 53	2,087 - 2,091	0 - 582	376 - 961	1,127 - 1,133
Professional, scientific, and technical services	54	32,083	2,880	6,445	22,758
Architectural, engineering, and related services	5413	2,553	205	435	1,913
Computer systems design and related services	5415	17,188	1,541	3,158	12,489
Scientific research and development services	5417	6,123	640	1,240	4,242
Research and development in nanotechnology	541713	154	17 i	38 i	99 i
Research and development in biotechnology (except nanobiotechnology)	541714	1,664	95	516	1,054
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	4,266	529	668	3,069
Research and development in the social sciences and humanities	541720	38	0	18	20
Other professional, scientific, and technical services	other 54	6,218	494 i	1,611 i	4,113
Health care services	621–23	1,965 - 2,043	159	453	1,353 - 1,432
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2,501 - 3,136	0 - 582	0 - 1,524	978 - 3,118

TABLE 28

**Domestic R&D paid for and performed by the company, by type of R&D, industry, and company size: 2021**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
All companies (number of domestic employees)	–	527,804	32,763	69,130	425,912
Small companies					
10–19 <sup>a</sup>	–	4,258	373	926	2,958
20–49	–	12,626	1,130	2,787	8,710
Medium companies					
50–99	–	12,488	1,190	2,639	8,659
100–249	–	20,030	1,743	3,682	14,606
Large companies					
250–499	–	20,574	2,367	3,579	14,628
500–999	–	23,655	1,588	3,619	18,448
1,000–4,999	–	83,609	4,758	10,889	67,961
5,000–9,999	–	53,873	3,738	5,907	44,228
10,000–24,999	–	84,057	7,444	11,810	64,804
25,000 or more	–	212,634	8,431	23,292	180,910

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

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 29-A  
Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (A–M): 2021

(Millions of U.S. dollars and number of companies)

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	29,860		527,804	1,383	188 i	6,947	452	199,157	7,213	6,887	2,137	652	7,545	5,249	372 i	2,203	15,398	7,888 i	2,338	1,960	897	444	444	4,550	33,937	19,420	7,754	307	4,927	237
Manufacturing industries	31–33	14,980		287,666	932	139 i	5,943	326	92,329	3,701	6,118	1,718	143 i	3,578	2,260	268 i	1,988	11,105	7,366 i	1,820	1,528	663	247	316	3,141	25,634	17,986	5,860	252	3,433	122 i
Food	311	880		4,963 - 4,968	25	0 - 137 e	5	62	280	69	28	299 i	* e	43	34	0 - 174 i	60	815 i	260	586	124	28	5 e	1 e	94	33	132	447	14	79	4
Beverage and tobacco products	312	190		1,228	* e	* e	* e	* e	55	6	* e	* e	2	29	155	* e	* e	89	2	* e	* e	47	* e	* e	* e	13	3	10	* e	* e	* e
Textile, apparel, and leather products	313–16	300		818	6	* e	1	1	291	19	1 e	* e	* e	18	57	0 - 30 e	* e	8	1 e	1 e	2	1	* e	1 e	1 e	18	14	6	* e	2 e	* e
Wood products	321	150		433 - 442	11 e	* e	5 e	4 e	36	5	1 e	* e	* e	11	26	* e	6	4 e	14 e	18	1 e	7 e	3 e	2 e	2 e	1 e	16	48	11	6 e	1 e
Paper	322	120		1,139	37	* e	1	17	16	* e	2	* e	* e	20	41	* e	* e	34	2 r	1	9	18	4	14	2	31 i	16	8	1	1 e	* e
Printing and related support activities	323	170		196 - 205 i	* e	* e	17 i	1	25 i	13	* i	* e	* e	1 i	2	0 - 26 e	* e	4 i	* e	2 i	4	5	* e	* i	* e	5	5	18 i	* e	6	* r
Petroleum and coal products	324	110		952	1 i	* e	* e	9	22	* i	* e	* e	0	2	1	0	* e	20	6	* e	5	15	1 r	* e	9	* e	* e	* e	8	3	0
Chemicals	325	2,120		97,097	191 i	0 - 137 i	237	63 i	22,296	345	4,566	1,229	112 i	745	404	55	100 i	4,758	4,278 i	245	228	197	71	19	1,299	17,375	819	406	27 i	2,224	9
Basic chemicals	3251	240		2,559	1 i	0	4	14	234	1	75	150	0	5	121	* e	* e	84	10	102	52	11	29	* e	69	65	19	5	5	29	* e
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	120		1,291 - 1,320 i	0 - 11 e	0	* e	* e	28	* e	0 - 47 i	0 - 47	0	0 - 8	49	0	* e	15	6 i	4	* e	14	37	3	* e	3 i	266	5	16 i	* e	* e
Pesticide, fertilizer, and other agricultural chemicals	3253	100		915 - 946	2	0	6	*	26	17	1	101 - 153	0	12	3	0	5	12	1	15	6	* e	* e	* e	* e	5 i	25	0 - 76	2	10	1
Pharmaceuticals and medicines	3254	1,110		88,524	179 i	0 - 137 i	221	48 i	21,664	314	4,313	928	112 i	712	185	55	94 i	4,491	4,236 i	115	95	38	4	16	1,228	17,200	463 i	177	3	2,133	7
Soap, cleaning compound, and toilet preparations	3256	290		2,531	* e	0	2 r	* e	198	9	93	* e	0	11	14	* e	* e	100	2 e	3	73 i	* e	* e	* e	* e	72	1 e	146	* e	9	* e
Paint, coating, adhesive, and other chemicals	3255, 3259	300		1,242 - 1,252	0 - 11	* e	5	* e	146	3	34 - 87	* e	0	0 - 8	32	0	*	56	23	7	3	134	1 e	*	1	29	45	0 - 76	* i	43	1 i
Plastics and rubber products	326	880		2,961	20	* e	420	1 e	190	40	40	12	0	58	41	0 - 51 e	4	72	86	11	9	50 i	58	1 e	114	125	234	91	7	12	* e
Nonmetallic mineral products	327	340		1,503	11	0 - 36 e	2 e	1 e	110	42	2 e	* e	* e	9	6 e	* e	* e	33	3 e	2 e	2 e	1 e	6	1 e	5	10	20	20	48	5 e	1 e
Primary metals	331	250		887 - 890	3	0	10	* e	28	2	2 i	* e	0	2	19	0	1 r	21	47	12	3	1 e	2	* e	2	35	40	33	8	4	* e
Fabricated metal products	332	2,160		3,879	33 e	2 e	66	8 e	464	105 i	83	3 e	* e	92	51 e	* e	8 e	230	151	27	55	27 e	25 e	4 e	34	118	171	103	12 e	82	9 r
Machinery	333	2,090		16,726	51	* e	123	84	4,202	58	153	4 i	0	265	268	1	43 i	1,722	364	578	173	92	33	11	223	635 i	462	460	26 i	146	74 i
Agricultural implement	33311	140		1,799 - 1,807	1	0	9	2	82	* e	* e	*	0	3	34	0	2	470	3	535	90	* e	10	*	1 r	*	18	110	* e	2	* e
Semiconductor machinery	333242	50		5,182	0	0	75 i	0	3,377	1 i	0	0	0	13	0	0	31 i	0	* e	0	0	0	0	0	0	392 i	0	9 i	0	0	72 i

TABLE 29-A  
Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (A–M): 2021  
(Millions of U.S. dollars and number of companies)

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
Engine, turbine, and power transmission equipment	3336	80	1,239 - 1,246	* e	0	1	1	79	* e	*	0	0	48	25	0	*	27	15	2 i	1	* e	7	3	8	21	30	6	*	13	*
Other machinery	other 333	1,830	8,499	50	* e	38	81	663	56	153	4 i	0	201	210	1	11	1,224	346	41	81	92	16	8	214	223	414	334	26 i	130	2 e
Computer and electronic products	334	2,040	94,211	138	1	4,421	33	49,995	2,236	237	145 i	27	1,342	518	39	1,714	1,053	109	109 i	615	50	17	65	713	3,932	313	957	11	79	13
Communications equipment	3342	270	11,339	83	0 - 2	93	8	4,683	258	30	86 i	18	619 i	249	18	11	575	44	6	42 i	8	6	4	604	362	94	97	6	35	4
Semiconductor and other electronic components	3344	610	45,516	25	0 - 2	3,795	11 i	23,020 i	1,068 i	27	3	0 - 10	181	20	*	1,582	97	15	0 - 69 i	0 - 574 e	34	0 - 8 e	31	18	1,551	58 i	142	0 - 4	11	0 - 7
Navigational, measuring, electromedical, and control instruments	3345	940	10,014	7	0 - 2 e	461	9	3,752	391	164	52	0 - 10 i	191	128	0 - 22	0 - 123 e	171	32	36	0 - 545	4 i	5	21	47 i	618	102	332	3	21 i	4
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	180	2,837	2	0	26	5	1,837	29	28	0 - 19 e	0	66	2	0	0 - 19	21	0 - 19	1 e	0 - 19 e	*	0 - 6 e	0 - 4 e	1	192	32	32	0	0 - 13 e	0 - 5 e
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	180	2,109	4	0	0 - 436	0	129	49	41	0	0 - 10	37	64	* e	0 - 123 e	0 - 151	11	6	0 - 545	*	* e	18	28 i	23	2	20	1 i	9	* e
Other measuring and controlling devices	other 3345	600	5,068	1	0 - 2 e	0 - 436 i	4	1,786	314	95	32 - 53	0 - 10 i	88	61	0 - 22	0 - 123 e	0 - 151	1 - 22	29	0 - 545	4 i	0 - 6	0 - 4	18	403	67	279	2	0 - 13 i	0 - 5
Other computer and electronic products	other 334	240	27,342	22	0	73	4 i	18,539	519	16 i	3	0 - 10	351	121	0 - 22	0 - 123 i	210	18	0 - 69	0 - 311	3 i	0 - 8	9	45	1,401 i	58	386	0 - 4 i	13	0 - 7
Electrical equipment, appliances, and components	335	570	5,007	9	0	31	2 e	1,305	27	54	* e	* e	28	94	0	17	243	35	25	6	6	5	* e	6	564	425	63	1 e	38	3
Transportation equipment	336	1,080	34,405	301	0 - 46	455	29	6,436 i	454	762	5	0 - 4 i	610 i	301 i	0 - 47	16	694	1,486	167 i	285	101	14	28	436 i	362 i	14,066	508	60 i	648	2
Motor vehicles, bodies, trailers, and parts	3361–63	530	22,754	92	* e	268	2	4,369 i	12	9	* e	0	16	59	* e	12	559	1,331	0 - 61	8	101	* e	* e	56	41	13,757	175	33 i	0 - 61	0 - 3
Aerospace products and parts	3364	320	9,900	160	0 - 46	174 i	25	1,943	415 i	739	5	0 - 4 i	529 i	71 i	0 - 46	0 - 5	86	149	25 - 168 i	269	0 - 1 i	8	23	312 i	318 i	104	19	26	513 - 649	0 - 3 e
Aircraft, aircraft engine, and aircraft parts	336411–13	300	9,293	81 i	0 - 46	175 i	25	1,724	232 - 416 i	730	5	0 - 4 i	495 i	71 i	0 - 46	0 - 5	84	149	23 - 166 i	269	0 - 1 i	8	22	129 - 313 i	317 i	105	19	0 - 27	513 - 649	0 - 3 e
Guided missile, space vehicle, and related parts	336414–15, 336419	30	608	79	0	0 - 175	*	219	0 - 182	10	0	0	34	0	0	0	3	0	2	0	0	0	1 i	0 - 182	2	0 - 105	0	0 - 27	0	0
Military armored vehicle, tank, and tank components	336992	20 r	20 - 24	0 - 7 e	0	0 - 7 i	0	2	0	0	0	0	0	0	0	0	0	0	0 - 7 e	0	0	0	2	1 i	0	14	0	0	0	0
Other transportation	other 336	220	1,726 - 1,731	41 - 51	* e	5 - 15	1 e	121	27	13 i	* e	0	65 i	171 i	1 e	0 - 5 e	49	6	0 - 74 e	7 i	0 - 1 e	6 e	3 i	66 i	3	191	314	1 e	0 - 74	* e
Furniture and related products	337	220	423	2	* e	2	* r	48	29	2 r	* e	* e	* e	5	0 - 28 e	* e	5	21	* e	* e	5	* e	* e	* e	13	126	23	9	* i	* e
Miscellaneous	339	1,400	20,822	92	* e	149	11	6,532	248	186	20	0 - 4	302	237	0 - 33 e	18	1,299	500	39 i	9 e	12	3 e	169	201	2,363	1,125	2,658	8	99	6 i
Medical equipment and supplies	3391	780	18,204	83	* e	111	3 e	6,061	223	95	15	0 - 4	255	175	1 e	1 e	1,144	481	3 e	4 e	2 e	1 e	168	194	2,228	1,027	2,637	4 e	86	* e



TABLE 29-A  
Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (A–M): 2021  
(Millions of U.S. dollars and number of companies)

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
Other miscellaneous manufacturing	3399	620		2,618	9	* e	38	8	471	25	91	4	0	47	62	0 - 32	17	155	19	36 i	5	10	2 e	1 e	6	135 i	98	21	4	13	5 i
Nonmanufacturing industries	21–23, 42–81	14,890		240,138	450	50	1,003	126	106,828	3,511	768	420	509	3,967	2,988	103	215	4,293	522	518	432	234	197	128	1,409	8,302	1,433	1,894	55	1,494	115
Mining, quarrying, oil and gas extraction, and support activities	21	170 i		1,077 - 1,151	* e	0 - 6	22 i	0 - 12 e	78	21 i	0 - 17 i	* e	0	* e	29 i	0 - 15 e	* e	0 - 82 e	0 - 48	* e	6 i	0 - 65 e	16 i	* e	*	* e	0 - 82 e	0 - 82 i	1 e	* e	0 - 10
Utilities	22	40		133 - 17,961	0 - 48 i	0	0	0	0 - 646	0 - 56	0	*	*	0 - 279	0 - 121 i	0 - 15	0	0 - 179	0	*	0	0	0 - 21	0	0 - 181	0	0	0 - 134	0 - 10 i	0 - 24 i	0
Wholesale trade	42	1,720		1,661 - 1,770 i	0 - 48 e	1 e	34 i	7 e	196	20 i	8 e	1 e	* e	45 e	77 i	1 e	8 i	156 i	41 i	59 i	26 i	10 e	40 i	1 e	13 e	26 i	61 i	50 i	3 e	25 i	2 e
Electronic shopping and electronic auctions	454111–12	180		5,931 - 24,034 i	2 i	* e	0 - 160 i	* e	4,844 i	137 i	7 i	3 i	5 i	0 - 279 i	0 - 121 i	* i	4	29 i	20 i	1 i	1 i	0 - 65 i	* e	* e	5 i	0 - 1,000 i	0 - 162 i	0 - 134 i	* e	3 i	1 i
Transportation and warehousing	48–49	80		7,198 - 7,200	2 e	4	7	11	3,444 i	26	3	1	1	69	9	12	34	148 i	5 e	2 e	5	3 e	5 e	1 e	153 - 334	17	32	4 e	15	13	1
Information	51	3,380		146,488	223	31	414	67	74,700	2,304	430	25	377	2,483	1,780	41	67	1,653	269	314	194	102	39	66	444	4,560	779	759	15	204	45
Publishing	511	1,410		38,521	86	3	198	28	9,460	703	87	12	27 e	761 i	411	11	28	391	146	36	68	10	10	19	119	1,769	439	277	2	57	11
Newspaper, periodical, book, and directory publishers	5111	60		81	*	* e	1	* e	17	1	1	* e	1 i	* e	1	* i	1 i	2 i	1	* e	1 i	* e	*	*	2 i	16 i	2 i	2	* e	1	* e
Software publishers	5112	1,350		38,441	85	3	198	28	9,442	702	86	12	26 e	760 i	410	11	27	389	145	36	67	10	9	18	117	1,753	437	275	2	56	11
Telecommunications	517	160		3,736 - 3,805	0 - 66	1 e	21	3	287	128	1	*	1	604	53	0 - 15	1	46	5	2 e	48	1 e	5	1	14	37	4	5	0 - 4 e	21	0 - 7 e
Data processing, hosting, and related services	518	1,660		44,585	73	27	150	34	25,664	854	0 - 110	10	125	934	1,037	17	31	778	101	146	61	78	22	38	229	1,733	229	443	11	110	29
Other information	other 51	180		59,577 - 59,647	0 - 66	* e	44	2	39,290	619	231 - 344	4	225	184	279	0 - 15	6	438	18	131	17	12	3	7	83	1,021	107	34	0 - 4	17	0 - 7
Finance and insurance	52	530 r		20,902	26	* e	98	6 e	9,770	108	117	318	7	411	196	1 e	8	1,186	21	29	25	14	6 e	38	139	181	81	328	4 e	47	1 e
Real estate and rental and leasing	53	50		2,095 - 2,097	* e	* e	1	*	1,326	10	* e	* e	*	0 - 279	11	*	1	4	* i	2	*	* e	* e	* e	6	2 r	*	1	*	0 - 24	* e
Lessors of nonfinancial intangible assets (except copyrighted works)	533	10		5 - 8	0	0	0	0	0	*	0	0	0	0	4	0	0	0	* i	0	0	0	0	0	2 i	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	40		2,087 - 2,091	* e	* e	1	*	1,326	10	* e	* e	*	0 - 279	7	*	1	4	* e	2	*	* e	* e	* e	4	2 r	*	1	*	0 - 24	* e
Professional, scientific, and technical services	54	6,290		32,083	150	10 e	261	23	10,296	806 i	188	63	109	683	765	36	86 i	937	121	61	133	43 e	74	18	471	2,375	318	616	11 e	1,158	58
Architectural, engineering, and related services	5413	1,260		2,553	20 e	4 e	21	6	400	81	43	3 e	10	102	57	10	33	93	40	9	25	8 e	20 e	9	75	76	63	38	4	107	11
Computer systems design and related services	5415	3,220		17,188	107	4 e	189	14	5,067	489 i	61	35	72	326	396	21	41 i	457	56	27	98	28	20 e	7 e	276 e	961	139	480	4 e	1,018	4 e
Scientific research and development services	5417	1,020		6,123	10	0	27	* e	2,368	126	52	23	1 i	129	25	3	5	66	10	17	2 i	2	8	1	72	1,065	71	44	1	21	41

TABLE 29-A  
Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (A–M): 2021

(Millions of U.S. dollars and number of companies)

Industry and company size	NAICS code	Companies, U.S. total <sup>a</sup> (number)		United States	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia	Florida	Georgia	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana	
Research and development in nanotechnology	541713	60		154	* i	0	* e	* e	49	2 i	* e	* e	* e	* r	* i	0	0	* e	* e	* e	* e	* e	* e	* e	* e	* e	* e	* i	* i	* e	2	* e
Research and development in biotechnology (except nanobiotechnology)	541714	240		1,664	* e	0	1	* e	583	18	23	20	* e	7	10	0	*	35	1 i	16	*	1	7	*	30	506	2	16	*	5 i	* e	
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	720		4,266	9	0	26	* e	1,715	106	30	2 i	*	121	15	3	5	31	9	* e	1 i	1	1	1	42	559	68	27	1	14	41	
Research and development in the social sciences and humanities	541720	20		38	0	0	0	0	22	0	0	0	1 i	0	0	0	0	0	0	0	0	0	0	0	0	*	0	0	0	0	0	
Other professional, scientific, and technical services	other 54	800		6,218	12	1 e	24	3 e	2,461	111	31	3 e	25 e	127	287	2 e	8	322	15	8	9 i	5 e	26	2 e	48	273	46	55	2 e	13 e	2	
Health care services	621–23	550	r	1,965 - 2,043	3 i	* e	11	4	1,533	28	2 i	* e	* e	0 - 78	e 5	* e	* e	6	1 e	1 e	3	1 e	0 - 21	e 1 i	1 e	145	4 e	6	* e	0 - 24	e 1 i	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,960		2,501 - 3,136	0 - 48 e	0 - 6 e	0 - 160 e	0 - 12 e	0 - 646	0 - 56	0 - 17 e	7	10	0 - 279 e	0 - 121	0 - 15	7	0 - 179	0 - 48	48	39	0 - 65	0 - 21 e	3 e	0 - 181 e	0 - 1,000	0 - 162	0 - 134	0 - 10 e	24 e	0 - 10 e	
All companies (number of domestic employees)	–	29,860		527,804	1,383	188 i	6,947	452	199,157	7,213	6,887	2,137	652	7,545	5,249	372 i	2,203	15,398	7,888 i	2,338	1,960	897	444	444	4,550	33,937	19,420	7,754	307	4,927	237	
Small companies																																
10–19 <sup>b</sup>	–	5,250		4,258	33 e	3 e	37 e	11 e	1,032	113	40 e	9 e	17 e	125 e	86 e	6 e	11 e	127 e	58 e	14 e	20 e	30 e	24 e	7 e	154	418	94 e	77 e	11 e	44 e	6 e	
20–49	–	8,700		12,626	82 e	10 e	128 e	27 e	3,268	285	119 e	42	30 e	353 e	184 e	19	36	359 e	137 e	128	82 e	54 e	58 e	19 e	254 e	1,338	345 e	242	22 e	123 e	20	
Medium companies																																
50–99	–	5,520		12,488	65 e	5 e	111	28 e	3,599	165	86	16	32	231	146 e	8 e	34	389	108 e	52	37 e	50	36 e	18	289	2,035	268	243	14 e	85 e	11	
100–249	–	5,330		20,030	106	4 e	169	43	6,839	387	185	117	39 e	406	346	14	58	621	215	63	112	66	75	18	212	2,393	536	344	46 i	149	24	
Large companies																																
250–499	–	1,970		20,574	62	26	130	13	6,811	517	248	14	27	525	349	8	46	705	111	107	159	32	57 i	6	308	2,505	458	297	20	160	17	
500–999	–	1,230		23,655	125	* e	334	28	9,114	402	200	10	13	629	379	16	10	575	186	119	56	53	10	9	358	2,486	501	395	45	58	5	
1,000–4,999	–	1,300		83,609	420	0 - 80	847	132	35,229	1,401	867	836	96	1,328	841	18	169	1,954	788	394	313	375	119	70	1,063	8,115	2,310	1,419	60 i	404	54	
5,000–9,999	–	260		53,873	38	0 - 141	728	22	25,478	957	785	107	44	674	706	29	43	1,369	635	88	760	50	13	166	375	1,985	1,054	622	25	172	3	
10,000–24,999	–	200		84,057	227 i	0 - 141 i	406	34 i	27,311 i	1,453 i	862	578 i	95 i	796	630	221 i	1,726	4,870	5,253 i	585 i	246	122	16	35	464	5,795 i	2,930	1,235	29	2,057	78 i	
25,000 or more	–	130		212,634	225	3	4,057	115	80,475	1,533	3,493	409	258	2,478	1,582	34	69	4,430	396	787	175	65 i	35	96	1,072	6,867	10,924	2,880	34	1,676	18	

\* = amount < \$500,000; e = more than 50% of value is modeled—see "[Technical Notes](#)"; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

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

**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. For a given estimate in this table, if the conditions are satisfied for the "i", "r", and "e" flags, the e flag is assigned because the imputation rate and relative standard error may be found in the corresponding tables of imputation rates and relative standard errors (available from the Survey Manager upon request). An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 29-B  
Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (N–Z): 2021

(Millions of U.S. dollars and number of companies)

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	29,860	527,804	1,004	757	1,461	20,091	1,351	23,939	9,812	330	7,814	969	10,954	14,541	689	1,601	213	1,802	24,495	3,730	434	6,330	47,644	435 i	5,723	88	712
Manufacturing industries	31–33	14,980	287,666	311	274	947	14,456	1,110	8,749	5,805	175	5,975	613	8,953	11,010	623	1,164	155	1,104	13,615	1,639	233	1,806	5,506	369 i	3,736	47	375
Food	311	880	4,963 - 4,968	60	3 e	13	232	0 - 247 e	60	132	4	156	80	18	91	1 e	13	4	44	45	10	5	88	48	* e	110	* e	0 - 242
Beverage and tobacco products	312	190	1,228	* e	* e	* e	1 e	0 - 24 r	323	84	* e	* e	1 i	1 e	3	* e	* e	* e	* e	206	* e	* e	116	57	* e	12	* e	0 - 24
Textile, apparel, and leather products	313–16	300	818	* e	* e	3	23	* e	29	61	* e	89	2	18	9	1 e	63	* e	3 e	8	8	5	1 e	14	* e	20	* e	0 - 30
Wood products	321	150	433 - 442	1 e	1 e	2 e	2 e	0 - 39 e	15 r	19	6	10 e	1 e	16	13 e	* e	7	1 e	9 e	29	2 e	1 e	17	12	2 e	20	* e	0 - 39
Paper	322	120	1,139	1	*	2	21	* e	31	36	*	18	1	* i	23	3	205	* e	9	16	* r	1	117	15	* e	358	* e	8
Printing and related support activities	323	170	196 - 205 i	* e	2 i	* i	1 i	* e	6	7	* e	2 i	* e	2	15	* e	5 i	* e	12	12	2 i	* r	* i	4	3 i	12	* e	0 - 26
Petroleum and coal products	324	110	952	* e	1	* e	310	* e	* e	* e	0	5	49	2	7	* e	9	* e	* e	448	5	0	1	* e	* e	2	0	9
Chemicals	325	2,120	97,097	93	20 i	64	11,770	15	4,044	2,077	5	2,705	22	82	8,085	245	268 i	37	331 i	1,229	451	17	425 i	1,752	331 i	547	2	19 - 207
Basic chemicals	3251	240	2,559	20	* e	2	87	1 e	195	18	* e	247	14	6	208	2	12	31	249 i	181	15	0	115	16	11	36	*	9
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	120	1,291 - 1,320 i	* e	0 - 3	0 - 10 r	11	0	40 i	8	0	310	0 - 6 r	7	108	0 - 5	3	0	7	294	0 - 6 r	* e	14	4	29	4	0	0 - 47
Pesticide, fertilizer, and other agricultural chemicals	3253	100	915 - 946	2	* e	* e	15 - 223	* e	4	179 - 387	*	37	* e	2	2 e	0	*	1	1 i	8	* e	* e	6	8	* e	38	0	6
Pharmaceuticals and medicines	3254	1,110	88,524	67 i	18 i	54	11,192	14	3,585	1,640	5	702	3	54 i	7,619	240	235 i	1	62	678	431	13	285 i	1,720	290 i	445	1	0 - 164
Soap, cleaning compound, and toilet preparations	3256	290	2,531	2	* e	* e	260 i	* e	212 i	27	0	1,203	1	2	10	0 - 5 i	2 i	* e	5	46	1 e	4	1 e	2	1 e	9	0	0 - 26
Paint, coating, adhesive, and other chemicals	3255, 3259	300	1,242 - 1,252	1 r	0 - 3 i	0 - 10	0 - 207	* e	8	0 - 207	0	207	0 - 6 i	11	138	*	16	4	6	24	0 - 6	* e	6	1	* e	15	* e	0 - 193
Plastics and rubber products	326	880	2,961	12	1 e	15	21	0 - 51 i	106	103	* e	350	52	3 e	168	13	47	4	25	122	4	* e	21	11 i	6	152	1	0 - 51
Nonmetallic mineral products	327	340	1,503	1 e	1 e	1 e	31	0 - 36 e	948	35	* e	37 i	2 e	4	35	* e	7	* e	5 e	13 e	1 e	2 r	6	5	1 e	13	* e	0 - 36
Primary metals	331	250	887 - 890	* e	* e	8	4	0 - 37	8	9	* e	27	1	22	128	1	2	2	8	339	1	1 i	2	2 i	1	31	* e	0 - 37

TABLE 29-B  
Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (N–Z): 2021

(Millions of U.S. dollars and number of companies)

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>
Fabricated metal products	332	2,160	3,879	14	16	r 59	327	12	125	82	5	e 243	24	e 43	139	e 7	e 57	4	e 54	334	22	e 2	e 28	e 36	e 6	e 219	2	54
Machinery	333	2,090	16,726	79	40	61	157	i 7	605	432	147	456	243	734	336	36	215	26	106	1,676	66	11	110	141	5	e 739	9	39
Agricultural implement	33311	140	1,799 - 1,807	60	1	*	2	* e	4	34	55	72	0 - 110	2	i 0 - 110	0	3	5	4	6	7	0	* e	21	0	65	i *	e 0 - 39
Semiconductor machinery	333242	50	5,182	0	1	*	50	i 0	98	i 0	0	* e	0	578	14	i 0	0	0	0	469	i 0	0	0	0	0	0	0	1
Engine, turbine, and power transmission equipment	3336	80	1,239 - 1,246	*	3	1	*	0	337	13	1	56	4	1	20	2	132	*	1	23	i *	e 0	55	17	*	284	2	0 - 24
Other machinery	other 333	1,830	8,499	19	35	59	105	i 7	166	385	91	327	128 - 240	153	191 - 304	34	80	21	102	1,178	59	11	55	103	5	e 390	7	0 - 39
Computer and electronic products	334	2,040	94,211	19	53	622	810	769 - 1,037	1,681	2,052	4	652	73	7,302	865	74	132	66	140	7,210	390	167	326	1,414	6	228	6	0 - 242
Communications equipment	3342	270	11,339	6	22	99	371	14	407	i 771	1	91	15	72	174	6	33	2	55	650	105	3	173	193	2	24	0 - 4	0 - 32
Semiconductor and other electronic components	3344	610	45,516	6	8	152	166	i 109 - 1,024	355	721	i *	109	i 0 - 24	e 6,776	264	34	50	29	17	3,546	49	134	19	287	0 - 5	e 29	0 - 4	e 0 - 242
Navigational, measuring, electromedical, and control instruments	3345	940	10,014	4	3	258	208	0 - 545	339	180	1	387	36	206	295	0 - 36	e 38	32	47	337	i 140	21	84	187	0 - 5	e 133	3	0 - 242
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	180	2,837	0 - 4	0 - 3	i 103	11	0 - 19	81	6	0	57	2	4	86	0 - 19	e 6	0 - 19	e 37	8	82	2	r 6	61	0	7	i *	0 - 19
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	180	2,109	1	1	136	61	0 - 545	65	0 - 175	0	53	25	0 - 203	33	0 - 36	e *	*	*	51	2	*	47	29	0 - 5	0 - 127	*	e 0 - 242
Other measuring and controlling devices	other 3345	600	5,068	0 - 4	0 - 3	18	136	0 - 545	194	0 - 175	1	277	9	0 - 203	176	0 - 36	e 33	12 - 33	10	279	i 57	19	31	97	0 - 5	e 0 - 127	3	0 - 242
Other computer and electronic products	other 334	240	27,342	3	i 20	113	i 65	0 - 311	i 579	i 380	1	i 65	i 0 - 24	i 248	132	0 - 36	i 11	i 2	i 21	i 2,676	i 96	8	50	747	0 - 5	i 42	0 - 4	0 - 242
Electrical equipment, appliances, and components	335	570	5,007	1	e 2	e 8	196	* e	109	158	* e	142	15	104	298	9	26	* e	27	155	1	e 1	e 17	163	1	e 552	26	5
Transportation equipment	336	1,080	34,405	24	i 12	17	86	i 41	327	248	i 3	743	36	389	263	11	i 94	7	107	1,432	i 200	i 8	468	i 1,335	8	i 295	0 - 5	e 1 - 48
Motor vehicles, bodies, trailers, and parts	3361–63	530	22,754	3	2	4	2	1	125	220	i 0 - 4	329	9	322	80	0 - 12	e 71	1	77	215	38	* e	32	156	* e	125	* e	0 - 46

TABLE 29-B  
Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (N–Z): 2021

(Millions of U.S. dollars and number of companies)

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>
Aerospace products and parts	3364	320	9,900	20 i	10	12 i	71 i	41	200 i	15	0 - 4	404	26	65	117	0 - 12 i	8	0 - 7	19	1,197 i	158 i	8	148 i	1,174	7 i	20	0 - 5 e	0 - 46
Aircraft, aircraft engine, and aircraft parts	336411–13	300	9,293	20 i	10	12 i	70 i	40	196 i	15	0 - 4	395	23	0 - 66	113	0 - 12 i	7	0 - 7	15	1,154 i	158 i	8	133 i	991 - 1,175	7 i	20	0 - 5 e	0 - 46
Guided missile, space vehicle, and related parts	336414–15, 336419	30	608	0	* i	0	1	1	3	1 i	0	8	3	0 - 66	3	0	1	0	4	44	0	*	15	0 - 182	0	0	0	0
Military armored vehicle, tank, and tank components	336992	20 r	20 - 24	0	0	0	0	0	0	0 - 7 i	0	0 - 7 i	0	0	0 - 7 e	0	* e	0	0	0	0	0	0	0	0	0	0	0 - 7
Other transportation	other 336	220	1,726 - 1,731	1 e	1	1 e	12	0	3 e	5 - 14 i	0	2 - 12	1 r	2 e	58 - 68 i	0 - 12 e	14 i	0 - 7	11 i	20	4	* e	288 i	6 e	* e	150	0	2
Furniture and related products	337	220	423	* e	* e	* e	1 i	* e	2	26	* e	10	* e	5	7	* e	* e	* e	15	6	22	3	10	2	* e	9	* e	0 - 28
Miscellaneous	339	1,400	20,822	8	121 i	72	464	0 - 35 e	330 i	243	* e	331	11	210	523	221	13	2 e	211 i	335	453	8	54	495	1 e	416	0 - 5 e	0 - 35
Medical equipment and supplies	3391	780	18,204	1 e	3	15	420	0 - 25 e	224 i	216	* e	296	9	22	479	21	9	1 e	202 i	266	297	3 r	37	297	* e	380	0	0 - 25
Other miscellaneous manufacturing	3399	620	2,618	7	118 i	57	45	0 - 32 e	106	27	* e	35	2 e	187	45	201	4 e	1 e	8	69 i	156 i	5	17	198	* e	36	0 - 5 e	0 - 32
Nonmanufacturing industries	21–23, 42–81	14,890	240,138	693	483 i	513	5,636	241	15,190	4,007	155	1,840	356	2,001	3,531	66	437	59	698	10,880	2,091	201 i	4,524	42,138	67	1,987	41	337
Mining, quarrying, oil and gas extraction, and support activities	21	170 i	1,077 - 1,151	* e	0 - 82 i	* e	* e	19 r	* e	0 - 82	16 i	0 - 82 e	77 i	* e	20 i	* e	* e	0 - 10 i	* e	753	6	* e	0 - 82 e	1 e	0 - 17 i	11 i	0 - 12 i	0 - 82
Utilities	22	40	133 - 17,961	0	0	0 - 10	0 - 363	0	0 - 637	0	0 - 22	0 - 169	0	*	0 - 60	0	0	0	0	0 - 508	0 - 45	0	0 - 1,322	0 - 13,910 i	0 - 17	0 - 147	0 - 12	*
Wholesale trade	42	1,720	1,661 - 1,770 i	9	11	3 e	47 e	1 e	82 i	45 i	0 - 22 i	74 i	6 e	21 i	41 e	2 e	33 i	7	83 i	153 i	8 e	1 e	24 i	27	1 e	39 i	0 - 12 e	0 - 155
Electronic shopping and electronic auctions	454111–12	180	5,931 - 24,034 i	* e	0 - 212 i	9 i	0 - 363 i	1 i	0 - 637 i	36 i	1 i	0 - 169 i	1 i	0 - 402 i	95 i	1 i	0 - 40 i	1 i	8 i	672 i	55	* e	0 - 1,322 i	0 - 13,910 i	2 i	0 - 147 i	* e	1
Transportation and warehousing	48–49	80	7,198 - 7,200	9	6	1 e	18	2	286 i	17	1 e	35	3 e	15	293 i	* e	3	* e	102	1,060	5	* e	19 r	1,098	1	16	1	0 - 155
Information	51	3,380	146,488	521	149	314	2,682	100	9,149	2,347	82	658	177	1,266	1,626	32	193	22	346 i	4,074	1,618	56	1,411	25,943	8	1,210	20	99
Publishing	511	1,410	38,521	28	43	149	343	15	843	1,133	76	398	21	523	464	16	33	12	42	1,119	470	31	378	16,237	3	951	10 r	15
Newspaper, periodical, book, and directory publishers	5111	60	81	* e	* e	1 i	1	* e	3	2 i	* e	2 i	* i	3 i	2	* i	* e	* e	1 i	4	* e	* i	* e	1	* e	3	* e	4
Software publishers	5112	1,350	38,441	28	43	149	341	15	840	1,131	76	396	20	520	462	15	33	12	41	1,115	470	31	377	16,236	3	947	10 r	11

TABLE 29-B  
Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (N–Z): 2021

(Millions of U.S. dollars and number of companies)

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>
Telecommunications	517	160	3,736 - 3,805	1 e	3	4	1,527	0 - 86	298	59	0 - 5 e	6	3	5	7	0 - 5	0 - 58	1 e	5	60	7	0 - 7	66	346	0 - 3	16	0 - 9 e	0 - 85
Data processing, hosting, and related services	518	1,660	44,585	409	57	126	412	0 - 86	2,288	938	3	168	138	492	431	13	104	5	231 i	1,674	862	20	682	2,273	4	203	3	0 - 85
Other information	other 51	180	59,577 - 59,647	84	46	34	401	0 - 86	5,720	217	0 - 5	86	14	246	724	0 - 5	0 - 58 i	4	68	1,221	279	0 - 7	285	7,087	0 - 3	40	0 - 9	0 - 85
Finance and insurance	52	530	20,902	43	64	13	1,106	1 e	2,643	532	1 e	462	37	30	380	4	68	2 e	17	1,134	114	2	616	156	1 e	308	1 e	3
Real estate and rental and leasing	53	50	2,095 - 2,097	0 - 34	0 - 212	* e	1	1	216 i	8	* e	10	* e	0 - 402	3	* e	* e	* e	1	10	7	* e	0 - 484	0 - 484	* e	* e	* e	2
Lessors of nonfinancial intangible assets (except copyrighted works)	533	10	5 - 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 - 3
Other real estate and rental and leasing	other 53	40	2,087 - 2,091	0 - 34	0 - 212	* e	1	1	216 i	8	* e	10	* e	0 - 402	3	* e	* e	* e	1	10	7	* e	0 - 484	0 - 484	* e	* e	* e	0 - 3
Professional, scientific, and technical services	54	6,290	32,083	74	44	167	1,408 i	109	2,085	923	36	430	38 e	266	1,003	21	103	20	110	2,501	233	140 i	1,123	1,000	40	247	10	80
Architectural, engineering, and related services	5413	1,260	2,553	6	10	22	71	7	90	67	3 e	43	8 e	95	102	6	13 e	13 i	30	231	23	89 i	101	75	3 e	38	2 e	34
Computer systems design and related services	5415	3,220	17,188	11 e	24	56 i	402	20	1,681	660	25	235	18 e	99	182	7 e	50	5	39 e	1,723	61	44	707	551	9 e	153 i	7	25
Scientific research and development services	5417	1,020	6,123	34	2	82	166	79	94	135	6	86	4	58	567	4 i	23	2	4	110	62	1	128	243	26	10	1 i	10
Research and development in nanotechnology	541713	60	154	* e	* e	* e	* e	3	14	* e	0	5	* e	3 i	* e	* e	* e	2	* e	15	* e	1	4	53 i	* e	* e	0	0
Research and development in biotechnology (except nanobiotechnology)	541714	240	1,664	31	*	70	33	* e	23	58	*	9	4	8	37	* e	6	0	1	11	20	0	9	53	*	7	0	3
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	720	4,266	3	1	11	126	76	55	76	6	68	*	47	530	4	17	*	3 i	84	42	* i	115	134	26	3 e	1 i	7

TABLE 29-B  
Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (N–Z): 2021

(Millions of U.S. dollars and number of companies)

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>
Research and development in the social sciences and humanities	541720	20	38	0	0	0	6	0	2	0	0	4	0	0	0	* i	0	0	0	0	0	0	0	3	0	0	0	0
Other professional, scientific, and technical services	other 54	800	6,218	24	8 e	7	769 i	2 e	220	62	1 e	65	8 e	15	153	4	17	1 e	37	436	87	6	186	131	2 e	46	1	11
Health care services	621–23	550 r	1,965 - 2,043	7	* e	* e	15	* e	96	19	* e	6	1 e	5	15	* e	1 e	* e	3	20	5	* e	13	7	* e	13	* e	0 - 78
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,960	2,501 - 3,136	0 - 34	0 - 212 e	0 - 10 e	0 - 363	6 e	0 - 637 e	0 - 85	0 - 22 e	0 - 169	17	0 - 402	0 - 60 e	5	0 - 40 e	0 - 10	28	0 - 508	0 - 45	1 e	0 - 1,322 e	0 - 2,947	0 - 17 e	0 - 147	0 - 12	0 - 155
All companies (number of domestic employees)	–	29,860	527,804	1,004	757	1,461	20,091	1,351	23,939	9,812	330	7,814	969	10,954	14,541	689	1,601	213	1,802	24,495	3,730	434	6,330	47,644	435 i	5,723	88	712
Small companies																												
10–19 <sup>c</sup>	–	5,250	4,258	15 e	16 e	30	270	12	206	93 e	5 e	93 e	14 e	47 e	133 e	9 e	25 e	9	34 e	234 e	50 e	5 e	130 e	137	5 e	53 e	8 r	16
20–49	–	8,700	12,626	29 e	62	52 e	414	97	560 e	350	20 e	360 e	68 e	127 e	580	30 e	57 e	13 e	90 e	737 e	150	17 e	351 e	404	15 e	190 e	9 e	79
Medium companies																												
50–99	–	5,520	12,488	26 e	52	48	283	21	421	211	10 e	261	41 e	170	679	14 e	97	13	86 e	657	146	28	208 e	535	12 e	201	12	95
100–249	–	5,330	20,030	71	57	140	567	64	780	355	19	439	49	282	555	33	54 e	13	141 i	1,093	234	100 i	358	596	13	242	7	183
Large companies																												
250–499	–	1,970	20,574	60	46	61	551	0 - 135	952	361	11	274	29	295	780	9	102	23	108	1,293	366	22	244	867	5	286	2	0 - 135
500–999	–	1,230	23,655	91	69	183	823	47	1,300	706	9 i	503	44	105	287	16	77	16	133	1,478	528	13	126	447	5	381	9	142
1,000–4,999	–	1,300	83,609	194	155 i	476	1,603	17	3,825	1,921	117	1,245	357	774	1,947	250	233	105	141	3,226	1,058	93 i	974	4,338	51	801	32	0 - 80
5,000–9,999	–	260	53,873	121	6	123	805	0 - 178	3,391	1,847	31	642	127	887	1,111	15	337	4	219 i	3,104	221	85	925	1,770	0 - 157 i	1,016	5	0 - 178
10,000–24,999	–	200	84,057	43	50	77 i	6,508	9	3,902	1,070	1	878	138	702	2,319 i	246	303 i	4	486 i	4,590	420 i	8	422 i	1,358	177 i	2,124	*	2 - 193
25,000 or more	–	130	212,634	356	244 i	272	8,268	906 - 1,088	8,603	2,898	106	3,118	103	7,564	6,150	68 i	316	14	362	8,082	557	64	2,591 i	37,192	0 - 157 i	428	4	0



\* = amount < \$500,000; e = more than 50% of value is modeled—see "[Technical Notes](#)"; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. For a given estimate in this table, if the conditions are satisfied for the "i", "r", and "e" flags, the e flag is assigned because the imputation rate and relative standard error may be found in the corresponding tables of imputation rates and relative standard errors (available from the Survey Manager upon request). An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 30  
Domestic R&D paid for and performed by the company, by industry, company size, and domestic R&D program size: 2021  
(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	527,804	5,164	29,864	41,230	25,406	426,141
Manufacturing industries	31–33	287,666	2,804	13,865	23,086	16,407	231,504
Food	311	4,963 - 4,968	165 - 203	645	847	680 - 718	2,588
Beverage and tobacco products	312	1,228	25	124	67	179	832
Textile, apparel, and leather products	313–16	818	65	190	288	79	197
Wood products	321	433 - 442	26	258 - 267	149	0	0
Paper	322	1,139	21	119	163	147	688
Printing and related support activities	323	196 - 205 i	23 - 32	92	82 i	0	0
Petroleum and coal products	324	952	19	70	170	72	621
Chemicals	325	97,097	325	2,477	8,251	5,507	80,537
Basic chemicals	3251	2,559	42 - 55	198 - 234	810	556 - 593	871 - 932
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,291 - 1,320 i	0 - 34	135 - 171	185 - 210	0	880 - 929 i
Pesticide, fertilizer, and other agricultural chemicals	3253	915 - 946	4 - 17	74	113	0	711 - 754
Pharmaceuticals and medicines	3254	88,524	90	1,649	6,708	4,800	75,276
Soap, cleaning compound, and toilet preparations	3256	2,531	66 - 79	153	155 - 169	0	2,144
Paint, coating, adhesive, and other chemicals	3255, 3259	1,242 - 1,252	51 - 100	202 - 232	240 - 265	114 - 151	533 - 563
Plastics and rubber products	326	2,961	192	650	1,035	171	913
Nonmetallic mineral products	327	1,503	95	191	127	109	981
Primary metals	331	887 - 890	55 - 60	181	282	0	368
Fabricated metal products	332	3,879	474 - 512	1,789	729	514 - 552	334
Machinery	333	16,726	369	1,950	2,228	1,472	10,707
Agricultural implement	33311	1,799 - 1,807	0 - 53	51 - 120	164	50 - 103	1,415 - 1,484
Semiconductor machinery	333242	5,182	6	42	144	278	4,711
Engine, turbine, and power transmission equipment	3336	1,239 - 1,246	11	56 - 65	166	176	829
Other machinery	other 333	8,499	298 - 353	1,723 - 1,796	1,754	914 - 969	3,682 - 3,752
Computer and electronic products	334	94,211	346	2,174	3,035	3,020	85,635
Communications equipment	3342	11,339	59	213 - 278	332 - 386	610 - 677	10,006
Semiconductor and other electronic components	3344	45,516	75	765	1,044	1,076	42,556
Navigational, measuring, electromedical, and control instruments	3345	10,014	187	769 - 833	1,273	887 - 953	6,832
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	2,837	38	164 - 229	422	338	1,809 - 1,876
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	2,109	38	90	90 - 230	221	1,532 - 1,671
Other measuring and controlling devices	other 3345	5,068	112	450 - 515	621 - 760	328 - 395	3,286 - 3,425

TABLE 30  
Domestic R&D paid for and performed by the company, by industry, company size, and domestic R&D program size: 2021  
(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 computer and electronic products	other 334	27,342	24 i	309 - 363	333 - 387	381	26,240
Electrical equipment, appliances, and components	335	5,007	94	546	1,068	751	2,548
Transportation equipment	336	34,405	174	923	1,999	1,956	29,352
Motor vehicles, bodies, trailers, and parts	3361–63	22,754	75	397	1,311	1,094	19,877
Aerospace products and parts	3364	9,900	43	331	563	626	8,337
Aircraft, aircraft engine, and aircraft parts	336411–13	9,293	39	303 - 332	234 - 564	360	7,998 - 8,338
Guided missile, space vehicle, and related parts	336414–15, 336419	608	4	0 - 28	0 - 329	266	0 - 339
Military armored vehicle, tank, and tank components	336992	20 - 24	2 - 6	18	0	0	0
Other transportation	other 336	1,726 - 1,731	49 - 56	177	125	236	1,138
Furniture and related products	337	423	39	143	241	0	0
Miscellaneous	339	20,822	233 - 250	1,330 - 1,346	2,324	1,714	15,203
Medical equipment and supplies	3391	18,204	108	829	1,735	1,276	14,256
Other miscellaneous manufacturing	3399	2,618	125 - 142	501 - 518	589	438	947
Nonmanufacturing industries	21–23, 42–81	240,138	2,360	15,999	18,143	8,999	194,637
Mining, quarrying, oil and gas extraction, and support activities	21	1,077 - 1,151	20	282 i	155 - 233	126	492
Utilities	22	133 - 17,961	3	0 - 1,392	7 - 932	23 - 108 i	100 - 17,928
Wholesale trade	42	1,661 - 1,770 i	371	1,240 i	49 - 160 i	0	0
Electronic shopping and electronic auctions	454111–12	5,931 - 24,034 i	0 - 399	44	10 - 935	50 - 134	4,419 - 23,494 i
Transportation and warehousing	48–49	7,198 - 7,200	0 - 59	88	537	50 - 109 i	6,467
Information	51	146,488	506	5,022	8,962	4,333	127,666
Publishing	511	38,521	258 - 266	1,762 - 1,892	2,667	1,255 - 1,385	32,441
Newspaper, periodical, book, and directory publishers	5111	81	9	15	56 i	0	0
Software publishers	5112	38,441	249 - 257	1,747 - 1,877	2,611	1,255 - 1,385	32,441
Telecommunications	517	3,736 - 3,805	7 - 15	113 - 183	359	75 i	3,175
Data processing, hosting, and related services	518	44,585	215 - 223	2,678 - 2,787	5,244	2,464 - 2,573	33,866
Other information	other 51	59,577 - 59,647	11	245 - 337	692	353 - 445	58,184
Finance and insurance	52	20,902	10	737	1,134	809	18,213
Real estate and rental and leasing	53	2,095 - 2,097	0 - 60	43	10 - 70	0	1,985

TABLE 30  
Domestic R&D paid for and performed by the company, by industry, company size, and domestic R&D program size: 2021  
(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
Lessors of nonfinancial intangible assets (except copyrighted works)	533	5 - 8	0 - 2	6	0	0	0
Other real estate and rental and leasing	other 53	2,087 - 2,091	0 - 60	37	10 - 70	0	1,985
Professional, scientific, and technical services	54	32,083	1,040	6,967	6,009	2,701	15,366
Architectural, engineering, and related services	5413	2,553	207	1,036	1,121	189	0
Computer systems design and related services	5415	17,188	571	3,394	2,014	1,263	9,946
Scientific research and development services	5417	6,123	103	1,485	1,832	1,078	1,624
Research and development in nanotechnology	541713	154	5	106	44	0	0
Research and development in biotechnology (except nanobiotechnology)	541714	1,664	18	455	552	583	58
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	4,266	79	908	1,217	495	1,567
Research and development in the social sciences and humanities	541720	38	2	16	20	0	0
Other professional, scientific, and technical services	other 54	6,218	158	1,052	1,042	171	3,795
Health care services	621–23	1,965 - 2,043	14 - 96	189	347	655	758
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2,501 - 3,136	0 - 399	0 - 1,392	0 - 925	171	100 - 2,965
All companies (number of domestic employees)	–	527,804	5,164	29,864	41,230	25,406	426,141
Small companies							
10–19 <sup>a</sup>	–	4,258	1,150	2,676	248	50 - 85	100 - 135
20–49	–	12,626	1,584 - 1,671	7,622	3,221	113 - 156	0 - 84
Medium companies							
50–99	–	12,488	1,074	5,178	5,321	915	0
100–249	–	20,030	785 - 870	6,824	7,229	4,122	984 - 1,068
Large companies							
250–499	–	20,574	257	3,166	6,749	3,273	7,129
500–999	–	23,655	116	2,042	5,660	5,234	10,602
1,000–4,999	–	83,609	98	1,947	8,731	6,802	66,031
5,000–9,999	–	53,873	11	168	2,363	2,124	49,205
10,000–24,999	–	84,057	2	177	1,115	2,077	80,687
25,000 or more	–	212,634	*	63	592	656	211,322

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

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. R&D program size classifications are based on R&D performance. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 31

**Domestic R&D paid for and performed by the company as a percentage of domestic net sales, by industry and company size: 2021**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percentage of domestic sales of R&D performers or funders <sup>a</sup>	Percentage of domestic sales of R&D performers <sup>b</sup>
All industries	21–23, 31–33, 42–81	527,804	4.0	4.1
Manufacturing industries	31–33	287,666	4.4	4.4
Food	311	4,963 - 4,968	D	D
Beverage and tobacco products	312	1,228	0.7	0.7
Textile, apparel, and leather products	313–16	818	1.1	1.1
Wood products	321	433 - 442	D	D
Paper	322	1,139	1.2	1.2
Printing and related support activities	323	196 - 205	i D	D
Petroleum and coal products	324	952	0.3	0.3
Chemicals	325	97,097	7.4	7.4
Basic chemicals	3251	2,559	0.8	0.8
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,291 - 1,320	i D	D
Pesticide, fertilizer, and other agricultural chemicals	3253	915 - 946	D	D
Pharmaceuticals and medicines	3254	88,524	14.2	14.2
Soap, cleaning compound, and toilet preparations	3256	2,531	2.0	2.0
Paint, coating, adhesive, and other chemicals	3255, 3259	1,242 - 1,252	D	D
Plastics and rubber products	326	2,961	1.3	1.3
Nonmetallic mineral products	327	1,503	2.8	3.1
Primary metals	331	887 - 890	D	D
Fabricated metal products	332	3,879	1.0	1.0
Machinery	333	16,726	3.9	3.9
Agricultural implement	33311	1,799 - 1,807	D	D
Semiconductor machinery	333242	5,182	17.4	17.4
Engine, turbine, and power transmission equipment	3336	1,239 - 1,246	D	D
Other machinery	other 333	8,499	2.9	2.9
Computer and electronic products	334	94,211	12.1	12.1
Communications equipment	3342	11,339	10.9	11.0
Semiconductor and other electronic components	3344	45,516	19.6	19.6
Navigational, measuring, electromedical, and control instruments	3345	10,014	6.4	6.4
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	2,837	17.1	17.1
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	2,109	4.6	4.6
Other measuring and controlling devices	other 3345	5,068	5.4	5.4
Other computer and electronic products	other 334	27,342	9.6	9.6
Electrical equipment, appliances, and components	335	5,007	3.2	3.3
Transportation equipment	336	34,405	3.4	3.4
Motor vehicles, bodies, trailers, and parts	3361–63	22,754	3.7	D
Aerospace products and parts	3364	9,900	3.2	3.2
Aircraft, aircraft engine, and aircraft parts	336411–13	9,293	3.1	3.1
Guided missile, space vehicle, and related parts	336414–15, 336419	608	5.4	5.4
Military armored vehicle, tank, and tank components	336992	20 - 24	D	D

TABLE 31

**Domestic R&D paid for and performed by the company as a percentage of domestic net sales, by industry and company size: 2021**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percentage of domestic sales of R&D performers or funders <sup>a</sup>	Percentage of domestic sales of R&D performers <sup>b</sup>
Other transportation	other 336	1,726 - 1,731	D	D
Furniture and related products	337	423	1.0	1.1
Miscellaneous	339	20,822	3.7	3.7
Medical equipment and supplies	3391	18,204	4.2	4.2
Other miscellaneous manufacturing	3399	2,618	1.9	1.9
Nonmanufacturing industries	21–23, 42–81	240,138	3.7	3.8
Mining, quarrying, oil and gas extraction, and support activities	21	1,077 - 1,151	D	D
Utilities	22	133 - 17,961	D	D
Wholesale trade	42	1,661 - 1,770	i D	D
Electronic shopping and electronic auctions	454111–12	5,931 - 24,034	i D	D
Transportation and warehousing	48–49	7,198 - 7,200	D	D
Information	51	146,488	8.6	8.6
Publishing	511	38,521	12.6	12.7
Newspaper, periodical, book, and directory publishers	5111	81	4.0	4.3
Software publishers	5112	38,441	12.7	12.7
Telecommunications	517	3,736 - 3,805	D	D
Data processing, hosting, and related services	518	44,585	7.9	7.9
Other information	other 51	59,577 - 59,647	D	D
Finance and insurance	52	20,902	1.4	1.6
Real estate and rental and leasing	53	2,095 - 2,097	D	D
Lessors of nonfinancial intangible assets (except copyrighted works)	533	5 - 8	D	D
Other real estate and rental and leasing	other 53	2,087 - 2,091	D	D
Professional, scientific, and technical services	54	32,083	6.6	6.7
Architectural, engineering, and related services	5413	2,553	3.3	3.3
Computer systems design and related services	5415	17,188	8.6	8.6
Scientific research and development services	5417	6,123	7.4	7.4
Research and development in nanotechnology	541713	154	36.4	58.2
Research and development in biotechnology (except nanobiotechnology)	541714	1,664	6.1	6.1
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	4,266	7.9	7.9
Research and development in the social sciences and humanities	541720	38	2.7	2.7
Other professional, scientific, and technical services	other 54	6,218	5.0	5.0
Health care services	621–23	1,965 - 2,043	D	D
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2,501 - 3,136	D	D
All companies (number of domestic employees)	–	527,804	4.0	4.1
Small companies				

TABLE 31

**Domestic R&D paid for and performed by the company as a percentage of domestic net sales, by industry and company size: 2021**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percentage of domestic sales of R&D performers or funders <sup>a</sup>		Percentage of domestic sales of R&D performers <sup>b</sup>	
10–19 <sup>c</sup>	–	4,258	11.9		12.7	
20–49	–	12,626	12.1		12.5	
Medium companies						
50–99	–	12,488	8.5		8.7	
100–249	–	20,030	5.3		5.4	
Large companies						
250–499	–	20,574	5.5		5.7	
500–999	–	23,655	4.7		4.9	
1,000–4,999	–	83,609	4.2		4.2	
5,000–9,999	–	53,873	3.5		3.6	
10,000–24,999	–	84,057	3.8		3.8	
25,000 or more	–	212,634	3.7		3.8	

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

NAICS = 2017 North American Industry Classification System.

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

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

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

**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Unless indicated otherwise, statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.



TABLE 32

**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: 2021**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percentage of domestic sales of R&D performers or funders <sup>a</sup>	Percentage of domestic sales of R&D performers <sup>b</sup>
All industries	21–23, 31–33, 42–81	577,661	4.4	4.5
Manufacturing industries	31–33	331,953	5.1	5.1
Food	311	5,233	0.7	0.8
Beverage and tobacco products	312	1,403	0.8	0.8
Textile, apparel, and leather products	313–16	829	1.1	1.1
Wood products	321	445 - 454	D	D
Paper	322	1,145	1.2	1.2
Printing and related support activities	323	208	0.6	D
Petroleum and coal products	324	1,153	0.4	0.4
Chemicals	325	130,325	10.0	10.0
Basic chemicals	3251	2,621	0.8	0.8
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,330	2.0	2.0
Pesticide, fertilizer, and other agricultural chemicals	3253	1,011 - 1,045	D	D
Pharmaceuticals and medicines	3254	121,242	19.4	19.5
Soap, cleaning compound, and toilet preparations	3256	2,821	2.3	2.3
Paint, coating, adhesive, and other chemicals	3255, 3259	1,264 - 1,298	D	D
Plastics and rubber products	326	3,021	1.3	1.3
Nonmetallic mineral products	327	1,516	2.8	3.1
Primary metals	331	899	0.8	0.8
Fabricated metal products	332	3,959	1.0	1.0
Machinery	333	17,031	4.0	4.0
Agricultural implement	33311	1,922	3.4	3.4
Semiconductor machinery	333242	5,183	17.4	17.4
Engine, turbine, and power transmission equipment	3336	1,252 - 1,259	D	D
Other machinery	other 333	8,666 - 8,675	D	D
Computer and electronic products	334	98,022	12.6	12.6
Communications equipment	3342	12,424	12.0	12.0
Semiconductor and other electronic components	3344	45,816	19.7	19.7
Navigational, measuring, electromedical, and control instruments	3345	10,265	6.6	6.6
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	2,913	17.6	17.6
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	2,161	4.7	4.7
Other measuring and controlling devices	other 3345	5,191	5.5	5.5
Other computer and electronic products	other 334	29,516	10.3	10.3
Electrical equipment, appliances, and components	335	5,078	3.3	3.3
Transportation equipment	336	39,068	3.9	3.9
Motor vehicles, bodies, trailers, and parts	3361–63	26,877	4.3	D
Aerospace products and parts	3364	10,380	3.3	D
Aircraft, aircraft engine, and aircraft parts	336411–13	9,710	3.2	3.2
Guided missile, space vehicle, and related parts	336414–15, 336419	669	5.9	D
Military armored vehicle, tank, and tank components	336992	20 - 24	D	D

TABLE 32

**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: 2021**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percentage of domestic sales of R&D performers or funders <sup>a</sup>	Percentage of domestic sales of R&D performers <sup>b</sup>
Other transportation	other 336	1,786 - 1,792	D	D
Furniture and related products	337	439	1.0	1.1
Miscellaneous	339	22,164 - 22,186	D	D
Medical equipment and supplies	3391	19,458	4.5	4.5
Other miscellaneous manufacturing	3399	2,706 - 2,727	D	D
Nonmanufacturing industries	21–23, 42–81	245,708	3.8	3.9
Mining, quarrying, oil and gas extraction, and support activities	21	1,087 - 1,279	D	D
Utilities	22	134 - 18,638	D	D
Wholesale trade	42	1,836	i 0.2	0.2
Electronic shopping and electronic auctions	454111–12	5,931 - 24,688	i D	D
Transportation and warehousing	48–49	7,247 - 7,249	D	D
Information	51	149,633	8.8	8.8
Publishing	511	40,163	13.2	13.2
Newspaper, periodical, book, and directory publishers	5111	87	4.3	4.6
Software publishers	5112	40,076	13.2	13.3
Telecommunications	517	4,311 - 4,380	D	D
Data processing, hosting, and related services	518	45,288	8.1	8.1
Other information	other 51	59,801 - 59,871	D	D
Finance and insurance	52	21,040	1.4	1.6
Real estate and rental and leasing	53	2,099 - 2,101	D	D
Lessors of nonfinancial intangible assets (except copyrighted works)	533	6 - 9	D	D
Other real estate and rental and leasing	other 53	2,091 - 2,095	D	D
Professional, scientific, and technical services	54	33,200	6.9	6.9
Architectural, engineering, and related services	5413	2,659	3.4	3.4
Computer systems design and related services	5415	17,514	8.8	8.8
Scientific research and development services	5417	6,778	8.2	8.2
Research and development in nanotechnology	541713	170	40.1	59.5
Research and development in biotechnology (except nanobiotechnology)	541714	1,908	7.0	7.0
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	4,662	8.6	8.6
Research and development in the social sciences and humanities	541720	38	2.7	2.7
Other professional, scientific, and technical services	other 54	6,249	5.1	5.1
Health care services	621–23	2,217 - 2,296	D	D
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2,504 - 3,815	D	D

TABLE 32

**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: 2021**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percentage of domestic sales of R&D performers or funders <sup>a</sup>	Percentage of domestic sales of R&D performers <sup>b</sup>
All companies (number of domestic employees)	–	577,661	4.4	4.5
Small companies				
10–19 <sup>c</sup>	–	4,801	13.4	14.2
20–49	–	14,619	14.0	14.4
Medium companies				
50–99	–	15,085	10.3	10.5
100–249	–	22,471	5.9	6.0
Large companies				
250–499	–	23,150	6.2	6.4
500–999	–	25,923	5.2	5.4
1,000–4,999	–	88,751	4.4	4.5
5,000–9,999	–	57,987	3.8	3.9
10,000–24,999	–	97,378	4.3	4.4
25,000 or more	–	227,495	3.9	4.1

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

NAICS = 2017 North American Industry Classification System.

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

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

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

**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Unless indicated otherwise, statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 33  
Domestic R&D paid for by others and performed by the company, by type of cost, industry, and company size: 2021  
(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	74,695	41,653	985	3,197	600	i 8,324	i 1,140	2,747	281	6,170	i 9,597
Manufacturing industries	31–33	38,394	22,148	426	1,941	243	4,808	423	1,435	222	1,831	4,917
Food	311	297 - 302	189	1	10	6	i 15	15	14 - 26	1	7	37
Beverage and tobacco products	312	19	13	0	4	0	0	0	1	0	0	0
Textile, apparel, and leather products	313–16	11	6	*	i *	i 0	2	* i	0	* i	* i	2
Wood products	321	2 - 10	3	0	0	*	*	*	*	0	*	0 - 6
Paper	322	0	0	0	0	0	0	0	0	0	0	0
Printing and related support activities	323	0 - 7	*	*	i *	i *	i *	i *	0	* i	* i	0 - 6 i
Petroleum and coal products	324	5	4	*	i *	i *	i *	* i	0	* i	* i	* i
Chemicals	325	12,393	6,173	354	1,287	68	891	200	670	10	999	1,741
Basic chemicals	3251	154	115	0	0 - 12	0 - 12	12	*	12	0	4	0 - 12
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	69 - 98	i 56	i 0	0	0 - 13	0 - 42	0 - 20	0 - 25	i *	0	0 - 41
Pesticide, fertilizer, and other agricultural chemicals	3253	211 - 241	i 103 - 134	i *	i 6 - 21	i 0	0 - 67	i 0 - 31	i 0 - 25	i 0	* i	* i
Pharmaceuticals and medicines	3254	11,697	5,749	354	1,263	56	807	170	620	6	988	1,682
Soap, cleaning compound, and toilet preparations	3256	209	121	*	i 4	0	7	0 - 31	14	4	6	18 - 56
Paint, coating, adhesive, and other chemicals	3255, 3259	19 - 28	0 - 27	0	*	0 - 13	0 - 27	0	0 - 25	0	2	0 - 27
Plastics and rubber products	326	183	96	0	2	r 2	47	0	6	3	*	28
Nonmetallic mineral products	327	31	19	0	0	*	2	*	1	0	5	4
Primary metals	331	22 - 26	i 8	i 0	1	i 1	7	i *	0 - 6	0	1	i 5
Fabricated metal products	332	412	146	*	11	13	100	r 7	13	*	112	r 9
Machinery	333	1,003	520	1	127	4	168	9	33	*	13	128
Agricultural implement	33311	60 - 68	0 - 60	0	1	0	7	1	0 - 17	0	0 - 11	0 - 60
Semiconductor machinery	333242	167	107	0	7	*	25	2	17	*	3	6
Engine, turbine, and power transmission equipment	3336	128 - 134	99	1	0	2	19	1	0 - 11	0	*	4
Other machinery	other 333	641	252 - 315	*	119	2	117	5	0 - 17	* i	0 - 11	56 - 119
Computer and electronic products	334	6,852	4,422	66	179	57	764	69	311	28	192	764
Communications equipment	3342	1,218	i 962	i *	i 35	i 7	i 55	i 15	22	i *	i 35	i 87
Semiconductor and other electronic components	3344	1,880	1,291	63	66	19	62	19	116	26	69	148

TABLE 33  
Domestic R&D paid for by others and performed by the company, by type of cost, industry, and company size: 2021  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Salaries, wages, and fringe benefits		Stock-based compensation		Temporary staffing		Expensed equipment		Materials and supplies		Lease and rental payments		Depreciation		Royalties and licensing fees		Other purchased services (except R&D)		Other	
Navigational, measuring, electromedical, and control instruments	3345	3,630		2,078		3		67		23		645		32		167		1		88		526
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	250		154		0		27		*		20		6		3		0		6		34
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	3,193		1,819		*		29		20		614		24		159		1		54		472
Other measuring and controlling devices	other 3345	187		105		3		11		3	r	10		3		6		*		28		20
Other computer and electronic products	other 334	123		92		0		11		8		3		2		5		0		*		2
Electrical equipment, appliances, and components	335	486		294		0		42		6		61		7		20		7		13		35
Transportation equipment	336	16,356		10,095	i	*		264	i	87		2,690	i	115		353	i	172		472		2,109
Motor vehicles, bodies, trailers, and parts	3361-63	3,637		1,901		*		156	i	39		369	i	82		116		120 - 173		246		552 - 611
Aerospace products and parts	3364	11,568	i	7,487	i	*		88	i	39	i	2,145	i	21	i	209	i	0 - 52	i	184	i	1,341 - 1,397
Aircraft, aircraft engine, and aircraft parts	336411-13	10,552	i	6,760	i	0		65	i	37	i	1,933	i	21	i	209	i	0 - 52	i	183	i	1,291 - 1,347
Guided missile, space vehicle, and related parts	336414-15, 336419	1,016		726		*		23		2		212		0		*		0		1		50
Military armored vehicle, tank, and tank components	336992	1		*		0		*	i	*	i	*	i	*	i	0		0 - 2	i	*	i	0 - 2
Other transportation	other 336	1,149		707	i	*	i	20	i	8	i	176	i	13	i	28	i	0 - 52	i	42	i	100 - 158
Furniture and related products	337	3		3		0		*	i	*	i	*	i	*		*		*	i	*	i	*
Miscellaneous	339	311		157		3		14		1		60		1		4		*		16		55
Medical equipment and supplies	3391	233		112		3		13		*		42		1		2		*	r	7		53
Other miscellaneous manufacturing	3399	78		45		0		*		*		18		*		2		*		9		3
Nonmanufacturing industries	21-23, 42-81	36,300	i	19,505		559		1,256	i	358	i	3,516	i	717	i	1,312	i	59	i	4,340	i	4,679
Mining, quarrying, oil and gas extraction, and support activities	21	183	i	123	i	0		0		5	i	0		3	i	6	i	8	i	36	i	2
Utilities	22	35	i	8	i	1		2	i	1		3	i	*		0		0		5	i	16
Wholesale trade	42	84		62		4	i	1	i	*	r	*	i	1	i	2	r	0		2	i	11
Electronic shopping and electronic auctions	454111-12	4 - 8		3	r	0		0		0		0 - 3		0		2	r	0		0		0
Transportation and warehousing	48-49	8 - 10		4		0		0		0		0		0		0 - 2		0		0		5
Information	51	1,366		1,069		42		38		4		58		17		32		7	r	20		80
Publishing	511	631		475		2		19		4		50		2		26		5	r	5	r	45
Newspaper, periodical, book, and directory publishers	5111	23	r	17	r	0		0		0		2	r	0		0		0		4	r	0
Software publishers	5112	608		457		2		19		4		48		2		26		5	r	1		45
Telecommunications	517	30 - 98		0 - 69		0		5		*		*		0 - 9		0 - 5		3		1		0 - 27

TABLE 33  
Domestic R&D paid for by others and performed by the company, by type of cost, industry, and company size: 2021  
(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											
Data processing, hosting, and related services	518	607	527	6 - 41	9	*	8	8	2	0	7	1 - 36											
Other information	other 51	29 - 99	0 - 69	0 - 35	5	i	*	0 - 9	0 - 5	0	7	0 - 35											
Finance and insurance	52	45	45	0	0	0	0	0	0	0	0	0											
Real estate and rental and leasing	53	0 - 1	*	0	0	0	0	0	0	0	0	0 - 1	i										
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0	0	0	0	0	0	0	0	0											
Other real estate and rental and leasing	other 53	0 - 1	*	0	0	0	0	0	0	0	0	0 - 1	i										
Professional, scientific, and technical services	54	34,413	i	18,086	i	512	1,214	i	347	i	3,440	i	691	i	1,268	i	44	i	4,264	i	4,548		
Architectural, engineering, and related services	5413	2,007	1,255	4	70	6	257	28	5	*	113	268											
Computer systems design and related services	5415	3,221	2,208	249	35	4	90	81	49	5	97	402											
Scientific research and development services	5417	28,019	i	13,844	i	240	i	953	i	329	i	3,060	i	560	i	1,200	i	37	i	4,044	i	3,753	i
Research and development in nanotechnology	541713	73	i	36	i	0	1	i	0	7	i	1	i	*	i	0	2	i	26	i			
Research and development in biotechnology (except nanobiotechnology)	541714	7,374	3,253	79	191	7	435	68	183	*	1,835	i	1,323										
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	20,046	i	10,154	i	142	i	729	i	322	i	2,573	i	487	i	1,013	i	36	i	2,193	i	2,398	i
Research and development in the social sciences and humanities	541720	525	400	19	32	*	46	4	4	0	14	7											
Other professional, scientific, and technical services	other 54	1,166	779	19	156	8	33	22	14	2	9	125											
Health care services	621-23	95	56	*	1	i	1	i	4	i	4	i	1	0	13	i	17	i					
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	62 - 66	49	0	*	0	7 - 14	1	0 - 4	0	0	0 - 4											
All companies (number of domestic employees)	-	74,695	41,653	985	3,197	600	i	8,324	i	1,140	2,747	281	6,170	i	9,597								
Small companies																							
10-19 <sup>a</sup>	-	1,219	638	12	24	18	181	31	16	1	155	r	143										
20-49	-	2,434	1,287	21	120	34	456	57	29	10	108	313											
Medium companies																							
50-99	-	2,052	1,155	86	65	17	277	57	45	6	62	283											
100-249	-	3,993	2,463	113	94	22	357	75	69	12	293	494											
Large companies																							
250-499	-	3,358	2,049	20	205	44	256	89	73	18	152	452											
500-999	-	3,777	2,068	32	136	66	378	91	167	3	i	131	705										
1,000-4,999	-	11,006	5,399	202	1,225	93	862	159	542	47	i	905	i	1,572	i								

TABLE 33  
Domestic R&D paid for by others and performed by the company, by type of cost, industry, and company size: 2021  
(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
5,000–9,999	–	8,944 i	5,357 i	101	366 i	121 i	1,333 i	176 i	478 i	21 i	169 i	820 i
10,000–24,999	–	20,549	11,348	382	578 i	130 i	1,543 i	290 i	833 i	127	3,506 i	1,811 i
25,000 or more	–	17,361	9,889 i	17	385	53 i	2,680 i	115	495	35 i	688	3,003

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 34  
Domestic R&D paid for by others and performed by the company, by industry and company size: 2021  
(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	74,695	1,219	2,434	2,052	3,993	3,358	3,777	11,006	8,944	i	20,549	17,361		
Manufacturing industries	31–33	38,394	400	889	702	1,347	1,547	1,607	9,257	2,196		7,942	12,508	i	
Food	311	297 - 302	0	0 - 72	6	5 - 71	1	10	42 - 107	0 - 46		36 - 188	3		
Beverage and tobacco products	312	19	0	* r	0	*	0	0	18	0		0	0		
Textile, apparel, and leather products	313–16	11	0	5	1 r	5	0	0	*	0		0	0		
Wood products	321	2 - 10	0	0	0	0	0	2 - 10	0	0		0	0		
Paper	322	0	0	0	0	0	0	0	0	0		0	0		
Printing and related support activities	323	0 - 7	0	0 - 7	0	*	0	0	0	0		0	0		
Petroleum and coal products	324	5	0	0	0	0	0	*	0	0 - 5		0 - 5	1		
Chemicals	325	12,393	65	471	245	446	766	484	5,117	356		4,051	391		
Basic chemicals	3251	154	0 - 6	1	1	13	4	9	97 - 108	20		2	0		
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	69 - 98	i	0 - 7	4	3 r	11	9	0	32 - 71	i	0	1		
Pesticide, fertilizer, and other agricultural chemicals	3253	211 - 241	i	0	* i	0	* i	0	0	210 - 241	i	0	0		
Pharmaceuticals and medicines	3254	11,697	59	465	238	400	749	475	4,735	337		3,849	390		
Soap, cleaning compound, and toilet preparations	3256	209	0	0	0	20	*	0	0	0		190	0		
Paint, coating, adhesive, and other chemicals	3255, 3259	19 - 28	0 - 7	1	3	3	4	0	0 - 9	0		11	0		
Plastics and rubber products	326	183	0 - 26	0 - 72	7	4	7	30	5	*		31 - 133	0		
Nonmetallic mineral products	327	31	0	1	*	6	1	10	13	0		0	0		
Primary metals	331	22 - 26	i	0	0 - 5	5 r	1	2	0	15	i	0 - 5	0		
Fabricated metal products	332	412		196 - 248	19	3	20	19	4 i	102		0 - 46	0		
Machinery	333	1,003	15	111	r	66	115	13	19	136		463	61	3	
Agricultural implement	33311	60 - 68	0	0	0	0 - 63	0	0	0	0 - 68		0	*		
Semiconductor machinery	333242	167	0	21	24	20	i	0	11	91		0	0		
Engine, turbine, and power transmission equipment	3336	128 - 134		0 - 6	2	9	*	i	6	0		71	38	0	
Other machinery	other 333	641	9 - 16	88	r	32	31 - 96	7	8	45		324 - 393	23	2	
Computer and electronic products	334	6,852	40 - 88	111		196	291	649	624	848	i	0 - 40	3,214		
Communications equipment	3342	1,218	i	0 - 72	0 - 27	0 - 74	0 - 144	0 - 158	0	49	0 - 827	i	0	78 - 1,170	i
Semiconductor and other electronic components	3344	1,880		0 - 72	27	66	0 - 144	492	448	681	0 - 169	i	1	0	



TABLE 34  
Domestic R&D paid for by others and performed by the company, by industry and company size: 2021  
(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	
Navigational, measuring, electromedical, and control instruments	3345	3,630	16 - 32	58 - 85	57 - 131	148	0 - 158	175	33	9 - 836	0	2,044 - 3,136	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	250	3	38	58	44	0	99	0	9	0	0	
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	3,193	0 - 15	21	0 - 74	7 - 105	0 - 103	*	29	0 - 827	0	2,044 - 3,136	
Other measuring and controlling devices	other 3345	187	14	0 - 27	0 - 74	0 - 96	0 - 96	76	3	0 - 96	0	0	
Other computer and electronic products	other 334	123	0	0 - 27	0	0	0 - 39	1	85	0	0 - 39	0	
Electrical equipment, appliances, and components	335	486	*	19	4	42	8	21	129	0	263	0	
Transportation equipment	336	16,356	11	53	140	282	68	375	2,756	441	3,341	8,888	
Motor vehicles, bodies, trailers, and parts	3361–63	3,637	7	19	65	49	44	300	1,821	168	1,154	9	
Aerospace products and parts	3364	11,568	4	32	74	233	23	73	883	264	2,187	7,793	
Aircraft, aircraft engine, and aircraft parts	336411–13	10,552	0 - 5	24	69	0 - 234	21	0 - 74	0 - 352	264	1,951 - 2,188	7,793	
Guided missile, space vehicle, and related parts	336414–15, 336419	1,016	0 - 5	8	5	0 - 234	3	0 - 74	531 - 884	0	0 - 235	0	
Military armored vehicle, tank, and tank components	336992	1	0	0	1	0	0	1	0	0	0	0	
Other transportation	other 336	1,149	0	2	0	*	0	2	51	8	0	1,086	
Furniture and related products	337	3	0	2	1	*	*	0	*	0	0	0	
Miscellaneous	339	311	12	29 - 85	28	68 - 124	13	15 - 32	16 - 72	57	9	8	
Medical equipment and supplies	3391	233	12	30	24	69	1	7	17	57	9	8	
Other miscellaneous manufacturing	3399	78	*	0 - 54	5	0 - 54	12	8 - 26	0 - 54	0	0	0	
Nonmanufacturing industries	21–23, 42–81	36,300	819	1,545	1,351	2,646	1,811	2,170	1,749	6,748	12,608	4,853	
Mining, quarrying, oil and gas extraction, and support activities	21	183	0	*	13	26	0	0	124	0	19	0	
Utilities	22	35	0	4	0	0	0	0	2	*	*	28	
Wholesale trade	42	84	27	24	2	32	0	0	0	0	0	0	
Electronic shopping and electronic auctions	454111–12	4 - 8	2 - 5	0	2	0	0	0	0	0	0	0	
Transportation and warehousing	48–49	8 - 10	0	8	0	0	*	0 - 2	0	0	0	0	
Information	51	1,366	50	113	120	272	237	44	2	9	262	257	
Publishing	511	631	3	22 - 65	0 - 42	224	65	19	0	0	0	257	
Newspaper, periodical, book, and directory publishers	5111	23	0	23	0	0	0	0	0	0	0	0	
Software publishers	5112	608	3	0 - 42	0 - 42	224	65	19	0	0	0	257	
Telecommunications	517	30 - 98	*	23 - 91	0	6	0	0	0	0	0	0	
Data processing, hosting, and related services	518	607	46	0 - 62	0 - 62	42	172	24	2	0	262	0	

TABLE 34  
Domestic R&D paid for by others and performed by the company, by industry and company size: 2021  
(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						
Other information	other 51	29 - 99	*	*	19 - 90	0	0	0	0	9	i	0	0					
Finance and insurance	52	45	0	0	0	2	0	0	0	0		0	43					
Real estate and rental and leasing	53	0 - 1	0 - 1	0	0	*	0	0	0	0		0	0					
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0	0	0	0	0	0	0		0	0					
Other real estate and rental and leasing	other 53	0 - 1	0 - 1	0	0	*	0	0	0	0		0	0					
Professional, scientific, and technical services	54	34,413	i	739	1,355	1,200	2,303	1,537	2,109	1,594	i	6,726	i	12,325	i	4,524		
Architectural, engineering, and related services	5413	2,007		104	346	253	286	184	78	168		0		587		0		
Computer systems design and related services	5415	3,221		112	139	250	r	137	91	56		81		86		1,970	298	
Scientific research and development services	5417	28,019	i	464	787	554		1,666	1,186	1,814		1,335	i	6,640	i	9,768	i	3,805
Research and development in nanotechnology	541713	73	i	25	22	27	i	0	0	0		0		0		0		0
Research and development in biotechnology (except nanobiotechnology)	541714	7,374		102	119	85		542	49	203		0		0		2,469		3,805
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	20,046	i	334	637	442		1,069	1,132	1,611		1,335	i	6,188	i	7,298	i	0
Research and development in the social sciences and humanities	541720	525		3	9	0		56	6	0		0		452		0		0
Other professional, scientific, and technical services	other 54	1,166		60	84	143		213	76	161		9		0		0		421
Health care services	621–23	95		*	38	r	12	11	22	7		5		0		0		*
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	62 - 66		0 - 3	3	r	2	r	0	15	6 - 12	20		14		0		0

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 35

**Domestic R&D paid for by others and performed by the company, by type of R&D, industry, and company size: 2021**

(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	74,695	7,367	17,355 i	49,972
Manufacturing industries	31–33	38,394	4,509	5,640	28,246
Food	311	297 - 302	62 - 68	83	152
Beverage and tobacco products	312	19	*	3	15
Textile, apparel, and leather products	313–16	11	0	1	9
Wood products	321	2 - 10	*	0	2 - 10
Paper	322	0	0	0	0
Printing and related support activities	323	0 - 7	0 - 7	0 - 7	*
Petroleum and coal products	324	5	2	2	1
Chemicals	325	12,393	2,822	1,601	7,970
Basic chemicals	3251	154	14	68	71
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	69 - 98 i	* i	8 i	60 - 89 i
Pesticide, fertilizer, and other agricultural chemicals	3253	211 - 241 i	4 - 72	139 - 207	* i
Pharmaceuticals and medicines	3254	11,697	2,737	1,319	7,641
Soap, cleaning compound, and toilet preparations	3256	209	0 - 39	0 - 39	171
Paint, coating, adhesive, and other chemicals	3255, 3259	19 - 28	0 - 28	0 - 28	0 - 27
Plastics and rubber products	326	183	16	44	123
Nonmetallic mineral products	327	31	1	5	25
Primary metals	331	22 - 26 i	0 - 3	1	22 i
Fabricated metal products	332	412	12	73	328 r
Machinery	333	1,003	17	79	908
Agricultural implement	33311	60 - 68	0 - 6	0 - 27	40 - 68
Semiconductor machinery	333242	167	5	13	149
Engine, turbine, and power transmission equipment	3336	128 - 134	0 - 7	27 i	101
Other machinery	other 333	641	0 - 13	10 - 41	590 - 619
Computer and electronic products	334	6,852	233	916	5,702
Communications equipment	3342	1,218 i	10 i	230 i	978 i
Semiconductor and other electronic components	3344	1,880	89	105	1,687
Navigational, measuring, electromedical, and control instruments	3345	3,630	111	549	2,970
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	250	13	56	182
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	3,193	22	448	2,723
Other measuring and controlling devices	other 3345	187	77	46	65
Other computer and electronic products	other 334	123	24	32	67
Electrical equipment, appliances, and components	335	486	12	30	444
Transportation equipment	336	16,356	1,318 i	2,763 i	12,275 i
Motor vehicles, bodies, trailers, and parts	3361–63	3,637	190 i	1,760 i	1,687
Aerospace products and parts	3364	11,568 i	1,127 i	891 i	9,549 i
Aircraft, aircraft engine, and aircraft parts	336411–13	10,552 i	1,114 i	858 i	8,580 i
Guided missile, space vehicle, and related parts	336414–15, 336419	1,016	13	33	969
Military armored vehicle, tank, and tank components	336992	1	0	0	1
Other transportation	other 336	1,149	0	112	1,037
Furniture and related products	337	3	* r	*	3
Miscellaneous	339	311	7 - 18	31 - 43	253 - 272
Medical equipment and supplies	3391	233	7	29	197

TABLE 35

**Domestic R&D paid for by others and performed by the company, by type of R&D, industry, and company size: 2021**

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Basic research	Applied research	Development	
Other miscellaneous manufacturing	3399	78		0 - 11	2 - 15	56 - 75	
Nonmanufacturing industries	21–23, 42–81	36,300	i	2,858	11,716	21,726	i
Mining, quarrying, oil and gas extraction, and support activities	21	183	i	1	47	135	i
Utilities	22	35	i	3	5	28	i
Wholesale trade	42	84		20	9	55	i
Electronic shopping and electronic auctions	454111–12	4 - 8		0	0	4 - 8	
Transportation and warehousing	48–49	8 - 10		1	*	6 - 9	
Information	51	1,366		132	125	1,109	
Publishing	511	631		12	21	598	
Newspaper, periodical, book, and directory publishers	5111	23	r	0	0	23	r
Software publishers	5112	608		12	21	575	
Telecommunications	517	30 - 98		0 - 76	0 - 32	2 - 25	
Data processing, hosting, and related services	518	607		45	73	488	
Other information	other 51	29 - 99		0 - 76	0 - 32	0 - 22	i
Finance and insurance	52	45		1	1	43	
Real estate and rental and leasing	53	0 - 1		*	0	0 - 1	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0		0	0	0	
Other real estate and rental and leasing	other 53	0 - 1		*	0	0 - 1	
Professional, scientific, and technical services	54	34,413	i	2,687	11,450	20,276	i
Architectural, engineering, and related services	5413	2,007		88	275	1,644	
Computer systems design and related services	5415	3,221		350	1,226	1,645	
Scientific research and development services	5417	28,019	i	2,201	9,832	15,986	i
Research and development in nanotechnology	541713	73	i	7	20	46	i
Research and development in biotechnology (except nanobiotechnology)	541714	7,374		1,050	117	6,207	i
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	20,046	i	663	9,689	9,695	i
Research and development in the social sciences and humanities	541720	525		482	6	38	i
Other professional, scientific, and technical services	other 54	1,166		48	117	1,001	
Health care services	621–23	95		8	57	31	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	62 - 66		5	22	34 - 40	
All companies (number of domestic employees)	–	74,695		7,367	17,355	49,972	
Small companies							
10–19 <sup>a</sup>	–	1,219		122	245	852	
20–49	–	2,434		151	500	1,784	
Medium companies							
50–99	–	2,052		171	617	1,264	
100–249	–	3,993		417	662	2,914	
Large companies							
250–499	–	3,358		254	955	2,150	
500–999	–	3,777		636	458	2,683	
1,000–4,999	–	11,006		2,135	2,083	6,788	i
5,000–9,999	–	8,944	i	600	5,752	2,592	i
10,000–24,999	–	20,549		910	4,556	15,084	i
25,000 or more	–	17,361		1,972	1,527	13,862	

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 36  
Domestic R&D paid for by others and performed by the company, by source of funds, industry, and company size: 2021  
(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	74,695	26,587	i	20,806	2,450		23,582	329		155	78	1	674	34	
Manufacturing industries	31–33	38,394	6,601		13,401	1,454		16,374	119		136	24	*	264	21	
Food	311	297 - 302	38 - 77		212	1 - 35		0	0		0	*	0	0 - 27	0	
Beverage and tobacco products	312	19	*		18	0		0	0		*	0	0	0	0	
Textile, apparel, and leather products	313–16	11	5		0	*		1	0		0	0	0	5	0	
Wood products	321	2 - 10	0		2 - 10	0		0	0		0	0	0	0	0	
Paper	322	0	0		0	0		0	0		0	0	0	0	0	
Printing and related support activities	323	0 - 7	0		0	0		0	0		0	0	0	0 - 7	0 - 4	
Petroleum and coal products	324	5	5		0	0		0	0		0	0	0	*	0	
Chemicals	325	12,393	2,654		7,695	723		1,223	5		0	15	*	72	6	
Basic chemicals	3251	154	8		126	10		6	2		0	*	*	2	r 0	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	69 - 98	i 14		31 - 78	i *		3 - 23	0		0	*	0	0	0	
Pesticide, fertilizer, and other agricultural chemicals	3253	211 - 241	i *	i	210 - 241	0		0	*	i	0	0	0	0	0	
Pharmaceuticals and medicines	3254	11,697	2,631		7,066	711		1,194	4		0	14	0	70	6	
Soap, cleaning compound, and toilet preparations	3256	209	*		209	0		0	0		0	0	0	0	0	
Paint, coating, adhesive, and other chemicals	3255, 3259	19 - 28	1		0 - 25	2		1 - 21	0		0	*	*	i 0	0	
Plastics and rubber products	326	183	56		103	*	r	3	r 0		0	*	r 0	20	r *	
Nonmetallic mineral products	327	31	5		12	0		4	0		0	0	0	0	10	
Primary metals	331	22 - 26	i 0 - 26		*	0 - 26	i	*	0 - 3		0	*	0	0	0	
Fabricated metal products	332	412	298	r	60	5		13	0		0	*	0	35	r 0	
Machinery	333	1,003	211		117	161		503	0		2	3	*	3	3	r
Agricultural implement	33311	60 - 68	0 - 68		0 - 56	0 - 68		0 - 6	0		0	0	0	0	0	
Semiconductor machinery	333242	167	8		55	91		14	0		0	0	0	*	0	
Engine, turbine, and power transmission equipment	3336	128 - 134	28		8	0 - 7		93	0		*	0	0	0	0	
Other machinery	other 333	641	106 - 177		0 - 56	0 - 71		391 - 397	0		2	3	*	3	3	r
Computer and electronic products	334	6,852	1,650		2,065	225		2,828	8		53	6	0	15	*	

TABLE 36  
Domestic R&D paid for by others and performed by the company, by source of funds, industry, and company size: 2021  
(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
Communications equipment	3342	1,218	i 462 - 570 i	99 - 207	0 - 12	421 - 504	i *	17 - 39	0	0	0 - 12	0
Semiconductor and other electronic components	3344	1,880	75	1,527	187	81	6	0	*	0	4	0
Navigational, measuring, electromedical, and control instruments	3345	3,630	1,007	333	28	2,223	0 - 3	15 - 36	6	0	0 - 12	*
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	250	0 - 14	229	0	3 - 17	0	0	6	0	0 - 12	0
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	3,193	829 - 1,008	0 - 105	0 - 29	2,086 - 2,197	0 - 3	15 - 36	0	0	0	0
Other measuring and controlling devices	other 3345	187	0 - 164	0 - 105	0 - 29	23 - 121	0 - 3	0	* r	0	0 - 12	*
Other computer and electronic products	other 334	123	0 - 104	0 - 104	0 - 12	19 - 102	0 - 3 i	0	0	0	0 - 12	0
Electrical equipment, appliances, and components	335	486	12	440	8	25	1	0	0	0	*	0
Transportation equipment	336	16,356	1,534	2,576	294 i	11,670 i	104	81 i	*	0 - 1	88 - 99	0 - 4
Motor vehicles, bodies, trailers, and parts	3361-63	3,637	808	2,479	234 i	48	0 - 70	0 - 70 i	*	0	0 - 70	0 - 4 i
Aerospace products and parts	3364	11,568	i 724	40 - 98	58 - 61	10,527 i	33 - 105	10 - 82 i	0	0 - 1	0 - 99	0 - 4
Aircraft, aircraft engine, and aircraft parts	336411-13	10,552	i 519	40 - 98	56 - 61	9,719 i	33 - 105	8 - 82 i	0	0 - 1	0 - 99	0 - 4
Guided missile, space vehicle, and related parts	336414-15, 336419	1,016	206 i	0	0 - 2	808	0	0 - 2	0	0	0	0
Military armored vehicle, tank, and tank components	336992	1	0 - 1	0	0 - 1	1	0	0	0	0	0	0
Other transportation	other 336	1,149	0 - 3	0 - 56	0	1,094	0	0	0	0	0 - 56	0
Furniture and related products	337	3	3	0	0	0	0	0	0	0	1	0
Miscellaneous	339	311	98	92 - 104	7	102	0 - 3	0	*	0 - 1	1 - 13	0
Medical equipment and supplies	3391	233	60	93	7	72	0	0	*	0	2	0
Other miscellaneous manufacturing	3399	78	38 r	0 - 11	*	30	0 - 3	0	*	0 - 1	0 - 11	0
Nonmanufacturing industries	21-23, 42-81	36,300	i 19,986 i	7,405 i	995 i	7,207	210	19	54	1	410	13 i
Mining, quarrying, oil and gas extraction, and support activities	21	183	i 19 i	145 - 158 i	6 - 20 i	0	0	0	0	0	0	0

TABLE 36  
Domestic R&D paid for by others and performed by the company, by source of funds, industry, and company size: 2021  
(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
Utilities	22	35	i 0 - 8	0 - 8	0	28	i 0 - 8	0	0	0	*	0
Wholesale trade	42	84	27 r	45 i	0	0	*	i 0	0	0	12 i	* r
Electronic shopping and electronic auctions	454111-12	4 - 8	0	0	0	0	0	0	0	0	4 - 8	0
Transportation and warehousing	48-49	8 - 10	9	0	0 - 1	0	0	0	0	0	0	0
Information	51	1,366	271	649	45	377	18 r	0	*	r 0	6	0
Publishing	511	631	240	325 r	11 r	36 r	18 r	0	*	r 0	*	0
Newspaper, periodical, book, and directory publishers	5111	23 r	0	0	0	23 r	0	0	0	0	0	0
Software publishers	5112	608	240	325 r	11 r	13	18 r	0	*	r 0	*	0
Telecommunications	517	30 - 98	0 - 32	0 - 96	0	3	0	0	0	0	0	0
Data processing, hosting, and related services	518	607	0 - 32	195 - 236	34	338	0	0	0	0	0 - 7	0
Other information	other 51	29 - 99	0 - 32 i	0 - 99	0	0	0	0	*	r 0	0 - 7	0
Finance and insurance	52	45	45	0	0	0	0	0	0	0	0	0
Real estate and rental and leasing	53	0 - 1	0	0	0	0	*	0	0	0	0 - 1	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0	0	0	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	0 - 1	0	0	0	0	*	0	0	0	0 - 1	0
Professional, scientific, and technical services	54	34,413	i 19,555	i 6,550	i 920	i 6,790	172	19	40	1	353 i	13 i
Architectural, engineering, and related services	5413	2,007	442	36	8	1,318	121	*	3	*	77	0
Computer systems design and related services	5415	3,221	553	2,010	33 r	569	8 r	11	3	0	34 r	*
Scientific research and development services	5417	28,019	i 18,420	i 4,365	i 798	i 4,106	39	8	32	*	240 i	13 i
Research and development in nanotechnology	541713	73 i	13 i	12	1 i	47 i	1 i	0	0	0	0	0
Research and development in biotechnology (except nanobiotechnology)	541714	7,374	6,657	549	27	78	*	7	25	*	30	*
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	20,046	i 11,741	i 3,804	i 770	i 3,476	31	1	6	*	i 205	i 13 i
Research and development in the social sciences and humanities	541720	525	9	0	0	504	8	1	*	0	4	0
Other professional, scientific, and technical services	other 54	1,166	140	139	82	797	4	*	3	0	2	0
Health care services	621-23	95	45	6	2 r	10	0	0	13 r	*	i 19 r	0
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	62 - 66	3 - 19	0	5 - 24	3	10 - 22	0	0	0	15	0



TABLE 36  
Domestic R&D paid for by others and performed by the company, by source of funds, industry, and company size: 2021  
(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 companies (number of domestic employees)	–	74,695	26,587	i	20,806	2,450			23,582	329	155	78	1	674	34		
Small companies																	
10–19 <sup>a</sup>	–	1,219	385 - 577		175	0 - 73			444	17	1	7	1	0 - 192	0 - 8		
20–49	–	2,434	792		392	69			912	28	r	8	20	209	3	r	
Medium companies																	
50–99	–	2,052	483		684	90			694	13	9	6	*	71	2	r	
100–249	–	3,993	971		1,232	205			1,421	27	r	2	30	104	*		
Large companies																	
250–499	–	3,358	491		1,520	249			1,065	*	0	3	*	24	6		
500–999	–	3,777	912		1,193	297			1,271	38	1	11	0	44	10		
1,000–4,999	–	11,006	2,329	i	5,885	509			2,137	95	i	21 - 34	1	i	19	0 - 8	
5,000–9,999	–	8,944	i	3,416	3,540	i	741	i	1,107	0 - 115	2	1	*	i	10 - 132	8	i
10,000–24,999	–	20,549	11,200	i	6,098	221	i	2,961	0 - 71	0 - 71	0	0	0	0	0	0	
25,000 or more	–	17,361	5,411 - 5,603		86	0 - 73			11,570	i	0 - 115	29 - 106	i	0	0	0 - 192	0

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 37

**Domestic R&D paid for by others and performed by the company as a percentage of domestic net sales, by industry and company size: 2021**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percentage of domestic sales of R&D performers or funders <sup>a</sup>	Percentage of domestic sales of R&D performers <sup>b</sup>
All industries	21–23, 31–33, 42–81	74,695	0.6	0.6
Manufacturing industries	31–33	38,394	0.6	0.6
Food	311	297 - 302	D	D
Beverage and tobacco products	312	19	*	*
Textile, apparel, and leather products	313–16	11	*	*
Wood products	321	2 - 10	D	D
Paper	322	0	0.0	0.0
Printing and related support activities	323	0 - 7	D	D
Petroleum and coal products	324	5	*	*
Chemicals	325	12,393	0.9	0.9
Basic chemicals	3251	154	*	*
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	69 - 98	i D	D
Pesticide, fertilizer, and other agricultural chemicals	3253	211 - 241	i D	D
Pharmaceuticals and medicines	3254	11,697	1.9	1.9
Soap, cleaning compound, and toilet preparations	3256	209	0.2	0.2
Paint, coating, adhesive, and other chemicals	3255, 3259	19 - 28	D	D
Plastics and rubber products	326	183	0.1	0.1
Nonmetallic mineral products	327	31	0.1	0.1
Primary metals	331	22 - 26	i D	D
Fabricated metal products	332	412	0.1	0.1
Machinery	333	1,003	0.2	0.2
Agricultural implement	33311	60 - 68	D	D
Semiconductor machinery	333242	167	0.6	0.6
Engine, turbine, and power transmission equipment	3336	128 - 134	D	D
Other machinery	other 333	641	0.2	0.2
Computer and electronic products	334	6,852	0.9	0.9
Communications equipment	3342	1,218	i 1.2	1.2
Semiconductor and other electronic components	3344	1,880	0.8	0.8
Navigational, measuring, electromedical, and control instruments	3345	3,630	2.3	2.3
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	250	1.5	1.5
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	3,193	6.9	7.0
Other measuring and controlling devices	other 3345	187	0.2	0.2
Other computer and electronic products	other 334	123	*	*
Electrical equipment, appliances, and components	335	486	0.3	0.3
Transportation equipment	336	16,356	1.6	1.6
Motor vehicles, bodies, trailers, and parts	3361–63	3,637	0.6	D
Aerospace products and parts	3364	11,568	i 3.7	3.7
Aircraft, aircraft engine, and aircraft parts	336411–13	10,552	i 3.5	3.5
Guided missile, space vehicle, and related parts	336414–15, 336419	1,016	9.0	9.0
Military armored vehicle, tank, and tank components	336992	1	0.1	D
Other transportation	other 336	1,149	1.5	1.5
Furniture and related products	337	3	*	*

TABLE 37

**Domestic R&D paid for by others and performed by the company as a percentage of domestic net sales, by industry and company size: 2021**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)		Percentage of domestic sales of R&D performers or funders <sup>a</sup>	Percentage of domestic sales of R&D performers <sup>b</sup>
Miscellaneous	339	311		0.1	0.1
Medical equipment and supplies	3391	233		0.1	0.1
Other miscellaneous manufacturing	3399	78		0.1	0.1
Nonmanufacturing industries	21–23, 42–81	36,300	i	0.6	0.6
Mining, quarrying, oil and gas extraction, and support activities	21	183	i	0.1	0.1
Utilities	22	35	i	*	*
Wholesale trade	42	84		*	*
Electronic shopping and electronic auctions	454111–12	4 - 8		D	D
Transportation and warehousing	48–49	8 - 10		D	D
Information	51	1,366		0.1	0.1
Publishing	511	631		0.2	0.2
Newspaper, periodical, book, and directory publishers	5111	23	r	1.1	1.2
Software publishers	5112	608		0.2	0.2
Telecommunications	517	30 - 98		D	D
Data processing, hosting, and related services	518	607		0.1	0.1
Other information	other 51	29 - 99		D	D
Finance and insurance	52	45		*	*
Real estate and rental and leasing	53	0 - 1		D	D
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0		0.0	0.0
Other real estate and rental and leasing	other 53	0 - 1		D	D
Professional, scientific, and technical services	54	34,413	i	7.1	7.1
Architectural, engineering, and related services	5413	2,007		2.6	2.6
Computer systems design and related services	5415	3,221		1.6	1.6
Scientific research and development services	5417	28,019	i	33.8	33.9
Research and development in nanotechnology	541713	73	i	17.3	27.7
Research and development in biotechnology (except nanobiotechnology)	541714	7,374		27.2	27.2
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	20,046	i	37.2	37.2
Research and development in the social sciences and humanities	541720	525		37.6	37.6
Other professional, scientific, and technical services	other 54	1,166		0.9	0.9
Health care services	621–23	95		0.1	0.1
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	62 - 66		D	D
All companies (number of domestic employees)	–	74,695		0.6	0.6
Small companies					
10–19 <sup>c</sup>	–	1,219		3.4	3.6
20–49	–	2,434		2.3	2.4
Medium companies					
50–99	–	2,052		1.4	1.4
100–249	–	3,993		1.0	1.1
Large companies					
250–499	–	3,358		0.9	0.9
500–999	–	3,777		0.8	0.8
1,000–4,999	–	11,006		0.6	0.6

TABLE 37

**Domestic R&D paid for by others and performed by the company as a percentage of domestic net sales, by industry and company size: 2021**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percentage of domestic sales of R&D performers or funders <sup>a</sup>	Percentage of domestic sales of R&D performers <sup>b</sup>
5,000–9,999	–	8,944 i	0.6	0.6
10,000–24,999	–	20,549	0.9	0.9
25,000 or more	–	17,361	0.3	0.3

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

NAICS = 2017 North American Industry Classification System.

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

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

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

**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Unless indicated otherwise, statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 38

**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: 2021**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percentage of domestic sales of R&D performers or funders <sup>a</sup>	Percentage of domestic sales of R&D performers <sup>b</sup>
All industries	21–23, 31–33, 42–81	81,797	0.6	0.6
Manufacturing industries	31–33	42,967	0.7	0.7
Food	311	302	*	*
Beverage and tobacco products	312	22	*	*
Textile, apparel, and leather products	313–16	11	*	*
Wood products	321	2–10	D	D
Paper	322	*	*	*
Printing and related support activities	323	0–7	D	D
Petroleum and coal products	324	6	*	*
Chemicals	325	15,558	1.2	1.2
Basic chemicals	3251	166	0.1	0.1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	90–127	D	D
Pesticide, fertilizer, and other agricultural chemicals	3253	211–245	D	D
Pharmaceuticals and medicines	3254	14,806	2.4	2.4
Soap, cleaning compound, and toilet preparations	3256	214	0.2	0.2
Paint, coating, adhesive, and other chemicals	3255, 3259	19–65	D	D
Plastics and rubber products	326	187	0.1	0.1
Nonmetallic mineral products	327	33	0.1	0.1
Primary metals	331	22–26	D	D
Fabricated metal products	332	421	0.1	0.1
Machinery	333	1,036	0.2	0.2
Agricultural implement	33311	60–82	D	D
Semiconductor machinery	333242	169	0.6	0.6
Engine, turbine, and power transmission equipment	3336	141–147	D	D
Other machinery	other 333	644–661	D	D
Computer and electronic products	334	7,017	0.9	0.9
Communications equipment	3342	1,233	1.2	1.2
Semiconductor and other electronic components	3344	1,937	0.8	0.8
Navigational, measuring, electromedical, and control instruments	3345	3,721	2.4	2.4
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	258	1.6	1.6
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	3,269	7.1	7.1
Other measuring and controlling devices	other 3345	194	0.2	0.2
Other computer and electronic products	other 334	126	*	*
Electrical equipment, appliances, and components	335	491	0.3	0.3
Transportation equipment	336	17,521	1.7	1.7
Motor vehicles, bodies, trailers, and parts	3361–63	3,867	0.6	D
Aerospace products and parts	3364	12,503	4.0	4.0
Aircraft, aircraft engine, and aircraft parts	336411–13	11,483	3.8	3.8
Guided missile, space vehicle, and related parts	336414–15, 336419	1,021	9.1	9.1
Military armored vehicle, tank, and tank components	336992	1	0.1	D
Other transportation	other 336	1,149	1.5	1.5
Furniture and related products	337	4	*	*

TABLE 38

**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: 2021**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)		Percentage of domestic sales of R&D performers or funders <sup>a</sup>	Percentage of domestic sales of R&D performers <sup>b</sup>
Miscellaneous	339	325 - 331		D	D
Medical equipment and supplies	3391	248		0.1	0.1
Other miscellaneous manufacturing	3399	77 - 83		D	D
Nonmanufacturing industries	21-23, 42-81	38,831	i	0.6	0.6
Mining, quarrying, oil and gas extraction, and support activities	21	189	i	0.1	0.1
Utilities	22	42		*	*
Wholesale trade	42	87		*	*
Electronic shopping and electronic auctions	454111-12	8	r	*	*
Transportation and warehousing	48-49	8 - 10		D	D
Information	51	1,514		0.1	0.1
Publishing	511	682		0.2	0.2
Newspaper, periodical, book, and directory publishers	5111	23	r	1.1	1.2
Software publishers	5112	659		0.2	0.2
Telecommunications	517	31 - 100		D	D
Data processing, hosting, and related services	518	702		0.1	0.1
Other information	other 51	29 - 100		D	D
Finance and insurance	52	47		*	*
Real estate and rental and leasing	53	0 - 1		D	D
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0		0.0	0.0
Other real estate and rental and leasing	other 53	0 - 1		D	D
Professional, scientific, and technical services	54	36,729	i	7.6	7.6
Architectural, engineering, and related services	5413	2,378		3.1	3.1
Computer systems design and related services	5415	3,321		1.7	1.7
Scientific research and development services	5417	29,770	i	35.9	36.0
Research and development in nanotechnology	541713	84	i	19.8	31.7
Research and development in biotechnology (except nanobiotechnology)	541714	7,537		27.8	27.8
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	21,567	i	40.0	40.0
Research and development in the social sciences and humanities	541720	581		41.7	41.7
Other professional, scientific, and technical services	other 54	1,260		1.0	1.0
Health care services	621-23	104		0.1	0.1
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	98 - 106		D	D
All companies (number of domestic employees)	-	81,797		0.6	0.6
Small companies					
10-19 <sup>c</sup>	-	1,365		3.8	3.9
20-49	-	2,651		2.5	2.6
Medium companies					
50-99	-	2,240		1.5	1.6
100-249	-	4,589		1.2	1.2
Large companies					
250-499	-	4,102		1.1	1.1
500-999	-	4,120		0.8	0.9

TABLE 38

**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: 2021**

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US\$millions)	Percentage of domestic sales of R&D performers or funders <sup>a</sup>	Percentage of domestic sales of R&D performers <sup>b</sup>
1,000–4,999	–	11,930	0.6	0.6
5,000–9,999	–	9,649	0.6	0.6
10,000–24,999	–	22,820	1.0	1.0
25,000 or more	–	18,332	0.3	0.3

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

NAICS = 2017 North American Industry Classification System.

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

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

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

**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Unless indicated otherwise, statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 39  
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: 2021  
(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	23,582	2,344	i	3,250		17,987		
Manufacturing industries	31–33	16,374	1,181	i	1,652	i	13,541		
Food	311	0	0		0		0		
Beverage and tobacco products	312	0	0		0		0		
Textile, apparel, and leather products	313–16	1	0		1	i	0		
Wood products	321	0	0		0		0		
Paper	322	0	0		0		0		
Printing and related support activities	323	0	0		0		0		
Petroleum and coal products	324	0	0		0		0		
Chemicals	325	1,223	41		135		1,047		
Basic chemicals	3251	6	*	i	0 - 7	i	0 - 7		
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	3 - 23	*	i	0 - 8	i	0 - 14		
Pesticide, fertilizer, and other agricultural chemicals	3253	0	0		0		0		
Pharmaceuticals and medicines	3254	1,194	41		119		1,034		
Soap, cleaning compound, and toilet preparations	3256	0	0		0		0		
Paint, coating, adhesive, and other chemicals	3255, 3259	1 - 21	1		0 - 17		0 - 14		
Plastics and rubber products	326	3	r	0	0		3	r	
Nonmetallic mineral products	327	4		1	2		1		
Primary metals	331	*	*	i	0		*		
Fabricated metal products	332	13		0	1	i	13		
Machinery	333	503		6	35		463		
Agricultural implement	33311	0 - 6		0 - 6	0		0		
Semiconductor machinery	333242	14		0	0		14		
Engine, turbine, and power transmission equipment	3336	93		0 - 6	22 - 28		64		
Other machinery	other 333	391 - 397		0 - 6	7 - 13		384		
Computer and electronic products	334	2,828		30	i	486	2,312		
Communications equipment	3342	421 - 504	i	0 - 11	i	90	i	332 - 403	i
Semiconductor and other electronic components	3344	81		5	i	6	i	70	
Navigational, measuring, electromedical, and control instruments	3345	2,223		9		373		1,841	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3 - 17		0		0 - 14	i	3	
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	2,086 - 2,197		0 - 10		312 - 374		1,771 - 1,839	
Other measuring and controlling devices	other 3345	23 - 121		0 - 10	i	0 - 46		0 - 66	



TABLE 39  
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: 2021  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
Other computer and electronic products	other 334	19 - 102	4 - 18	16	0 - 68 i
Electrical equipment, appliances, and components	335	25	*	2	23
Transportation equipment	336	11,670 i	1,100 i	976 i	9,594 i
Motor vehicles, bodies, trailers, and parts	3361-63	48	1	30	17 i
Aerospace products and parts	3364	10,527 i	1,099 i	838 i	8,591 i
Aircraft, aircraft engine, and aircraft parts	336411-13	9,719 i	1,088 i	811 i	7,820 i
Guided missile, space vehicle, and related parts	336414-15, 336419	808	11	26	771
Military armored vehicle, tank, and tank components	336992	1	0	0	1 i
Other transportation	other 336	1,094	0	109	986
Furniture and related products	337	0	0	0	0
Miscellaneous	339	102	3	14	85
Medical equipment and supplies	3391	72	2	11	59
Other miscellaneous manufacturing	3399	30	1	3	27
Nonmanufacturing industries	21-23, 42-81	7,207	1,163	1,598	4,446
Mining, quarrying, oil and gas extraction, and support activities	21	0	0	0	0
Utilities	22	28 i	*	5 i	23 i
Wholesale trade	42	0	0	0	0
Electronic shopping and electronic auctions	454111-12	0	0	0	0
Transportation and warehousing	48-49	0	0	0	0
Information	51	377	9 r	41	327
Publishing	511	36 r	* i	5	31 r
Newspaper, periodical, book, and directory publishers	5111	23 r	0	0	23 r
Software publishers	5112	13	* i	5	8
Telecommunications	517	3	*	* i	3
Data processing, hosting, and related services	518	338	9 r	36	293
Other information	other 51	0	0	0	0
Finance and insurance	52	0	0	0	0
Real estate and rental and leasing	53	0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0	0
Other real estate and rental and leasing	other 53	0	0	0	0
Professional, scientific, and technical services	54	6,790	1,154	1,552	4,084
Architectural, engineering, and related services	5413	1,318	77	193	1,049
Computer systems design and related services	5415	569	57 i	169 i	343 i
Scientific research and development services	5417	4,106	986	1,141	1,978
Research and development in nanotechnology	541713	47 i	6 i	17	25 i

TABLE 39  
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: 2021  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research		Applied research		Development	
Research and development in biotechnology (except nanobiotechnology)	541714	78	20		24	i	34	i
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	3,476	500	i	1,095		1,882	
Research and development in the social sciences and humanities	541720	504	461		6	i	37	
Other professional, scientific, and technical services	other 54	797	34		49		714	
Health care services	621–23	10	0		*	i	9	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	3	*	r	*	r	2	
All companies (number of domestic employees)	–	23,582	2,344	i	3,250		17,987	
Small companies								
10–19 <sup>a</sup>	–	444	33	i	113	i	299	
20–49	–	912	43		196		673	
Medium companies								
50–99	–	694	74	i	188		432	
100–249	–	1,421	166		335		921	
Large companies								
250–499	–	1,065	78		390		597	
500–999	–	1,271	336	i	191		744	i
1,000–4,999	–	2,137	39		303		1,795	
5,000–9,999	–	1,107	441		53	i	613	
10,000–24,999	–	2,961	27		252		2,683	
25,000 or more	–	11,570	i 1,108	i	1,231	i	9,230	i

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 40  
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: 2021  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Foreign companies			Foreign government agencies	Foreign universities, colleges, and academic researchers	All other
			Subsidiaries <sup>a</sup>	Company's parent	Unaffiliated companies			
All industries	21–23, 31–33, 42–81	55,500	32,055	20,806	2,450	155	1	34
Manufacturing industries	31–33	37,305	22,293	13,401	1,454	136	*	21
Food	311	756	508 - 544	212	1 - 35	0	0	0
Beverage and tobacco products	312	57	38	18	0	* r	0	0
Textile, apparel, and leather products	313–16	1	1	0	*	0	0	0
Wood products	321	2 - 10	0	2 - 10	0	0	0	0
Paper	322	25	25	0	0	0	0	0
Printing and related support activities	323	0 - 4	0	0	0	0	0	0 - 4
Petroleum and coal products	324	117	117	0	0	0	0	0
Chemicals	325	12,266	3,842	7,695	723	0	*	6
Basic chemicals	3251	147	11	126	10	0	*	0
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	31 - 79	0	31 - 78	*	0	0	0
Pesticide, fertilizer, and other agricultural chemicals	3253	210 - 241	0	210 - 241	0	0	0	0
Pharmaceuticals and medicines	3254	11,598	3,815	7,066	711	0	0	6
Soap, cleaning compound, and toilet preparations	3256	222	12	209	0	0	0	0
Paint, coating, adhesive, and other chemicals	3255, 3259	5 - 32	4	0 - 25	2	0	* i	0
Plastics and rubber products	326	175	72	103	* r	0	0	*
Nonmetallic mineral products	327	22	1 r	12	0	0	0	10
Primary metals	331	0 - 146	0 - 141	*	0 - 26	i	0	0
Fabricated metal products	332	69	4	60	5	0	0	0
Machinery	333	321	37	117	161	2	*	3 r
Agricultural implement	33311	3 - 103	3 - 35	0 - 56	0 - 68	0	0	0
Semiconductor machinery	333242	146	0	55	91	0	0	0
Engine, turbine, and power transmission equipment	3336	7 - 16	*	8	0 - 7	*	0	0
Other machinery	other 333	61 - 166	2 - 34	0 - 56	0 - 71	2	*	3 r
Computer and electronic products	334	18,870	16,526	2,065	225	53	0	*
Communications equipment	3342	141 - 10,590	9 - 10,334	99 - 207	0 - 12	17 - 39	0	0
Semiconductor and other electronic components	3344	3,892	2,177	1,527	187	0	0	0
Navigational, measuring, electromedical, and control instruments	3345	561 - 4,489	184 - 4,093	333	28	15 - 36	0	*
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	328	99	229	0	0	0	0

TABLE 40  
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: 2021  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Foreign companies				Foreign government agencies	Foreign universities, colleges, and academic researchers	All other
			Subsidiaries <sup>a</sup>	Company's parent	Unaffiliated companies				
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	16 - 172	2	0 - 105	0 - 29		15 - 36	0	0
Other measuring and controlling devices	other 3345	83 - 4,125	83 - 3,991	0 - 105	0 - 29		0	0	*
Other computer and electronic products	other 334	1,638 - 14,261	1,638 - 14,157	0 - 104	0 - 12		0	0	0
Electrical equipment, appliances, and components	335	471	24	440	8		0	0	0
Transportation equipment	336	3,100 - 3,109	151	2,576	294	i	81	i	0 - 1
Motor vehicles, bodies, trailers, and parts	3361-63	2,854 - 2,927	143	2,479	234	i	0 - 70	i	0
Aerospace products and parts	3364	119 - 254	8	40 - 98	58 - 61		10 - 82	i	0 - 1
Aircraft, aircraft engine, and aircraft parts	336411-13	117 - 252	8	40 - 98	56 - 61		8 - 82	i	0 - 1
Guided missile, space vehicle, and related parts	336414-15, 336419	2	0	0	0 - 2		0 - 2		0
Military armored vehicle, tank, and tank components	336992	0 - 1	0	0	0 - 1		0		0
Other transportation	other 336	0 - 56	0	0 - 56	0		0		0
Furniture and related products	337	18	18	0	0		0		0
Miscellaneous	339	895 - 1,042	795 - 936	92 - 104	7		0	0 - 1	0
Medical equipment and supplies	3391	896	796	93	7		0		0
Other miscellaneous manufacturing	3399	0 - 146	0 - 141	0 - 11	*		0	0 - 1	0
Nonmanufacturing industries	21-23, 42-81	18,195	i 9,762	i 7,405	i 995	i	19		1
Mining, quarrying, oil and gas extraction, and support activities	21	151 - 1,296	i 0 - 1,131		145 - 158	i	6 - 20	i	0
Utilities	22	0 - 8	0	0 - 8	0		0		0
Wholesale trade	42	44 - 1,644	i 0 - 1,598		45	i	0		0
Electronic shopping and electronic auctions	454111-12	0 - 3,072	i 0 - 3,072	i	0		0		0
Transportation and warehousing	48-49	0 - 2,624	0 - 2,623	0	0 - 1		0		0
Information	51	7,343	i 6,649	i	649		45		0
Publishing	511	1,078	742		325	r	11	r	0
Newspaper, periodical, book, and directory publishers	5111	0	0	0	0		0		0
Software publishers	5112	1,078	742		325	r	11	r	0
Telecommunications	517	0 - 96	0	0 - 96	0		0		0
Data processing, hosting, and related services	518	755	484 - 526	i	195 - 236		34		0
Other information	other 51	5,413 - 5,512	i 5,380 - 5,424	i	0 - 99		0		0

TABLE 40  
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: 2021  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Foreign companies			Foreign government agencies	Foreign universities, colleges, and academic researchers	All other
			Subsidiaries <sup>a</sup>	Company's parent	Unaffiliated companies			
Finance and insurance	52	0 - 2,623	0 - 2,623	0	0	0	0	0
Real estate and rental and leasing	53	0 - 1,651	0 - 1,651	0	0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	0 - 1,651	0 - 1,651	0	0	0	0	0
Professional, scientific, and technical services	54	7,546 i	43	6,550 i	920 i	19	1	13 i
Architectural, engineering, and related services	5413	45	0	36	8	*	*	0
Computer systems design and related services	5415	2,085	31	2,010	33 r	11	0	*
Scientific research and development services	5417	5,186 i	2	4,365 i	798 i	8	*	13 i
Research and development in nanotechnology	541713	12	0	12	1 i	0	0	0
Research and development in biotechnology (except nanobiotechnology)	541714	584	0	549	27	7	*	*
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	4,589 i	2	3,804 i	770 i	1	* i	13 i
Research and development in the social sciences and humanities	541720	1	0	0	0	1	0	0
Other professional, scientific, and technical services	other 54	231	10	139	82	*	0	0
Health care services	621-23	8	0	6	2 r	0	* i	0
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	5 - 24	0	0	5 - 24	0	0	0
All companies (number of domestic employees)	-	55,500	32,055	20,806	2,450	155	1	34
Small companies								
10-19 <sup>b</sup>	-	177 - 252	2	175	0 - 73	1	1	0 - 8
20-49	-	487	14	392	69	8	0	3 r
Medium companies								
50-99	-	872	87	684	90	9	*	2 r
100-249	-	1,488	49	1,232	205	2	*	*
Large companies								
250-499	-	2,382	606	1,520	249	0	*	6
500-999	-	2,267	767	1,193	297	1	0	10
1,000-4,999	-	9,509	3,083	5,885	509	21 - 34	*	0 - 8
5,000-9,999	-	5,254 i	962	3,540 i	741 i	2	* i	8 i
10,000-24,999	-	10,579 - 10,653	4,262	6,098	221 i	0 - 71	0	0

TABLE 40  
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: 2021  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Foreign companies			Foreign government agencies	Foreign universities, colleges, and academic researchers	All other
			Subsidiaries <sup>a</sup>	Company's parent	Unaffiliated companies			
25,000 or more	–	22,414	22,224	86	0 - 73	29 - 106	i	0

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. In all other tables, R&D costs of foreign-company subsidiaries of U.S. companies are included in company-funded U.S. domestic R&D totals. Only in this table are such R&D costs classified as being part of R&D paid for by sources located outside of the United States. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 41  
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: 2021  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Total <sup>a</sup>	Basic research <sup>b</sup>	Applied research <sup>b</sup>	Development <sup>b</sup>
All industries	21–23, 31–33, 42–81	32,055	760	3,534	27,760
Manufacturing industries	31–33	22,293	677	2,944	18,672
Food	311	508 - 544	0 - 37	0 - 134	337 - 489
Beverage and tobacco products	312	38	*	4	34
Textile, apparel, and leather products	313–16	1	0	0	1
Wood products	321	0	0	0	0
Paper	322	25	0	1	24
Printing and related support activities	323	0	0	0	0
Petroleum and coal products	324	117	28	44	44
Chemicals	325	3,842	301	587	2,954
Basic chemicals	3251	11	6	1	3
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	0	0	0	0
Pesticide, fertilizer, and other agricultural chemicals	3253	0	0	0	0
Pharmaceuticals and medicines	3254	3,815	292	584	2,939
Soap, cleaning compound, and toilet preparations	3256	12	0 - 3	0 - 3	10
Paint, coating, adhesive, and other chemicals	3255, 3259	4	0 - 3	0 - 3	2
Plastics and rubber products	326	72	8	9	56
Nonmetallic mineral products	327	1	0	*	1
Primary metals	331	0 - 141	*	*	0 - 141
Fabricated metal products	332	4	*	*	3
Machinery	333	37	3	4	30
Agricultural implement	33311	3 - 35	2	2	0 - 31
Semiconductor machinery	333242	0	0	0	0
Engine, turbine, and power transmission equipment	3336	*	*	*	*
Other machinery	other 333	2 - 34	2	1	0 - 31
Computer and electronic products	334	16,526	273	2,028	14,225
Communications equipment	3342	9 - 10,334	0 - 229	10	0 - 10,094
Semiconductor and other electronic components	3344	2,177	0 - 229	107 - 338	1,840
Navigational, measuring, electromedical, and control instruments	3345	184 - 4,093	45	40	100 - 4,008
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	99	*	*	99
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	2	*	*	2
Other measuring and controlling devices	other 3345	83 - 3,991	45	39	0 - 3,906
Other computer and electronic products	other 334	1,638 - 14,157	0 - 229	1,638 - 1,873	0 - 12,286
Electrical equipment, appliances, and components	335	24	*	1	22
Transportation equipment	336	151	13	13	125

TABLE 41  
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: 2021  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Total <sup>a</sup>	Basic research <sup>b</sup>	Applied research <sup>b</sup>	Development <sup>b</sup>
Motor vehicles, bodies, trailers, and parts	3361–63	143	13	12	119
Aerospace products and parts	3364	8	*	1	6
Aircraft, aircraft engine, and aircraft parts	336411–13	8	*	1	6
Guided missile, space vehicle, and related parts	336414–15, 336419	0	0	0	0
Military armored vehicle, tank, and tank components	336992	0	0	0	0
Other transportation	other 336	0	0	0	0
Furniture and related products	337	18	0	13	5
Miscellaneous	339	795 - 936	16 - 54	111 - 246	666 - 808
Medical equipment and supplies	3391	796	17	112	667
Other miscellaneous manufacturing	3399	0 - 141	0 - 37	0 - 134	0 - 141
Nonmanufacturing industries	21–23, 42–81	9,762 i	84	590 i	9,088 i
Mining, quarrying, oil and gas extraction, and support activities	21	0 - 1,131	0 - 67	0 - 138	0 - 927
Utilities	22	0	0	0	0
Wholesale trade	42	0 - 1,598	0	0 - 367	0 - 1,232
Electronic shopping and electronic auctions	454111–12	0 - 3,072 i	0	0 - 452 i	0 - 2,623 i
Transportation and warehousing	48–49	0 - 2,623	0	0	0 - 2,623
Information	51	6,649 i	14 - 82	137 - 207	6,429 i
Publishing	511	742	15	116	612
Newspaper, periodical, book, and directory publishers	5111	0	0	0	0
Software publishers	5112	742	15	116	612
Telecommunications	517	0	0	0	0
Data processing, hosting, and related services	518	484 - 526 i	0 - 67 i	0 - 91 i	392 - 526 i
Other information	other 51	5,380 - 5,424 i	0 - 67	0 - 91	5,290 - 5,424 i
Finance and insurance	52	0 - 2,623	0	0	0 - 2,623
Real estate and rental and leasing	53	0 - 1,651	0 - 67	0 - 452	0 - 1,133
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0	0
Other real estate and rental and leasing	other 53	0 - 1,651	0 - 67	0 - 452	0 - 1,133
Professional, scientific, and technical services	54	43	3	2	38
Architectural, engineering, and related services	5413	0	0	0	0
Computer systems design and related services	5415	31	2	2	27
Scientific research and development services	5417	2	*	0	2
Research and development in nanotechnology	541713	0	0	0	0
Research and development in biotechnology (except nanobiotechnology)	541714	0	0	0	0
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	2	*	0	2
Research and development in the social sciences and humanities	541720	0	0	0	0



TABLE 41  
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: 2021  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Total <sup>a</sup>	Basic research <sup>b</sup>	Applied research <sup>b</sup>	Development <sup>b</sup>
Other professional, scientific, and technical services	other 54	10	1	0	9
Health care services	621–23	0	0	0	0
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	0	0	0	0
All companies (number of domestic employees)	–	32,055	760	3,534	27,760
Small companies					
10–19 <sup>c</sup>	–	2	0	0	2
20–49	–	14	2	5 r	7
Medium companies					
50–99	–	87	11	5	72 i
100–249	–	49	4 i	1	44
Large companies					
250–499	–	606	68	94	444
500–999	–	767	14	114	639
1,000–4,999	–	3,083	104	285	2,694
5,000–9,999	–	962	57	145	760
10,000–24,999	–	4,262	280	394 i	3,588
25,000 or more	–	22,224	221	2,492	19,511 i

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

<sup>a</sup> Statistics are based on companies in the United States that reported to the survey. No systematic item imputation was applied. These statistics include an adjustment to the weight to account for unit nonresponse.  
<sup>b</sup> Respondent was not asked to report categorical breakouts of research and development paid for by foreign subsidiaries. Rather, ratios of the company's basic research, applied research, and development were calculated as proportions of the overall domestic R&D performance paid for by the company. These ratios were applied to the company's domestic R&D performance paid for by foreign subsidiaries to get estimates of a company's basic research, applied research, and development paid for by foreign subsidiaries.  
<sup>c</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 42  
Domestic R&D performance by performer and source of funds, by industry and company size: 2021  
(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	602,499	527,804	74,695	56,959	49,856	7,103
Manufacturing industries	31–33	326,060	287,666	38,394	48,860	44,287	4,572
Food	311	5,266	4,963 - 4,968	297 - 302	269	265 - 270	0 - 4
Beverage and tobacco products	312	1,247	1,228	19	178	175	4
Textile, apparel, and leather products	313–16	829	818	11	11	11	*
Wood products	321	444	433 - 442	2 - 10	12	12	0
Paper	322	1,139	1,139	0	6	6	*
Printing and related support activities	323	204 i	196 - 205 i	0 - 7	3 - 12	3 - 12	0
Petroleum and coal products	324	957	952	5	202	201	1
Chemicals	325	109,490	97,097	12,393	36,393	33,228	3,165
Basic chemicals	3251	2,713	2,559	154	75	63	12
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,389 i	1,291 - 1,320 i	69 - 98 i	30 - 69 i	11 - 40 i	2 - 40 i
Pesticide, fertilizer, and other agricultural chemicals	3253	1,157	915 - 946	211 - 241 i	99	93 - 99	0 - 6
Pharmaceuticals and medicines	3254	100,220	88,524	11,697	35,828	32,718	3,110
Soap, cleaning compound, and toilet preparations	3256	2,740	2,531	209	295	290	4
Paint, coating, adhesive, and other chemicals	3255, 3259	1,271	1,242 - 1,252	19 - 28	26 - 68	17 - 46	0 - 37
Plastics and rubber products	326	3,144	2,961	183	63	60	3
Nonmetallic mineral products	327	1,533	1,503	31	16	14	3
Primary metals	331	912	887 - 890	22 - 26 i	9 - 13	9 - 13	*
Fabricated metal products	332	4,291	3,879	412	89	80	9
Machinery	333	17,730	16,726	1,003	337	304	33
Agricultural implement	33311	1,867	1,799 - 1,807	60 - 68	114 - 138	114 - 123	0 - 15
Semiconductor machinery	333242	5,349	5,182	167	3	1	2
Engine, turbine, and power transmission equipment	3336	1,374	1,239 - 1,246	128 - 134	25	13	13
Other machinery	other 333	9,140	8,499	641	170 - 196	166 - 177	4 - 20
Computer and electronic products	334	101,063	94,211	6,852	3,976	3,811	165
Communications equipment	3342	12,557	11,339	1,218 i	1,100	1,085	15 i
Semiconductor and other electronic components	3344	47,396	45,516	1,880	357	300	57
Navigational, measuring, electromedical, and control instruments	3345	13,644	10,014	3,630	342	252	90
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,087	2,837	250	84	77	8
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	5,301	2,109	3,193	129	53	76
Other measuring and controlling devices	other 3345	5,256	5,068	187	129	123	6
Other computer and electronic products	other 334	27,465	27,342	123	2,177	2,174	3
Electrical equipment, appliances, and components	335	5,494	5,007	486	76	71	5

TABLE 42  
Domestic R&D performance by performer and source of funds, by industry and company size: 2021  
(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
Transportation equipment	336	50,760	34,405	16,356	5,828	4,663	1,165
Motor vehicles, bodies, trailers, and parts	3361–63	26,391	22,754	3,637	4,353	4,124	229
Aerospace products and parts	3364	21,468 i	9,900	11,568 i	1,415	479	936
Aircraft, aircraft engine, and aircraft parts	336411–13	19,845 i	9,293	10,552 i	1,348	418 i	931
Guided missile, space vehicle, and related parts	336414–15, 336419	1,623	608	1,016	67	62	5
Military armored vehicle, tank, and tank components	336992	21 - 25	20 - 24	1	*	*	0
Other transportation	other 336	2,875 - 2,880	1,726 - 1,731	1,149	61	60	*
Furniture and related products	337	426	423	3	17	17	*
Miscellaneous	339	21,133	20,822	311	1,361 - 1,380	1,342 - 1,363	14 - 20
Medical equipment and supplies	3391	18,438	18,204	233	1,268	1,254	14
Other miscellaneous manufacturing	3399	2,695	2,618	78	92 - 112	88 - 109	0 - 5
Nonmanufacturing industries	21–23, 42–81	276,439	240,138	36,300 i	8,100	5,569	2,530
Mining, quarrying, oil and gas extraction, and support activities	21	1,260 - 1,334	1,077 - 1,151	183 i	14 - 134	9 - 129	5 i
Utilities	22	168 - 17,997	133 - 17,961	35 i	7 - 685	0 - 677	7 i
Wholesale trade	42	1,745 - 1,855 i	1,661 - 1,770 i	84	68 - 177 i	65 - 175 i	2
Electronic shopping and electronic auctions	454111–12	5,936 - 24,040 i	5,931 - 24,034 i	4 - 8	0 - 681	0 - 677	0 - 4
Transportation and warehousing	48–49	7,208	7,198 - 7,200	8 - 10	49 i	49 i	0
Information	51	147,855	146,488	1,366	3,293	3,145	148
Publishing	511	39,152	38,521	631	1,694	1,642	51
Newspaper, periodical, book, and directory publishers	5111	103	81	23 r	7	7	0
Software publishers	5112	39,049	38,441	608	1,687	1,635	51
Telecommunications	517	3,835	3,736 - 3,805	30 - 98	576	574	1
Data processing, hosting, and related services	518	45,192	44,585	607	799	704	95
Other information	other 51	59,577 - 59,676	59,647	29 - 99	224	224	*
Finance and insurance	52	20,947	20,902	45	139	138	1
Real estate and rental and leasing	53	2,096	2,095 - 2,097	0 - 1	4	4	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	5 - 8	5 - 8	0	1	1	0
Other real estate and rental and leasing	other 53	2,088 - 2,091	2,087 - 2,091	0 - 1	3	3	0

TABLE 42  
Domestic R&D performance by performer and source of funds, by industry and company size: 2021  
(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
Professional, scientific, and technical services	54	66,496	32,083	34,413 i	3,433	1,117	2,315 i
Architectural, engineering, and related services	5413	4,560	2,553	2,007	477	106	372
Computer systems design and related services	5415	20,409	17,188	3,221	427	326	101
Scientific research and development services	5417	34,142 i	6,123	28,019 i	2,405 i	655	1,750 i
Research and development in nanotechnology	541713	228	154	73 i	27	16	11 i
Research and development in biotechnology (except nanobiotechnology)	541714	9,039	1,664	7,374	407	244	163
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	24,312 i	4,266	20,046 i	1,916 i	396	1,520 i
Research and development in the social sciences and humanities	541720	563	38	525	56	0	56
Other professional, scientific, and technical services	other 54	7,385	6,218	1,166	123	30	93
Health care services	621–23	2,060 - 2,138	1,965 - 2,043	95	262	252	9 r
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2,564 - 3,199	2,501 - 3,136	62 - 66	38 - 723	3 - 680	35 - 44
All companies (number of domestic employees)	–	602,499	527,804	74,695	56,959	49,856	7,103
Small companies							
10–19 <sup>a</sup>	–	5,477	4,258	1,219	689	543	146
20–49	–	15,061	12,626	2,434	2,209	1,993	217
Medium companies							
50–99	–	14,540	12,488	2,052	2,785	2,597	188
100–249	–	24,023	20,030	3,993	3,037	2,441	596
Large companies							
250–499	–	23,932	20,574	3,358	3,320	2,576	744
500–999	–	27,432	23,655	3,777	2,611	2,268	343
1,000–4,999	–	94,615	83,609	11,006	6,066	5,142	924
5,000–9,999	–	62,817	53,873	8,944 i	4,819	4,114	705 i
10,000–24,999	–	104,607	84,057	20,549	15,590	13,320	2,270
25,000 or more	–	229,995	212,634	17,361	15,832	14,861	971

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 43  
Domestic R&D performance by source of funds and performer, by industry and company size: 2021  
(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	577,661	49,856	527,804	81,797	7,103	74,695	23,582	51,113
Manufacturing industries	31–33	331,953	44,287	287,666	42,967	4,572	38,394	16,374	22,020
Food	311	5,233	265 - 270	4,963 - 4,968	302	0 - 4	297 - 302	0	297 - 302
Beverage and tobacco products	312	1,403	175	1,228	22	4	19	0	19
Textile, apparel, and leather products	313–16	829	11	818	11	*	11	1	10
Wood products	321	445 - 454	12	433 - 442	2 - 10	0	2 - 10	0	2 - 10
Paper	322	1,145	6	1,139	*	*	0	0	0
Printing and related support activities	323	208	3 - 12	196 - 205	0 - 7	0	0 - 7	0	0 - 7
Petroleum and coal products	324	1,153	201	952	6	1	5	0	5
Chemicals	325	130,325	33,228	97,097	15,558	3,165	12,393	1,223	11,170
Basic chemicals	3251	2,621	63	2,559	166	12	154	6	148
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,330	11 - 40	1,291 - 1,320	90 - 127	2 - 40	69 - 98	3 - 23	46 - 92
Pesticide, fertilizer, and other agricultural chemicals	3253	1,011 - 1,045	93 - 99	915 - 946	211 - 245	0 - 6	211 - 241	0	211 - 241
Pharmaceuticals and medicines	3254	121,242	32,718	88,524	14,806	3,110	11,697	1,194	10,502
Soap, cleaning compound, and toilet preparations	3256	2,821	290	2,531	214	4	209	0	209
Paint, coating, adhesive, and other chemicals	3255, 3259	1,264 - 1,298	17 - 46	1,242 - 1,252	19 - 65	0 - 37	19 - 28	1 - 21	2 - 27
Plastics and rubber products	326	3,021	60	2,961	187	3	183	3	180
Nonmetallic mineral products	327	1,516	14	1,503	33	3	31	4	27
Primary metals	331	899	9 - 13	887 - 890	22 - 26	*	22 - 26	*	22 - 26
Fabricated metal products	332	3,959	80	3,879	421	9	412	13	399
Machinery	333	17,031	304	16,726	1,036	33	1,003	503	501
Agricultural implement	33311	1,922	114 - 123	1,799 - 1,807	60 - 82	0 - 15	60 - 68	0 - 6	54 - 68
Semiconductor machinery	333242	5,183	1	5,182	169	2	167	14	154
Engine, turbine, and power transmission equipment	3336	1,252 - 1,259	13	1,239 - 1,246	141 - 147	13	128 - 134	93	36 - 42

TABLE 43  
Domestic R&D performance by source of funds and performer, by industry and company size: 2021  
(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 machinery	other 333	8,666 - 8,675	166 - 177	8,499	644 - 661	4 - 20	641	391 - 397	243 - 251			
Computer and electronic products	334	98,022	3,811	94,211	7,017	165	6,852	2,828	4,024			
Communications equipment	3342	12,424	1,085	11,339	1,233	15	1,218	421 - 504	714 - 797	i		
Semiconductor and other electronic components	3344	45,816	300	45,516	1,937	57	1,880	81	1,800			
Navigational, measuring, electromedical, and control instruments	3345	10,265	252	10,014	3,721	90	3,630	2,223	1,407			
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	2,913	77	2,837	258	8	250	3 - 17	234 - 248			
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	2,161	53	2,109	3,269	76	3,193	2,086 - 2,197	995 - 1,107			
Other measuring and controlling devices	other 3345	5,191	123	5,068	194	6	187	23 - 121	67 - 164			
Other computer and electronic products	other 334	29,516	2,174	27,342	126	3	123	19 - 102	21 - 104			
Electrical equipment, appliances, and components	335	5,078	71	5,007	491	5	486	25	461			
Transportation equipment	336	39,068	4,663	34,405	17,521	1,165	16,356	11,670	4,685	i		
Motor vehicles, bodies, trailers, and parts	3361–63	26,877	4,124	22,754	3,867	229	3,637	48	3,589			
Aerospace products and parts	3364	10,380	479	9,900	12,503	936	11,568	10,527	1,041	i		
Aircraft, aircraft engine, and aircraft parts	336411–13	9,710	418	9,293	11,483	931	10,552	9,719	833	i		
Guided missile, space vehicle, and related parts	336414–15, 336419	669	62	608	1,021	5	1,016	808	207	i		
Military armored vehicle, tank, and tank components	336992	20 - 24	*	20 - 24	1	0	1	1	*			
Other transportation	other 336	1,786 - 1,792	60	1,726 - 1,731	1,149	*	1,149	1,094	55			
Furniture and related products	337	439	17	423	4	*	3	0	3			
Miscellaneous	339	22,164 - 22,186	1,342 - 1,363	20,822	325 - 331	14 - 20	311	102	209			
Medical equipment and supplies	3391	19,458	1,254	18,204	248	14	233	72	162			
Other miscellaneous manufacturing	3399	2,706 - 2,727	88 - 109	2,618	77 - 83	0 - 5	78	30	48			
Nonmanufacturing industries	21–23, 42–81	245,708	5,569	240,138	38,831	2,530	36,300	7,207	29,093	i		
Mining, quarrying, oil and gas extraction, and support activities	21	1,087 - 1,279	9 - 129	1,077 - 1,151	189	5	183	0	183	i		
Utilities	22	134 - 18,638	0 - 677	133 - 17,961	42	7	35	28	7	i		

TABLE 43  
Domestic R&D performance by source of funds and performer, by industry and company size: 2021  
(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 (subcontracted or passed-through R&D costs)	R&D performed by the company								
		Total	R&D performed by others (purchased and collaborative R&D)		R&D performed by the company			Total	Paid for by the U.S. government		Paid for by non-U.S. government sources					
Wholesale trade	42	1,836	i	65 - 175	i	1,661 - 1,770	i	87	2	84	0	84	i			
Electronic shopping and electronic auctions	454111-12	5,931 - 24,688	i	0 - 677		5,931 - 24,034	i	8	r	0 - 4	4 - 8	0	4 - 8			
Transportation and warehousing	48-49	7,247 - 7,249		49	i	7,198 - 7,200		8 - 10	0	8 - 10	0	8 - 10				
Information	51	149,633		3,145		146,488		1,514	148	1,366	377	989				
Publishing	511	40,163		1,642		38,521		682	51	631	36	r	595			
Newspaper, periodical, book, and directory publishers	5111	87		7		81		23	r	0	23	r	0			
Software publishers	5112	40,076		1,635		38,441		659	51	608	13	595				
Telecommunications	517	4,311 - 4,380		574		3,736 - 3,805		31 - 100	1	30 - 98	3	26 - 96				
Data processing, hosting, and related services	518	45,288		704		44,585		702	95	607	338	269				
Other information	other 51	59,801 - 59,871		224		59,577 - 59,647		29 - 100	*	29 - 99	0	29 - 99				
Finance and insurance	52	21,040		138		20,902		47	1	45	0	45				
Real estate and rental and leasing	53	2,099 - 2,101		4		2,095 - 2,097		0 - 1	0	0 - 1	0	0 - 1				
Lessors of nonfinancial intangible assets (except copyrighted works)	533	6 - 9		1		5 - 8		0	0	0	0	0				
Other real estate and rental and leasing	other 53	2,091 - 2,095		3		2,087 - 2,091		0 - 1	0	0 - 1	0	0 - 1				
Professional, scientific, and technical services	54	33,200		1,117		32,083	i	36,729	i	2,315	i	6,790	27,624	i		
Architectural, engineering, and related services	5413	2,659		106		2,553		2,378	372	2,007	1,318	688				
Computer systems design and related services	5415	17,514		326		17,188		3,321	101	3,221	569	2,652				
Scientific research and development services	5417	6,778		655		6,123	i	29,770	i	1,750	i	4,106	23,914	i		
Research and development in nanotechnology	541713	170		16		154	i	84	i	11	i	47	i	26	i	
Research and development in biotechnology (except nanobiotechnology)	541714	1,908		244		1,664		7,537	163	7,374	78	7,296				
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	4,662		396		4,266	i	21,567	i	1,520	i	20,046	i	3,476	16,570	i
Research and development in the social sciences and humanities	541720	38		0		38		581	56	525	504	22				
Other professional, scientific, and technical services	other 54	6,249		30		6,218		1,260	93	1,166	797	370				



TABLE 43  
Domestic R&D performance by source of funds and performer, by industry and company size: 2021  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Paid for by the company				Paid for by others								
								R&D performed by others (subcontracted or passed-through R&D costs)		R&D performed by the company				
		Total	R&D performed by others (purchased and collaborative R&D)	R&D performed by the company	Total					Paid for by the U.S. government	Paid for by non-U.S. government sources			
Health care services	621–23	2,217 - 2,296	252		1,965 - 2,043	104		9	r	95	10		85	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2,504 - 3,815	3 - 680		2,501 - 3,136	98 - 106		35 - 44		62 - 66	3		59 - 63	
All companies (number of domestic employees)	–	577,661	49,856		527,804	81,797		7,103		74,695	23,582		51,113	
Small companies														
10–19 <sup>a</sup>	–	4,801	543		4,258	1,365		146		1,219	444		775	
20–49	–	14,619	1,993		12,626	2,651		217		2,434	912		1,522	
Medium companies														
50–99	–	15,085	2,597		12,488	2,240		188		2,052	694		1,359	
100–249	–	22,471	2,441		20,030	4,589		596		3,993	1,421		2,572	
Large companies														
250–499	–	23,150	2,576		20,574	4,102		744		3,358	1,065		2,294	
500–999	–	25,923	2,268		23,655	4,120		343		3,777	1,271		2,506	
1,000–4,999	–	88,751	5,142		83,609	11,930		924		11,006	2,137		8,869	
5,000–9,999	–	57,987	4,114		53,873	9,649	i	705	i	8,944	i	1,107	7,837	i
10,000–24,999	–	97,378	13,320		84,057	22,820		2,270		20,549	2,961		17,588	i
25,000 or more	–	227,495	14,861		212,634	18,332		971		17,361	11,570	i	5,791	

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 44

**R&D paid for by the company and others and performed by the company outside of the United States, by selected location: 2021**

(Millions of U.S. dollars)

Location	Total		Paid for by the company		Paid for by others	
Total	135,412		120,270		15,142	i
Puerto Rico <sup>a</sup>	743	i	698	i	44	
Canada	9,283		8,354		929	
Latin America and other Western Hemisphere <sup>b</sup>	5,376		4,794		581	i
Argentina	456	i	270		186	i
Brazil	1,387		1,226		161	i
Chile	233		205		28	i
Mexico	1,505		1,363		142	i
Other Latin American and Western Hemisphere locations	1,795	i	1,731		64	i
Africa	605		457		148	i
South Africa	345	i	206		139	i
Other African locations	260		251		9	i
Asia and Pacific	45,196		41,804		3,392	i
Australia	2,566		2,342		224	i
China	11,639		10,775		864	
Hong Kong	643		620		23	i
India	14,314		13,814		501	i
Indonesia	41		37		4	i
Japan	5,241		4,316		925	i
Malaysia	1,094		1,070		24	i
New Zealand	356		232		124	i
Singapore	3,237		2,944		293	i
South Korea	1,998		1,781		218	i
Taiwan	2,662		2,528		134	
Thailand	470		446		24	i
Other Asian or Pacific locations	934		898		36	i
Europe	64,996		55,148		9,848	i
Austria	563		481		82	i
Belgium	3,033		2,774		259	i
Czechia	654		582		72	i
Denmark	951		912		39	i
Finland	646		599		47	
France	4,165		3,282		883	i
Germany	10,450		9,531		919	i
Hungary	366		242		124	i
Ireland	5,704		5,484		221	i
Italy	1,927		1,646		281	i
Luxembourg	506	i	428		78	i
Netherlands	4,086		3,028		1,058	i
Norway	434		413		21	
Poland	1,232		1,040		192	i
Russia	669		523		147	i
Spain	2,179	i	1,395		784	i
Sweden	1,730		1,549		181	i
Switzerland	5,700		4,907		794	
Turkey	314		283		31	i
United Kingdom	16,229		13,002		3,227	i
Other European locations	3,458		3,047		410	i
Middle East	8,757		8,606		152	i
Israel	8,232		8,123		109	i
Other Middle Eastern locations	525		483		42	i

**TABLE 44**  
**R&D paid for by the company and others and performed by the company outside of the United States, by selected location: 2021**  
(Millions of U.S. dollars)

Location	Total		Paid for by the company		Paid for by others	
Undistributed <sup>c</sup>	457	i	409	i	48	

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

<sup>a</sup> Puerto Rico is not included in the U.S. total due to its classification as a U.S. territory.  
<sup>b</sup> Other Western Hemisphere is defined as Argentina, Brazil, Chile, Mexico, and other Latin America.  
<sup>c</sup> Includes data reported that were not allocated to a specific country.

**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 \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 45-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: 2021 (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	135,412	743 i	9,283	563	3,033	654	951	646	4,165	10,450	366	5,704	1,927	506	4,086	434	1,232	669	2,179 i	1,730	5,700	314	16,229	3,458
Manufacturing industries	31–33	78,389	733 i	4,149	415	2,616	290	684	423	2,284	7,546	131	2,849	1,493	378	2,415	333	710	381	982	761	3,413	123	6,345	1,525
Food	311	1,190	0 - 278	66	3	13	0 - 7	3	*	74	62	4	0 - 33	15	0	36	0 - 24	9	11	16	1	37	4	95	49
Beverage and tobacco products	312	893	0	0 - 52	0	20	0	9	0	0	*	0	0 - 33	53	0	0 - 10	0	1	0 - 13	2	0	451	*	68	5
Textile, apparel, and leather products	313–16	169	0	3	2	5	0 - 7	0	4	20	6	0	0	4	0	4	0	0 - 8	0	1	3	43	0	4	1
Wood products	321	4	0	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper	322	67	0	45	0	0	0	0	0 - 6	1	4	0	0	0	0	1	0	1	0	0	0 - 7	1	*	2	0
Printing and related support activities	323	27	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum and coal products	324	175	0	46	*	26	0	4	0	5	9	0	0	1	0	4	0 - 8	0	0	*	*	0	*	43	0 - 8
Chemicals	325	23,741	158	865	165	2,237	49	227	56	724	1,879	38	925	538	168	1,605	51	126	171	443	193	2,070	102	2,855	722
Basic chemicals	3251	997	0	0 - 40	3	47	1	0 - 51	13	73	86	*	0 - 4	84	*	108	2	1	3	20	43	30	8	111	2
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	580 i	0	5	0	29	0	0	0	9	61	0	0	16	168	58	0	*	1	14	0	23	*	8	4 i
Pesticide, fertilizer, and other agricultural chemicals	3253	123	0 - 40	2	*	*	*	0 - 51	0	0 - 21	5	*	0	1	0	1	0	*	0	1	0	1	0	4	0 - 10
Pharmaceuticals and medicines	3254	20,936	117 - 130	820	160	2,040	47	177	42	603	1,470	37	922	432	0	1,407	49	117	166	405	151	2,004	93	2,587	704
Soap, cleaning compound, and toilet preparations	3256	871	0 - 41	0 - 40 i	1	113	*	0	*	21	226	1	*	4	0	6	0	3	2	2	0	9	1	124	5
Paint, coating, adhesive, and other chemicals	3255, 3259	234	0	0 - 40	1	7	*	0	0	0 - 21	31	*	0 - 4	2	*	25	*	4	*	1	*	3	*	22	0 - 10
Plastics and rubber products	326	607	0	6 i	0	6	1	0	0	70	144 i	*	1	32	5	2	0	*	1	4	4	7	*	87	47
Nonmetallic mineral products	327	198	0	12	0	4	*	*	0	19	22	0	0	0	0	0	0	5	6	0	0	0	0	1	3
Primary metals	331	50 i	0	0 - 15 i	0	0	0	0	0	0	4	0	0 - 15	0	0	0	0 - 15 i	1	0	3 i	0 - 15	0	0	4	9
Fabricated metal products	332	378	0	15	5	3	33	2	1	16	41	*	*	5	0	5	5	*	*	3	*	38	0	31	*
Machinery	333	5,343	10	222	27 i	36	7 i	83	92	370	915	10	14	235	*	110	55	19	2	128	92	75	*	365	28
Agricultural implement	33311	907	0	10	1	0 - 17	0	12	0 - 93	0 - 247	0 - 814	1	0	14	0	24	0	*	*	0 - 46	*	0 - 52	*	2	3
Semiconductor machinery	333242	1,299	10	0	24 i	20	0	0	0	3	43 i	0	4	7 i	0	0	0	0	0	0	0	7	0	4	14
Engine, turbine, and power transmission equipment	3336	546	0	24	0	*	*	50	0	122	60	3	*	19	0	6	0	*	0	83	*	18	*	54	2
Other machinery	other 333	2,591	0	188	2	0 - 17	7 i	21	0 - 93	0 - 247	0 - 814	7	10	194	*	80	55	19	2	0 - 46	92	0 - 52	*	305	9
Computer and electronic products	334	31,535	135 - 473 i	2,038	160	131	164	278	230	583	1,959	29	1,474	245	3	271	161	319	109	266 i	266	407	10	1,614	378
Communications equipment	3342	3,411	*	507	*	32	0 - 31 i	26	20	115	119	0 - 20	118	74	*	28	0 - 115	88	3	13	44	39	2	233	73
Semiconductor and other electronic components	3344	16,521	2	1,060	93	51	79	150	87	258	539	0 - 20	425	103	0	65	44	186 - 212	98	47	26	66	8	632	101
Navigational, measuring, electromedical, and control instruments	3345	3,576	0	216	0 - 68	36	56	52	117	126	663	10	27	45	3	133	3 - 118	0 - 25	4	31	167	223	*	441	98
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	467	0	18	0	9	*	*	4	24	28	0	1	4	0	7	0	*	0	*	11	58	*	180	14
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	594	0	0 - 199	0	*	4	*	0	9	0 - 572	0	0 - 27	6	0	0 - 127	4	0	0	1	0 - 157	0 - 166	0	0 - 262	0 - 85

TABLE 45-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: 2021 (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
Other measuring and controlling devices	other 3345	2,516	0	0 - 199	0 - 68	26	51	51	113	93	62 - 636	10	0 - 27	35	3	0 - 127	0 - 115	0 - 25	4	31	0 - 157	0 - 166	0	0 - 262	0 - 85
Other computer and electronic products	other 334	8,027	132 - 471 i	256	0 - 68	12	0 - 31	50	6	84	638	0 - 20 i	904	24	0	44	*	21	4	175 i	30	79	*	308	105
Electrical equipment, appliances, and components	335	1,880	*	121	9	12	1	1	1	52	251	1	18	103	0	18	6	45	1	2	0	52	*	102	31
Transportation equipment	336	7,663	0 - 101 i	543	2	75 i	28	0 - 7 i	0 - 6	106	1,573 i	32	1 - 34	209	202	216	0 - 19	177 i	0 - 14	92	114	12	3	847	170
Motor vehicles, bodies, trailers, and parts	3361–63	6,720	0	363	0 - 3	75 i	0 - 29	0	0 - 6	56	1,453 i	32	2	16 - 178	202	213	0	137 i	1	57	113	1	0 - 4	715	166
Aerospace products and parts	3364	711	0 - 101 i	134 i	0	0	0 - 29	0 - 7 i	0	20	92	0	0 - 33	30 - 193	*	3	0 - 19	37	0 - 13 i	1	*	3	0 - 4	114	3
Aircraft, aircraft engine, and aircraft parts	336411–13	693	0 - 101 i	115 - 135 i	0	0	0 - 29	0 - 7 i	0	1 - 21 i	73 - 93	0	0 - 33	30 - 193	*	3	0	37	0 - 13 i	1	*	3	0 - 4	114	3
Guided missile, space vehicle, and related parts	336414–15, 336419	18	0	0 - 19	0	0	0	0	0	0 - 19	0 - 19	0	0	0	0	*	0 - 19	0	0	0	0	0	0	*	0
Military armored vehicle, tank, and tank components	336992	0 - 3	0	0	0 - 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other transportation	other 336	228 - 233	0	46 i	0	0	0 - 11 i	0	0	30 i	28	0	0	0	0	1	0	3	0	34	1 i	8	0	18 i	1
Furniture and related products	337	37	0	0	0	0	0	12	0	9	4	0	0	0	0	0	0	0	0	0	1	0	0	8	0
Miscellaneous	339	4,431	51	111 - 171	42	48	5	63 - 70 i	36 - 43	236	667	16	386	51	0	138 - 149	35	4 - 13	71	22	72 - 91	219	3	219	68 - 88
Medical equipment and supplies	3391	4,007	50	112	32	48	5	64 i	37	229	650	16	386	39	0	139	35	5	71	22	73	219	3	200	68
Other miscellaneous manufacturing	3399	424	1 i	0 - 59	10 i	0	*	0 - 7	0 - 6	7 i	16	0	*	12	0	0 - 10	0	0 - 8	0	0	0 - 18	*	*	19 i	0 - 21 i
Nonmanufacturing industries	21–23, 42–81	57,024	10	5,134	148 i	417	364	267	223	1,881	2,904	235	2,856	434 i	128 i	1,672 i	101	522	288	1,198 i	970	2,287	191	9,884	1,932
Mining, quarrying, oil and gas extraction, and support activities	21	5 - 79	0	0 - 79	0	0 - 42 i	0	0	0	0 - 79	0	0	0	0	0	0 - 30	0	0	0	0	0	0	0	0 - 79 i	0
Utilities	22	0 - 1,129	0	1	*	0	*	0	0	*	0	0	0	0	0	0	0	0 - 36	*	*	0	0	0	0 - 504	0
Wholesale trade	42	0 - 109 i	0	1	0	0 - 42	0	0	0	0 - 109	0 - 109 i	0	0	0 - 71	0	*	0	0	0	0	0	0	0 - 109	0	
Electronic shopping and electronic auctions	454111–12	4,330 - 6,357 i	0	0 - 478 i	5 i	1 i	3 i	0 - 8 i	2 i	0 - 152 i	0 - 530 i	*	0 - 1,182 i	0 - 71 i	56 - 107 i	0 - 30 i	0 - 4 i	0 - 36 i	0	0 - 56 i	0 - 137 i	9	0 - 23	0 - 504 i	60 i
Transportation and warehousing	48–49	73	0	0 - 70	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0
Information	51	29,258	2	3,088	73	167	288	222	174	716	992	93	1,258	74 - 98	22 - 46	598	92	277	120	355	670	1,506	138	5,076	1,349
Publishing	511	9,933	1	1,554	0 - 24	44	93	136	69	242	274	18	265	37	4	0 - 257	62	0 - 149	32	138	536	0 - 294	0 - 139	979	550
Newspaper, periodical, book, and directory publishers	5111	*	i	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Software publishers	5112	9,933	1	1,554	0 - 24	44	93	136	69	242	274	18	265	37	4	0 - 257	62	0 - 149	32	138	536	0 - 294	0 - 139	979	550
Telecommunications	517	77 i	0	0 - 60	0	0 - 70	0	0	0	*	*	0	3	0	0	0 - 70	0	0	0	6	0	*	*	0 - 70	0 - 70

TABLE 45-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: 2021 (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	
Data processing, hosting, and related services	518	9,881		0 - 2	1,099	50	0 - 124	191	0 - 87	0 - 106	339	377	70	670	38	19	342	26	129	86	136	0 - 135	0 - 431	0 - 139	1,103	474	
Other information	other 51	9,367	i	0 - 2	374 - 437	0 - 24	0 - 124	5	0 - 87	0 - 106	135	341	4	320	0 - 24	0 - 24	0 - 257	4	0 - 149	2	75	0 - 135	781 - 1,507	0 - 139	2,923 - 2,996	254 - 327	
Finance and insurance	52	2,461		0	191	*	0 - 42	7	0	0	0 - 152	26	29	0 - 1,182	0 - 71	*	0 - 30	0	0 - 36	12	0 - 56	0 - 137	16	0	668	38	
Real estate and rental and leasing	53	103		0	0 - 91	0	*	*	0	0	8	0 - 91	0	0 - 91	0 - 71	0	*	0	0	0 - 56	*	0	0	0 - 91	6		
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0 - 2		0	0 - 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Other real estate and rental and leasing	other 53	100 - 104		0	0 - 91	0	*	*	0	0	8	0 - 91	0	0 - 91	0 - 71	0	*	0	0	0 - 56	*	0	0	0 - 91	6		
Professional, scientific, and technical services	54	18,763	i	8	1,378	70	i 209	i 66	i 38 - 46	i 46	1,007	i 1,358	113	i 417	290	i 0 - 25	1,042	i 6 - 10	210 - 233	i 156	i 788	i 164	i 757	31 - 54	i 3,638	i 477	i
Architectural, engineering, and related services	5413	39	r	0	4	0	0	0	*	0	0	*	0	0	*	0	2	i 0	0	0	0	0	0	*	2	i 0	
Computer systems design and related services	5415	4,632		5	458	6	16	i 6	0 - 8	1	135	608	0 - 7	213	45	0 - 25	15	0 - 4	55	12	30	18	115	0 - 23	407	56	
Scientific research and development services	5417	13,630	i	2	723	64	i 193	i 60	i 39	i 45	828	i 736	i 107	i 201	i 235	i *	1,003	i 7	156	i 144	i 755	i 144	i 640	31	i 3,193	i 405	i
Research and development in nanotechnology	541713	16		0	*	0	0	0	0	0	0	3	0	0	0	0	0	0	0	1	0	*	0	0	0	*	
Research and development in biotechnology (except nanobiotechnology)	541714	4,402		0	214	6	36	17	11	7	143	219	19	6	77	0	32	7	54	31	103	18	592	10	1,333	118	
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	9,207	i	* i	509	58	i 157	i 43	i 28	i 38	i 685	i 515	i 88	i 195	i 157	i *	971	i *	101	i 112	i 652	i 125	i 48	i 22	i 1,860	i 287	i
Research and development in the social sciences and humanities	541720	5		2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Other professional, scientific, and technical services	other 54	463		*	193	*	*	0	0	0	43	14	0 - 7	3	11	0	21	0	0 - 21	0	4	2	1	0 - 21	35	16	
Health care services	621-23	2 - 81		0	0 - 80	0	0	0	0	0	0	*	0	0	0	0	0 - 30	0	0	0	0	0 - 80	0	0	0 - 80	1	
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	1 - 637		*	0 - 478	0	0	0	0	0	*	0 - 530	0	0 - 635	0 - 71	0	*	0	0	1	0 - 56	0	0	*	0 - 504	1	
All companies (number of domestic employees)	-	135,412		743	i 9,283	563	3,033	654	951	646	4,165	10,450	366	5,704	1,927	506	4,086	434	1,232	669	2,179	i 1,730	5,700	314	16,229	3,458	
Small companies																											
10-19 <sup>b</sup>	-	359		0	14	59 - 86	1	*	24	0 - 6	2	9	0	*	r *	0	*	0	*	1	9	r *	15	0	15	2	
20-49	-	909		0 - 44	65	0 - 26	4	*	0 - 32	*	14	30	0	4	12	i 2	9	3	21	15	r 12	1	9	2	76	39	
Medium companies																											
50-99	-	866		0	139	6	20	3	7 - 39	0 - 6	15	88	r *	20	r 5	0	3	*	3	10	7	9	12	2	106	22	
100-249	-	2,382		0 - 48	223	13	i 25	i 14	35	2	33	105	15	44	100	20	28	*	18	19	13	21	457	1	293	113	
Large companies																											
250-499	-	3,660		* r	312	22	4	3	69	i 5	140	114	15	62	38	2	42	i 3	44	4	44	39	148	*	454	117	
500-999	-	4,528		0	358	5	30	6	29	38	54	272	58	218	57	5	77	34	30	62	70	98	82	114	796	396	
1,000-4,999	-	20,663		45	2,289	58	201	110	234	137	844	1,762	76	994	212	11	300	44	225	119	250	479	i 525	39	2,328	799	
5,000-9,999	-	15,571		13	1,795	40	176	19	200	136	830	1,036	62	548	253	202	585	59	142	36	244	347	326	28	1,578	427	

TABLE 45-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: 2021 (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
10,000–24,999	–	28,481	639 i	1,110	162	419	186	125	70	1,194	2,273	86 i	698	731	*	1,240 i	85	282 i	151 i	1,079 i	310	621	45 i	3,321 i	710
25,000 or more	–	57,992	0 - 48	2,977	176	2,153	314	201	256	1,038	4,762	53	3,115	517	263	1,802	205	465	252	452	427	3,506	84	7,262	833

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

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

**Note(s):**  
Detail may not add to total because of rounding. Country detail was not collected from companies reporting less than \$1 million of R&D paid for by the company or reporting less than \$1 million of R&D paid for by others. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 45-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: 2021 (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 Asian or Pacific locations	Israel	Other Middle Eastern locations	South Africa	Other African locations	Undistributed <sup>a</sup>							
All industries	21–23, 31–33, 42–81	135,412	456	1,387	233	1,505	1,795	2,566	11,639	643	14,314	41	5,241	1,094	356	3,237	1,998	2,662	470	934	8,232	525	345	i	260	457	i					
Manufacturing industries	31–33	78,389	163	929	138	1,072	1,582	1,289	8,327	390	6,773	28	3,190	1,052	148	2,149	1,522	1,674	310	644	5,200	265	104	161	304	i						
Food	311	1,190	0 - 43	110	0 - 47	46	22	33	94	2	33	6	9	3	5	16	3	1	11	10	*	5	20	4	0 - 219	i						
Beverage and tobacco products	312	893	0 - 43	0 - 19	0 - 47	36	46	8	51	7	12	*	24	0	*	22	0	0	13	8	0	15	0 - 18	0	0							
Textile, apparel, and leather products	313–16	169	0	0 - 19	0	0 - 11	4	2	26	11	2	r	0	1	*	*	2	1	*	12	*	r	0	0	1	0						
Wood products	321	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
Paper	322	67	0	1	0	0	0	0	2	0	0	0	0	0	0	0	8	0	0	0	0	*	0	0	*	i						
Printing and related support activities	323	27	0	0	0	0	0	0	*	0	20	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0						
Petroleum and coal products	324	175	0	*	0	0	0	1	19	0	3	0	1	0	0	1	*	0	*	0	0	11	0	0	*	i						
Chemicals	325	23,741	120	371	92	174	268	486	2,031	174	493	i	9	1,613	19	21	367	258	112	51	63	383	165	66	30	7	i					
Basic chemicals	3251	997	2	24	1	9	6	3	89	26	11	2	15	1	1	65	2	5	1	8	16	16	0 - 6	9	0 - 8	i						
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	580	i	2	16	0	3	3	97	0	9	*	31	*	*	*	12	1	2	*	0	6	*	*	*	i						
Pesticide, fertilizer, and other agricultural chemicals	3253	123	1	12	*	0 - 13	0 - 4	2	1	0 - 25	0 - 22	1	1	*	0	0 - 18	*	*	3	1	0	0	*	0	0	0						
Pharmaceuticals and medicines	3254	20,936	115	297	89	148	241	474	1,675	124	444	i	5	1,526	16	20	190	241	104	43	41	363	140	61	20	0 - 8	i					
Soap, cleaning compound, and toilet preparations	3256	871	*	20	1	4	19	4	123	1	10	i	*	37	1	*	96	2	*	*	2	*	2	0 - 6	2	0 - 8	i					
Paint, coating, adhesive, and other chemicals	3255, 3259	234	*	2	*	0 - 13	0 - 4	1	45	0 - 25	0 - 22	*	3	1	0	0 - 18	3	2	1	i	11	4	0	*	0	*	i					
Plastics and rubber products	326	607	0 - 17	12	0	11	0 - 12	4	44	*	1	*	2	21	*	3	1	i	*	6	4	0	0	*	0	78	i					
Nonmetallic mineral products	327	198	0	2	0	4	0	*	19	0	0	0	3	0	0	0	44	24	0	0	32	0	0	0	*	i						
Primary metals	331	50	i	0	0 - 15	i	0	17	i	1	0	0	0	1	0	*	0	0	0	0	0	0	0	0	0	0 - 15	i					
Fabricated metal products	332	378	0 - 24	3	*	3	*	2	24	0	5	*	53	1	13	1	0	56	*	*	2	2	*	0	0 - 24	i						
Machinery	333	5,343	*	100	1	70	*	47	570	5	576	*	163	7	14	81	i	216	i	152	i	9	4	i	426	1	1	*	2	i		
Agricultural implement	33311	907	*	0 - 96	0	0 - 64	0	2	0 - 403	0	0 - 323	*	0	*	3	0	0	0	0	*	0 - 38	0	*	0	0	0						
Semiconductor machinery	333242	1,299	0	0	0	0	0	0	115	i	4	226	i	33	i	3	0	63	i	205	i	123	i	0	2	i	389	0	0	0	*	i
Engine, turbine, and power transmission equipment	3336	546	0	5	0	7	0	1	54	0	29	0	*	0	2	0	0	0	4	*	0	0	0	0	0	0	0					
Other machinery	other 333	2,591	*	0 - 96	1	0 - 64	*	44	0 - 403	1	0 - 323	*	130	4	9	18	12	30	5	1	0 - 38	1	1	*	2	i						
Computer and electronic products	334	31,535	1 - 44	54	i	0 - 47	233	1,161	i	199	3,418	11	997	984	90	1,478	328	1,249	177	500	4,011	48	0 - 18	0 - 7	0 - 219	i						
Communications equipment	3342	3,411	2	0 - 55	0 - 47	23	*	62	320	13	984	0 - 4	13	0 - 187	12	9	8	i	56	0 - 141	8	185	11	0 - 18	0 - 7	0						



TABLE 45-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: 2021 (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 Asian or Pacific locations	Israel	Other Middle Eastern locations	South Africa	Other African locations	Undistributed <sup>a</sup>	
Semiconductor and other electronic components	3344	16,521	0 - 43	0 - 55	0	0 - 211	98 - 631	32	2,160	48	3,014	0 - 4	526	644	17 - 33	949	200	719	37	456	2,931	*	0	*	0 - 219	i
Navigational, measuring, electromedical, and control instruments	3345	3,576	*	0 - 55	*	0 - 141	0 - 18	56	414	12	134	8	52	50	29	197	12	10	1	21	3 - 144	0 - 38	0 - 18	0	0 - 140	i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	467	*	0 - 18	0	0 - 18	0 - 18	5	10	0	6	6	1	7	0	62	*	0	0	*	4	0	0	0	0 - 18	i
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	594	0	0	0	0 - 140	0	0 - 52	0 - 405	1	0 - 129	0	*	0	0	0 - 136	0 - 13	1	*	0	0 - 140	0 - 38	0 - 18	0	0 - 140	i
Other measuring and controlling devices	other 3345	2,516	0	0 - 55	*	1	0	0 - 52	0 - 405	11	0 - 129	2	51	43	29	0 - 136	0 - 13	9	1	21	0 - 140	0	0 - 18	0	0 - 140	i
Other computer and electronic products	other 334	8,027	*	0 - 55	i 0 - 47	0 - 211	511 - 1,063	i 48	524	26	799	0	406	i 102 - 292	i 14 - 34	324	108	i 465	0 - 141	15	750 - 893	0 - 38	0 - 18	0	0 - 219	i
Electrical equipment, appliances, and components	335	1,880	0	38	0	58	2	6	613	i 4	177	i 0	54	5	2	30	43	10	i 5	2	0	*	0	0 - 7	0 - 22	i
Transportation equipment	336	7,663	0 - 43	205	0 - 47	411	5	368	1,000	3	i 257	0	60	2	1	i 78	i 569	52	r 25	4	13	0	2	i 122	0 - 101	i
Motor vehicles, bodies, trailers, and parts	3361-63	6,720	0 - 43	204	0 - 47	389	5	353	974	*	198	0	59	2	0	73	i 568	5	24	4	0 - 14	0	2	i 111 - 123	0 - 101	
Aerospace products and parts	3364	711	0	0 - 2	0	22	*	14	i 23	1	52	0	2	0	1	i 5	i *	*	1	i 0	0 - 14	0	0	0	0 - 101	i
Aircraft, aircraft engine, and aircraft parts	336411-13	693	0	0 - 2	0	22	*	14	i 23	1	52	0	2	0	1	i 5	i *	*	1	i 0	0 - 14	i 0	0	0	0 - 101	i
Guided missile, space vehicle, and related parts	336414-15, 336419	18	0	0	0	0	0	0	0	0	*	0	0	0	0	0	0	0	0	0	0 - 14	0	0	0	0	
Military armored vehicle, tank, and tank components	336992	0 - 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Other transportation	other 336	228 - 233	0	0 - 2	i 0	*	0	2	i 3	i 2	i 7	0	0	0	0	0	*	i 46	r *	i 0	0	0	*	i 0 - 11	i 0 - 11	i
Furniture and related products	337	37	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	*	i	
Miscellaneous	339	4,431	0 - 43	20	0 - 47	19 - 30	66 - 78	116	416	85	262	1	208	9	2	72	49	14	11	34	333	19	0 - 18	0 - 7	0 - 144	i
Medical equipment and supplies	3391	4,007	0 - 43	19	0 - 47	20	67	98	399	2	212	1	172	7	2	72	37	11	5	34	296	19	0 - 18	0 - 7	0 - 50	
Other miscellaneous manufacturing	3399	424	0	*	0 - 47	i 0 - 11	0 - 12	i 18	i 17	83	50	i 0	36	2	*	1	12	i 3	6	*	i 37	i 0	0	0	0 - 103	i
Nonmanufacturing industries	21-23, 42-81	57,024	293	i 458	i 95	433	213	1,277	i 3,311	253	7,542	13	2,051	i 42	208	i 1,088	i 476	i 988	161	r 290	3,032	260	i 241	i 99	154	i
Mining, quarrying, oil and gas extraction, and support activities	21	5 - 79	0	0	0	0	0	0 - 79	0	0	0 - 79	0	0 - 79	0	0	0	0	0	0	0	0	0	*	i *	0	
Utilities	22	0 - 1,129	0	0 - 187	0	0 - 24	0	*	*	0	0	0 - 12	0	0	*	0	0	0	0 - 2	0	0 - 382	0	*	0	0	
Wholesale trade	42	0 - 109	i 0	0	0	0 - 24	i 0 - 42	0	0 - 109	i 0	0 - 109	0	*	0	0	0	0 - 109	0 - 38	0	0	0	0	0	0	0 - 7	i
Electronic shopping and electronic auctions	454111-12	4,330 - 6,357	i 2	i 0 - 199	i 2	0 - 24	i 0 - 42	i 401	i 0 - 475	i 0 - 82	i 1,456	i 0 - 12	i 657	i 0 - 12	i 1	i 0 - 424	i 0 - 194	i 0 - 38	i 0 - 2	i 0 - 27	i 0 - 382	i 0 - 112	i 0 - 65	i *	i 0 - 7	i
Transportation and warehousing	48-49	73	0	0 - 70	0	0	0	0 - 70	0 - 70	0	0 - 70	0	0	0	0	0	0	0	0	0	0	0	*	0	0	

TABLE 45-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: 2021 (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 Asian or Pacific locations	Israel	Other Middle Eastern locations	South Africa	Other African locations	Undistributed <sup>a</sup>																								
Information	51	29,258	103	96 - 135	29 - 64	155	96	588	1,626	149	4,644	0 - 12	405	4 - 16	67	363	98	717	137	228	2,100	108	27 - 36	31 - 41	59	i																							
Publishing	511	9,933	0 - 8	20	25	12	3 - 24	178	1,037	0 - 150	1,783	1	136	0 - 16	0 - 25	125	50	21 - 221	135	165	648	11	6	32	10 - 23	i																							
Newspaper, periodical, book, and directory publishers	5111	*	i	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	i																								
Software publishers	5112	9,933	0 - 8	20	25	12	3 - 24	178	1,037	0 - 150	1,783	1	136	0 - 16	0 - 25	125	50	21 - 221	135	165	648	11	6	32	10 - 23	i																							
Telecommunications	517	77	i	0	0	0 - 9	*	0	*	0	0 - 70	0	0	0	0	*	0 - 49	0	0	0	0	0 - 9	0	0 - 50	i																								
Data processing, hosting, and related services	518	9,881	96	i	29	5	r	136	71	224	360	0 - 150	0 - 12	i	0 - 270	0 - 16	43	61	i	0 - 49	0 - 431	1	61	728	95	22	0	0 - 50																					
Other information	other 51	9,367	i	0 - 8	46 - 87	0 - 35	0 - 9	0 - 23	186	228	0 - 150	405 - 478	0 - 12	0 - 270	1	0 - 25	177	0 - 49	65 - 697	1	2	723	2	0 - 9	0 - 9	0 - 50	i																						
Finance and insurance	52	2,461	1	0 - 199	*	7	0 - 42	0 - 401	i	82	0 - 82	0 - 1,332	*	0 - 657	i	0	19	0 - 424	0 - 194	0 - 38	*	0 - 27	0 - 382	0 - 112	0 - 65	40 - 53	*	i																					
Real estate and rental and leasing	53	103	0	*	0	*	*	0 - 91	0 - 91	0	0 - 91	*	*	*	*	0 - 91	*	0	0	*	0	0	*	*	0 - 7	i																							
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0 - 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																								
Other real estate and rental and leasing	other 53	100 - 104	0	*	0	*	*	0 - 91	0 - 91	0	0 - 91	*	*	*	*	0 - 91	*	0	0	*	0	0	*	*	0 - 7	i																							
Professional, scientific, and technical services	54	18,763	i	187	i	164	i	31	i	249	77	i	290	1,130	24	i	1,443	2	i	991	i	27	i	121	i	303	i	186	i	235	23	i	37	i	550 - 664	41 - 153	i	150	i	16	i	89	i						
Architectural, engineering, and related services	5413	39	r	0	*	0	*	0	*	i	*	*	27	r	0	1	0	0	*	*	*	0	0	0	*	0	*	0																					
Computer systems design and related services	5415	4,632	3	27	*	164	19	53	362	1	891	0	84	10	8	33	5	126	*	3	441 - 556	0 - 112	10	7	58	i																							
Scientific research and development services	5417	13,630	i	184	i	130	i	28	i	84	i	57	i	231	i	744	23	i	508	i	2	i	904	i	16	i	111	i	269	i	178	i	70	i	23	i	31	i	107	i	41	i	138	i	9	i	29		
Research and development in nanotechnology	541713	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	i	0	0	0																								
Research and development in biotechnology (except nanobiotechnology)	541714	4,402	61	35	13	47	19	129	413	9	188	*	219	4	19	22	76	26	5	9	38	1	14	0	*	i																							
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	9,207	i	123	i	95	i	15	i	37	i	38	i	102	i	331	i	13	i	320	i	2	i	685	i	13	i	92	i	247	i	102	i	44	i	17	i	21	i	58	i	40	i	122	i	9	i	29	
Research and development in the social sciences and humanities	541720	5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	*	0	0	0	1	0	0																								
Other professional, scientific, and technical services	other 54	463	*	7	3	*	1	5	24	1	17	0	2	r	1	1	i	1	3	39	i	0	3	1	*	r	2	*	2	i																			
Health care services	621–23	2 - 81	0	0	0	0	0	0 - 80	0 - 80	0	0	0	0 - 80	0 - 12	0	0	0	0	0	0 - 27	0	0	*	0	0																								
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1 - 637	0	*	0 - 35	0 - 24	0 - 42	0 - 401	0 - 475	0 - 82	0 - 635	0	0	0	0	0 - 424	0 - 194	0	*	0 - 27	*	*	0	0	1	i																							
All companies (number of domestic employees)	–	135,412	456	1,387	233	1,505	1,795	2,566	11,639	643	14,314	41	5,241	1,094	356	3,237	1,998	2,662	470	934	8,232	525	345	i	260	457	i																						
Small companies																																																	

TABLE 45-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: 2021 (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 Asian or Pacific locations	Israel	Other Middle Eastern locations	South Africa	Other African locations	Undistributed <sup>a</sup>	
10–19 <sup>b</sup>	–	359	* r	0	0	* r	4 r	1	37	3	48 r	0	3	3	0	*	3	4	0	1	36	*	0	0	42	i
20–49	–	909	*	3	4 r	7	8	20	158	7	129	0	5	1	7 r	4	13	47 r	121 r	7 r	16	1	7	1	0 - 44	i
Medium companies																										
50–99	–	866	*	2	3	4	9	18	76	*	112	*	4	7	*	18 i	*	19	0	4	69	* r	*	5	12	i
100–249	–	2,382	6	2	4	12	25	16	163	29	211	*	32	2	3	40	13	77	2	24	95	2	1	1	0 - 52	i
Large companies																										
250–499	–	3,660	8	5	2	59	12	51	343	27	621	*	47	9	42	63	179 i	128	*	27	342	*	5	0	6	i
500–999	–	4,528	7	13	3	106 i	10	50	278	61	424	1	66	11	13	67	21	70	11	29	316	10	2	0	70	i
1,000–4,999	–	20,663	50	144	21 i	175	87	397	1,696	117	2,606	12	386 i	59	20	557	138	278	94	548	988	10	19	38	144	i
5,000–9,999	–	15,571	4	66	3	137	1,023 i	150	1,417	57	1,338	2	507 i	341 i	49	354	84	238	92 i	40	527	35	15	9	0	
10,000–24,999	–	28,481	233 i	434	53	296	137	513	2,416	51	3,267 i	10	1,862	84	156 i	1,048	569 i	656 i	45	78	736 i	100 i	163 i	28	9	i
25,000 or more	–	57,992	146	717	141	710	480	1,349	5,054	291	5,558	16	2,329	577	65	1,087	979	1,145	106	175	5,108	367	132	179	98 - 178	i

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

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

**Note(s):**  
Detail may not add to total because of rounding. Country detail was not collected from companies reporting less than \$1 million of R&D paid for by the company or reporting less than \$1 million of R&D paid for by others. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 46  
Worldwide, foreign, and domestic capital expenditures and capital expenditures for domestic R&D paid for and performed by the company, by type of expenditure, industry, and company size: 2021  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Worldwide capital expenditures				Foreign capital expenditures				Domestic capital expenditures				Domestic capital expenditures for R&D				Domestic capital expenditures for R&D (type of property)																			
		Total		Property, plant, and equipment		Identifiable intangible assets		Total		Property, plant, and equipment		Identifiable intangible assets		Total		Property, plant, and equipment		Identifiable intangible assets		Land acquisition		Buildings and land improvement		Machinery and equipment		Capitalized software		Other intellectual property		All other							
All industries	21–23, 31–33, 42–81	981,447		852,787		128,661		188,184		170,158		18,026		793,263		682,629		110,634		52,844		39,084		13,760		584	i	5,220		19,665		16,247	i	5,711		5,417	i
Manufacturing industries	31–33	429,329		372,727		56,603		124,622		112,126		12,497		304,707		260,601		44,106		28,450		22,755		5,695		243		3,877		15,169		2,596		3,654		2,910	
Food	311	33,986		29,957		4,029		7,625		7,033		592		26,361		22,924		3,437		946		926		20		13		138		622		35		16		124	
Beverage and tobacco products	312	13,740	i	12,281	i	1,459	i	5,269	i	5,269	i	0		8,472	i	7,012	i	1,459	i	297	i	296	i	1	r	0		25	i	253	i	1	r	0		18	i
Textile, apparel, and leather products	313–16	2,874		2,803		70		621		620		2		2,252		2,184		68		69		61		9	i	*		11		32		22		3		*	i
Wood products	321	2,527		2,463		64		179	i	176	i	3	i	2,348		2,288		61		15		15		*	i	*		1		13		*	i	0		*	
Paper	322	6,838		6,066		772		673		617		56		6,165		5,449		716		511		511		*	i	0		2		509		*		0		*	
Printing and related support activities	323	2,338		2,109		228		93		92		1		2,245		2,017		228		39		39		*		0		*		36		1		0		2	
Petroleum and coal products	324	24,164		23,338		825		10,755		10,152		603		13,409		13,187		222		171	i	165	i	6		*	i	16	i	116	i	6		0		33	i
Chemicals	325	86,197		77,531		8,667		22,116		20,373		1,743		64,081		57,157		6,924		8,291		6,748		1,543		16	i	1,968		3,346		535		1,190		1,236	
Basic chemicals	3251	25,426		22,957		2,469		6,952		5,958		994		18,473		16,999		1,475		317		303		14		0		37		253		3		3		21	
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	5,601		5,506		96		747		736		11		4,854		4,770	i	85		62		56		6		0		4		41		14		*		1	
Pesticide, fertilizer, and other agricultural chemicals	3253	3,466		3,210		256		267		235		32		3,199		2,974		225		170	i	71	i	99	i	2	i	15	i	40	i	85	i	7	i	21	i
Pharmaceuticals and medicines	3254	38,368		33,803		4,565		10,355		9,827		528		28,013		23,976		4,037		7,504		6,081		1,422		14	i	1,840		2,885		406		1,179		1,180	
Soap, cleaning compound, and toilet preparations	3256	8,470		7,878		592	i	2,467		2,449		17		6,003		5,429		574	i	174		174		1		0		59		82		24		*		10	
Paint, coating, adhesive, and other chemicals	3255, 3259	4,867		4,177		690		1,329		1,167		161		3,538		3,009		529		64		63		1	i	0		12	i	45		3		1		3	
Plastics and rubber products	326	13,253		12,672		582		1,812	i	1,762	i	50	i	11,441		10,910		532		353	i	348	i	5		0		42		281	i	6		1	r	23	
Nonmetallic mineral products	327	5,265		5,245	i	20	i	1,285	i	1,284	i	1		3,980		3,961		19	i	193		186		7	i	0		4	i	177		*		7	i	5	i
Primary metals	331	3,752		3,718		34		336		335		*		3,417		3,383		34		172		157		16		0		79		74	i	1		15		3	i
Fabricated metal products	332	15,054		13,944		1,110		3,491		3,051	r	440		11,563		10,893		670	r	397		380		17		3		42		291		17		1		42	
Machinery	333	25,349		23,637		1,712		7,408		7,145		263		17,941		16,492		1,449		1,295		1,112		183		*		122		783		140		11		238	

TABLE 46  
Worldwide, foreign, and domestic capital expenditures and capital expenditures for domestic R&D paid for and performed by the company, by type of expenditure, industry, and company size: 2021  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Worldwide capital expenditures			Foreign capital expenditures			Domestic capital expenditures			Domestic capital expenditures for R&D			Domestic capital expenditures for R&D (type of property)					
		Total	Property, plant, and equipment	Identifiable intangible assets	Total	Property, plant, and equipment	Identifiable intangible assets	Total	Property, plant, and equipment	Identifiable intangible assets	Total	Property, plant, and equipment	Identifiable intangible assets	Land acquisition	Buildings and land improvement	Machinery and equipment	Capitalized software	Other intellectual property	All other
Agricultural implement	33311	2,179	1,966	213	716	713	3	1,464	1,253	210	216	87	129	0	23	50	0 - 129	*	12 - 145
Semiconductor machinery	333242	3,612	3,436	176	1,704	1,703	1	1,908	1,733	175	314	313	1	i *	2	i 273	11	*	27
Engine, turbine, and power transmission equipment	3336	2,304	2,221	83	1,215	1,213	2	1,089	1,008	81	115	108	7	0	26	75	2	0	12
Other machinery	other 333	17,254	16,014	1,240	3,774	3,517	257	13,480	12,497	983	651	605	46	*	71	384	0 - 129	11	54 - 187 i
Computer and electronic products	334	89,644	61,906	27,738	36,474	29,501	6,973	53,170	32,405	20,766	9,468	6,927	2,540	122	792	5,312	1,064	i 1,691	487 i
Communications equipment	3342	5,156	3,374	1,782	934	576	358	4,222	2,798	1,424	731	0 - 732	0 - 732	i 44	0 - 102	459	128	i 0 - 102	0 - 102 i
Semiconductor and other electronic components	3344	55,910	33,324	22,586	23,836	17,630	6,206	32,074	15,694	16,380	5,014	i 3,969	1,045	i 37	i 286	i 3,218	731	i 444	299 i
Navigational, measuring, electromedical, and control instruments	3345	7,911	5,814	i 2,097	1,732	1,332	i 400	6,179	i 4,482	i 1,697	952	755	198	40	162	430	41 - 207	21 - 217	63 - 189
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	450	i 397	i 54	i 76	55	20	375	i 341	i 33	i 78	i 62	i 16	3	8	50	i 9	7	i 1 i
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	2,073	2,003	i 70	402	i 387	i 15	1,671	1,616	i 54	357	314	43	35	89	122	33	15	63
Other measuring and controlling devices	other 3345	5,388	3,414	i 1,974	1,254	890	364	4,134	i 2,524	i 1,610	i 517	378	i 139	2	65	i 258	0 - 166	0 - 194	0 - 126 i
Other computer and electronic products	other 334	20,667	19,394	1,273	9,973	9,963	10	10,695	9,431	1,263	2,770	1,471 - 2,205	565 - 1,299	0	240 - 346	1,206	0 - 166	927 - 1,227	0 - 126
Electrical equipment, appliances, and components	335	6,670	6,038	632	2,551	2,390	161	i 4,119	3,649	471	389	309	80	*	42	190	58	5	94
Transportation equipment	336	68,906	66,253	2,653	15,085	14,411	674	53,820	51,842	1,978	3,652	3,084	568	i 81	i 431	2,156	502	i 263	218
Motor vehicles, bodies, trailers, and parts	3361-63	54,932	53,077	1,855	12,405	11,735 - 12,405	0 - 670	42,528	40,672 - 41,343	1,185 - 1,856	i 2,813	i 2,355	i 458	i 68	i 308	1,654	i 475	i 98 - 263	42 - 208 i

TABLE 46  
Worldwide, foreign, and domestic capital expenditures and capital expenditures for domestic R&D paid for and performed by the company, by type of expenditure, industry, and company size: 2021  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Worldwide capital expenditures				Foreign capital expenditures			Domestic capital expenditures			Domestic capital expenditures for R&D					Domestic capital expenditures for R&D (type of property)																				
		Total		Property, plant, and equipment	Identifiable intangible assets	Total		Property, plant, and equipment	Identifiable intangible assets	Total		Property, plant, and equipment	Identifiable intangible assets	Total		Property, plant, and equipment	Identifiable intangible assets	Land acquisition	Buildings and land improvement	Machinery and equipment	Capitalized software	Other intellectual property	All other														
Aerospace products and parts	3364	11,435		10,752		683		2,437		1,767 - 2,438		0 - 670		8,998		8,314 - 8,986		13 - 684		704		595		109		0 - 14		113		401		25		0 - 150		1 - 167	
Aircraft, aircraft engine, and aircraft parts	336411-13	10,828		10,150		678		2,409		1,739 - 2,410		0 - 670		8,419		7,740 - 8,412		8 - 679		603		494		109		0		80		353		24		0 - 148		0 - 148	
Guided missile, space vehicle, and related parts	336414-15, 336419	607		602		5	i	28		22 - 29		0 - 6		579		573 - 580		0 - 6	i	101		100		*		0 - 14		33		48		1		1		1 - 20	
Military armored vehicle, tank, and tank components	336992	7		5		2	r	0		0		0		7		5		2	r	0 - 3		*		0 - 3		0		0		*		0		0 - 3		0	
Other transportation	other 336	2,531		2,419		112	i	244		238		5	i	2,288		2,181		107	i	133 - 137		134		0 - 3		0 - 14		10		101	i	2		0 - 16		10	
Furniture and related products	337	994		834		161		69		69		0		925		765		161		29		26		2	i	*		4		18		5		1		*	
Miscellaneous	339	27,777		21,930		5,847		8,780		7,846		934		18,997		14,084		4,913		2,164		1,466		698		7		158		961		204		449		387	
Medical equipment and supplies	3391	20,223		16,757		3,466		7,730		6,862		869		12,493		9,895		2,598		1,936		1,313		623		7		149		842		181		442		316	
Other miscellaneous manufacturing	3399	7,554		5,174		2,380		1,050		984		65		6,504		4,189		2,315		228		153		75		0		8		120		23	i	7		71	
Nonmanufacturing industries	21-23, 42-81	552,118		480,060		72,058		63,562		58,032		5,530		488,556		422,028		66,528		24,394	i	16,329		8,065	i	341	r	1,342	i	4,496		13,651	i	2,056	i	2,507	i
Mining, quarrying, oil and gas extraction, and support activities	21	27,919		27,721	i	199		3,755	i	3,752	i	4	i	24,164		23,969	i	195		263 - 344		249 - 331		13	i	12		2		78	i	26	i	0 - 209	i	0 - 228	
Utilities	22	104,992		102,718		2,275		390		390		0		104,603		102,328		2,275		1,003	i	960	i	43	i	0		0		63	i	50	i	0		890	i
Wholesale trade	42	14,919	i	14,195	i	724	i	651	i	618	i	33	i	14,268	i	13,578	i	690	i	693 - 816	i	497	i	196 - 320	i	*	i	56	i	138	i	151	i	149	r	197 - 324	i
Electronic shopping and electronic auctions	454111-12	1,086 - 83,088		387 - 82,389		699		0 - 19,383		0 - 19,383		0 - 282		1,086 - 78,607		387 - 77,908		416 - 700		1,087	i	846	i	241		0		0		0 - 408	i	154 - 1,088		0 - 209		0 - 467	i
Transportation and warehousing	48-49	21,698		20,841		858	i	921		638 - 921		0 - 282	i	20,778		19,919 - 20,203		575 - 858	i	261		202		60		0		40		44		109		0		68	
Information	51	218,900		173,839		45,060		30,744		27,708		3,036		188,156		146,131		42,025		10,768		6,373	i	4,395		5		608	i	1,661		6,744	i	1,282	i	469	
Publishing	511	45,316		35,675		9,642		14,807		13,947		860		30,509		21,728		8,782		2,887		1,093		1,794	i	5		131		570		1,531		525	i	125	
Newspaper, periodical, book, and directory publishers	5111	65	i	52		13	i	*	i	*	i	*	i	65		51		13	i	11	i	2		8	i	0		0		*	i	7		4	i	0	

TABLE 46  
Worldwide, foreign, and domestic capital expenditures and capital expenditures for domestic R&D paid for and performed by the company, by type of expenditure, industry, and company size: 2021  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Worldwide capital expenditures			Foreign capital expenditures			Domestic capital expenditures			Domestic capital expenditures for R&D				Domestic capital expenditures for R&D (type of property)								
		Total	Property, plant, and equipment	Identifiable intangible assets	Total	Property, plant, and equipment	Identifiable intangible assets	Total	Property, plant, and equipment	Identifiable intangible assets	Total	Property, plant, and equipment	Identifiable intangible assets	Land acquisition	Buildings and land improvement	Machinery and equipment	Capitalized software	Other intellectual property	All other				
Software publishers	5112	45,251	35,623	9,628	14,807	13,946	860	30,445	21,676	8,768	2,877	1,091	1,786	i	5	131	570	1,525	521	i	125		
Telecommunications	517	80,950	66,192	14,758	34	34	*	80,916	66,158	14,758	239	79	161	i	0	*	26	173	*	40	i		
Data processing, hosting, and related services	518	29,931	14,584	15,347	3,600	2,799	801	26,331	11,785	14,546	3,821	1,563	2,259		0	75	543	2,750	223	230			
Other information	other 51	62,703	57,389	5,314	12,303	10,928	1,375	50,400	46,461	3,939	3,820	3,639	181	i	*	402	521	2,290	533	74	i		
Finance and insurance	52	33,398	21,938	11,460	3,424	1,739	1,685	29,975	20,199	9,776	3,491	2,295	1,197	i	0	10	104	3,256	16	105	i		
Real estate and rental and leasing	53	15,082	14,677	405	55 - 14,674	55 - 14,674	0	409 - 15,027	4 - 14,622	405	243	121	121	i	0	4	3	172	58	5			
Lessors of nonfinancial intangible assets (except copyrighted works)	533	4 - 14,623	4 - 14,622	*	0 - 14,618	0 - 14,618	0	4 - 14,623	4 - 14,622	*	4 - 11	4 - 11	*	i	0	0	0	5	0	0 - 6			
Other real estate and rental and leasing	other 53	460 - 15,078	55 - 14,674	405	56	56	0	404 - 15,023	0 - 14,618	405	231 - 239	110 - 118	121	i	0	4	3	167	58	0 - 6	i		
Professional, scientific, and technical services	54	27,606	19,189	8,417	4,119	3,627	492	23,487	15,562	7,925	5,028	3,434	1,594	i	324	r	592	1,797	1,676	345	295		
Architectural, engineering, and related services	5413	1,938	1,696	242	227	197	29	1,711	1,498	213	249	195	54		0	24	158	34	r	26	8		
Computer systems design and related services	5415	15,077	10,013	5,064	2,036	1,808	228	13,041	8,205	4,837	r	2,367	1,398	969	i	0	82	922	1,171	i	65	126	
Scientific research and development services	5417	4,652	3,385	1,267	718	641	76	3,934	2,744	1,190	1,467	1,324	143	i	24	435	669	147	57	i	135		
Research and development in nanotechnology	541713	41	39	3	3	3	0	38	35	3	18	15	2		0	*	15	2	*	i	*	i	
Research and development in biotechnology (except nanobiotechnology)	541714	2,364	1,485	879	298	222	76	2,066	1,263	803	535	522	13		4	211	175	68	12	66			
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	2,228	1,849	378	416	416	*	1,811	1,433	378	904	783	121	i	20	224	476	73	i	45	i	66	i



TABLE 46  
Worldwide, foreign, and domestic capital expenditures and capital expenditures for domestic R&D paid for and performed by the company, by type of expenditure, industry, and company size: 2021  
(Millions of U.S. dollars)

Industry and company size	NAICS code	Worldwide capital expenditures				Foreign capital expenditures			Domestic capital expenditures			Domestic capital expenditures for R&D			Domestic capital expenditures for R&D (type of property)								
		Total	Property, plant, and equipment	Identifiable intangible assets		Total	Property, plant, and equipment	Identifiable intangible assets		Total	Property, plant, and equipment	Identifiable intangible assets		Total	Property, plant, and equipment	Identifiable intangible assets		Land acquisition	Buildings and land improvement	Machinery and equipment	Capitalized software	Other intellectual property	All other
Research and development in the social sciences and humanities	541720	19	12	7	*	*	0		19	12	7		10	4	7		0	*	4	4	0		3
Other professional, scientific, and technical services	other 54	5,939	4,095	1,844	1,139	980	158		4,800	3,115	1,685		945 i	517 i	428		300 r	51	48	325	196	26	
Health care services	621–23	3,146	2,557	589	123	123	*		3,022	2,433	589		345 - 436 i	191 - 414 i	21 - 154 i		0	28 i	205 i	95 i	*	15 - 109 i	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,373 - 83,375	0 - 82,001	1,374	0 - 19,383	0 - 19,383	0 - 282		1,091 - 78,612	0 - 77,520	1,091 - 1,375		914 - 1,215	858 - 1,159	56 i		0	2 i	0 - 408 i	279 - 1,213	0 - 209	0 - 467 i	
All companies (number of domestic employees)	–	981,447	852,787	128,661	188,184	170,158	18,026		793,263	682,629	110,634		52,844	39,084	13,760		584 i	5,220	19,665	16,247 i	5,711	5,417 i	
Small companies																							
10–19 <sup>a</sup>	–	4,652	4,227 r	425	254	115	139 r		4,398	4,112 r	286 i		474	293 i	181		7 i	33 i	207 i	121	71	35 i	
20–49	–	7,549	6,603	946 i	587	549	38 i		6,962	6,053	908 i		1,719	1,336	382 i		211 r	205	700	247 i	154 i	202	
Medium companies																							
50–99	–	8,101	6,787	1,313	393	318	75		7,708	6,470	1,238		1,733	1,382	351		13 i	322	816	302	63	217	
100–249	–	22,986	17,657	5,330	1,679	1,556	124		21,307	16,101	5,206		3,102	1,616	1,486		34 i	260	983	1,004 i	586	236	
Large companies																							
250–499	–	21,847	14,503	7,344 i	3,319	2,979	339		18,528	11,524	7,004 i		2,835	1,733	1,102 i		31 i	309	805	985	373	331	
500–999	–	25,146	19,504	5,641	2,758	1,993	765		22,388	17,511	4,877		3,012	2,187	825		49 i	320	1,099	1,113	162	269	
1,000–4,999	–	117,595	95,995	21,600	22,793	19,277	3,515		94,802	76,717	18,085		8,427	5,789	2,638		79	983	2,893	2,707	797	967	
5,000–9,999	–	110,249	97,823	12,426	19,370	17,511	1,859		90,879	80,312	10,567		5,864	4,469	1,395		22	297	2,046	2,716	154	628	
10,000–24,999	–	193,815	168,896	24,919	41,897	35,053	6,844		151,918	133,843	18,075		7,891	6,757	1,135 i		64 i	818	4,108	1,371	566	963 i	
25,000 or more	–	469,508	420,792	48,716	95,134	90,806	4,328		374,373	329,985	44,388		17,787 i	13,520 i	4,266 i		74 i	1,672 i	6,008 i	5,682 i	2,784	1,567 i	

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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



**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. The "undistributed" column shown in prior years is no longer necessary because of processing improvements implemented beginning in 2015. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 47  
Worldwide, domestic, and foreign total and R&D employment, by industry and company size: 2021  
(Thousands and percent)

Industry and company size	NAICS code	Worldwide employees			Domestic employees			Foreign employees		
		Total	R&D	Percentage of R&D employees	Total	R&D	Percentage of R&D employees	Total	R&D	Percentage of R&D employees
All industries	21–23, 31–33, 42–81	35,574	3,161	8.9	23,654	2,132	9.0	11,920	1,029	8.6
Manufacturing industries	31–33	18,325	1,524	8.3	10,334	1,015	9.8	7,991	510	6.4
Food	311	1,702	40	2.4	1,142	27	2.4	560	13	2.3
Beverage and tobacco products	312	992	8	0.8	425	5	1.1	567	3	0.6
Textile, apparel, and leather products	313–16	367	9	2.4	207	7	3.2	160	2	1.3
Wood products	321	142	6	4.3	129	6	4.7	13	*	0.5
Paper	322	281	8	2.9	194	6	3.2	87	2	2.1
Printing and related support activities	323	159	3	1.9	130	3	2.1	29	*	1.1
Petroleum and coal products	324	168	7	4.1	103	5	4.9	65	2	2.8
Chemicals	325	2,416	278	11.5	1,392	201	14.4	1,024	77	7.6
Basic chemicals	3251	334	19	5.8	208	12	5.6	126	8	6.1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	165	10	6.2	82	6	7.9	83	4	4.6
Pesticide, fertilizer, and other agricultural chemicals	3253	100	5	5.2	70	5	6.5	31	1	2.1
Pharmaceuticals and medicines	3254	1,072	211	19.7	638	157	24.6	434	54	12.5
Soap, cleaning compound, and toilet preparations	3256	486	18	3.7	253	11	4.5	232	6	2.8
Paint, coating, adhesive, and other chemicals	3255, 3259	258	14	5.3	140	9	6.7	118	4	3.7
Plastics and rubber products	326	691	29	4.2	493	23	4.7	198	6	2.9
Nonmetallic mineral products	327	216	9	4.4	136	8	6.0	80	1	1.5
Primary metals	331	169	10	6.0	127	9	7.5	42	1	1.4
Fabricated metal products	332	976	52	5.3	709	50	7.0	268	2	0.8
Machinery	333	1,899	159	8.4	932	100	10.8	967	59	6.1
Agricultural implement	33311	175	17	9.5	101	10	9.6	74	7	9.3
Semiconductor machinery	333242	116	27	23.5	40	14	35.7	76	13	17.1
Engine, turbine, and power transmission equipment	3336	217	11	5.1	84	8	9.2	132	3	2.5
Other machinery	other 333	1,391	104	7.5	706	68	9.7	685	35	5.2
Computer and electronic products	334	2,425	464	19.1	1,058	256	24.2	1,367	208	15.2
Communications equipment	3342	308	81	26.2	168	49	28.9	140	32	22.9
Semiconductor and other electronic components	3344	774	188	24.3	270	93	34.5	504	95	18.9
Navigational, measuring, electromedical, and control instruments	3345	710	86	12.0	362	54	15.0	348	31	9.0
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	82	10	12.6	54	8	14.4	28	3	9.2
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	177	25	14.0	120	21	17.9	57	3	5.8
Other measuring and controlling devices	other 3345	452	51	11.2	188	25	13.3	264	25	9.6
Other computer and electronic products	other 334	633	109	17.2	258	60	23.3	375	49	13.1

TABLE 47  
Worldwide, domestic, and foreign total and R&D employment, by industry and company size: 2021  
(Thousands and percent)

Industry and company size	NAICS code	Worldwide employees			Domestic employees			Foreign employees		
		Total	R&D	Percentage of R&D employees	Total	R&D	Percentage of R&D employees	Total	R&D	Percentage of R&D employees
Electrical equipment, appliances, and components	335	673	47	7.0	271	26	9.8	402	21 i	5.2
Transportation equipment	336	3,202	272	8.5	1,863	196	10.5	1,339	77	5.7
Motor vehicles, bodies, trailers, and parts	3361-63	2,035	168	8.3	889	108	12.1	1,146	60	5.3
Aerospace products and parts	3364	939	86	9.1	794	75	9.5	145	11	7.3
Aircraft, aircraft engine, and aircraft parts	336411-13	901	79	8.8	759	69	9.1	142	10	7.3
Guided missile, space vehicle, and related parts	336414-15, 336419	38	7	17.7	35	7	18.4	3	*	7.9
Military armored vehicle, tank, and tank components	336992	2	*	11.0	2	*	11.0	0	0	NA
Other transportation	other 336	226	18	8.1	177	12	6.9	48	6	12.2
Furniture and related products	337	173	4	2.6	137	4	2.9	36	*	1.3
Miscellaneous	339	1,672	118	7.1	886	83	9.4	787	35	4.5
Medical equipment and supplies	3391	1,255	96	7.7	619	65	10.5	636	31	4.9
Other miscellaneous manufacturing	3399	417	22	5.3	267	18	6.7	150	4 i	2.9
Nonmanufacturing industries	21-23, 42-81	17,249	1,637	9.5	13,320	1,117	8.4	3,929	520	13.2
Mining, quarrying, oil and gas extraction, and support activities	21	239	9 - 91	D	158	9 i	5.9	81	0 - 82	D
Utilities	22	350	3 - 33	D	341	3 - 24	D	9	0 - 10	D
Wholesale trade	42	784 i	23 - 127 i	D	651 i	24 i	3.7	133 i	0 - 103 i	D
Electronic shopping and electronic auctions	454111-12	98 - 5,964	98 - 221	D	98 - 5,080	98 - 120	D	0 - 888	0 - 103	D
Transportation and warehousing	48-49	1,410	21 - 125	D	1,087	22	2.0	323	0 - 103	D
Information	51	3,210	692	21.5	2,186	449	20.5	1,024	242	23.7
Publishing	511	776	216	27.9	460	127	27.5	316	90	28.4
Newspaper, periodical, book, and directory publishers	5111	7	1 i	17.5	6	1 i	18.5	*	0	0.0
Software publishers	5112	769	215	28.0	454	125	27.7	315	90	28.4
Telecommunications	517	610	23	3.7	542	22	4.0	68	1	1.5
Data processing, hosting, and related services	518	1,264	282	22.3	786	168	21.4	478	114	23.9
Other information	other 51	561	171	30.4	399	133	33.4	162	38	23.2
Finance and insurance	52	2,133	113	5.3	1,729	87	5.0	405	26	6.5
Real estate and rental and leasing	53	110	4 - 22	D	94	4	4.7	17	0 - 17	D
Lessors of nonfinancial intangible assets (except copyrighted works)	533	3	*	8.5	3	*	8.5	*	0	0.0
Other real estate and rental and leasing	other 53	107	4 - 22	D	90	4	4.6	17	0 - 17	D
Professional, scientific, and technical services	54	2,572	494	19.2	1,530	343	22.4	1,042	150	14.4
Architectural, engineering, and related services	5413	380	68	17.8	296	65	21.8	84	3 r	3.5

TABLE 47  
Worldwide, domestic, and foreign total and R&D employment, by industry and company size: 2021  
(Thousands and percent)

Industry and company size	NAICS code	Worldwide employees			Domestic employees			Foreign employees		
		Total	R&D	Percentage of R&D employees	Total	R&D	Percentage of R&D employees	Total	R&D	Percentage of R&D employees
Computer systems design and related services	5415	1,025	145	14.2	540	102	18.8	485	44	9.0
Scientific research and development services	5417	463	229	i 49.4	277	130	46.8	186	i 99	i 53.1
Research and development in nanotechnology	541713	2	1	57.8	2	1	60.5	*	*	i 25.1
Research and development in biotechnology (except nanobiotechnology)	541714	161	79	48.8	108	36	33.1	54	43	80.5
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	287	139	i 48.5	155	84	i 54.0	132	i 55	i 42.0
Research and development in the social sciences and humanities	541720	12	9	74.4	12	9	74.5	*	*	68.0
Other professional, scientific, and technical services	other 54	703	52	7.4	416	47	11.3	288	5	1.8
Health care services	621–23	432	8 - 22	D	420	9	2.1	12	0 - 13	D
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	49 - 5,915	49 - 153	D	49 - 5,031	50	D	0 - 888	0 - 103	D
All companies (number of domestic employees)	–	35,574	3,161	8.9	23,654	2,132	9.0	11,920	1,029	8.6
Small companies										
10–19 <sup>a</sup>	–	96	40	42.1	85	36	41.9	11	5	43.2
20–49	–	343	110	32.2	298	99	33.1	45	12	26.2
Medium companies										
50–99	–	473	102	21.5	418	92	22.1	56	9	16.7
100–249	–	1,111	178	16.0	886	157	17.8	225	21	9.2
Large companies										
250–499	–	1,003	148	14.8	741	110	14.9	262	38	14.5
500–999	–	1,343	154	11.4	926	110	11.9	416	43	10.3
1,000–4,999	–	5,009	507	10.1	3,148	340	10.8	1,860	168	9.0
5,000–9,999	–	3,218	315	9.8	1,933	211	10.9	1,285	103	8.0
10,000–24,999	–	5,986	541	9.0	3,260	309	9.5	2,726	232	8.5
25,000 or more	–	16,993	1,066	6.3	11,959	668	5.6	5,034	399	7.9

\* = amount < 500 employees; D = data withheld to avoid disclosing operations of individual companies; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%; NA = not available.

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 48  
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: 2021  
(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	737,911	602,499	135,412	3,161	2,132	1,029	233.4	282.6	131.6
Manufacturing industries	31–33	404,449	326,060	78,389	1,524	1,015	510	265.3	321.3	153.8
Food	311	6,456	5,266	1,190	40	27	13	160.7	194.7	90.6
Beverage and tobacco products	312	2,139	1,247	893	8	5	3	259.8	257.8	262.8
Textile, apparel, and leather products	313–16	997	829	169	9	7	2	114.6	126.6	78.2
Wood products	321	447	444	4	6	6	*	73.4	73.6	59.0
Paper	322	1,206	1,139	67	8	6	2	149.5	182.7	36.7
Printing and related support activities	323	231	204	27	3	3	*	76.0	75.1	83.4
Petroleum and coal products	324	1,131	957	175	7	5	2	163.8	187.9	96.4
Chemicals	325	133,231	109,490	23,741	278	201	77	479.5	546.0	307.1
Basic chemicals	3251	3,710	2,713	997	19	12	8	190.3	231.6	128.2
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,969	1,389	580	10	6	4	191.9	214.4	153.3
Pesticide, fertilizer, and other agricultural chemicals	3253	1,279	1,157	123	5	5	1	247.0	255.7	186.8
Pharmaceuticals and medicines	3254	121,157	100,220	20,936	211	157	54	573.3	637.9	386.1
Soap, cleaning compound, and toilet preparations	3256	3,611	2,740	871	18	11	6	202.6	241.0	134.9
Paint, coating, adhesive, and other chemicals	3255, 3259	1,505	1,271	234	14	9	4	109.4	136.0	53.1
Plastics and rubber products	326	3,752	3,144	607	29	23	6	129.4	135.6	104.9
Nonmetallic mineral products	327	1,731	1,533	198	9	8	1	182.8	186.0	161.7
Primary metals	331	963	912	50	10	9	1	95.7	96.5	82.5
Fabricated metal products	332	4,669	4,291	378	52	50	2	90.0	86.4	170.8
Machinery	333	23,073	17,730	5,343	159	100	59	145.3	176.9	91.1
Agricultural implement	33311	2,774	1,867	907	17	10	7	167.3	191.6	132.5
Semiconductor machinery	333242	6,648	5,349	1,299	27	14	13	242.9	373.1	99.7
Engine, turbine, and power transmission equipment	3336	1,920	1,374	546	11	8	3	173.5	176.9	165.5
Other machinery	other 333	11,731	9,140	2,591	104	68	35	113.0	133.7	73.1
Computer and electronic products	334	132,597	101,063	31,535	464	256	208	285.9	394.7	151.9
Communications equipment	3342	15,968	12,557	3,411	81	49	32	198.0	258.3	106.5
Semiconductor and other electronic components	3344	63,917	47,396	16,521	188	93	95	339.2	509.0	173.3
Navigational, measuring, electromedical, and control instruments	3345	17,220	13,644	3,576	86	54	31	201.2	251.3	114.3
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,554	3,087	467	10	8	3	344.9	400.4	180.0
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	5,895	5,301	594	25	21	3	238.2	246.9	180.9
Other measuring and controlling devices	other 3345	7,771	5,256	2,516	51	25	25	153.8	209.3	99.0
Other computer and electronic products	other 334	35,492	27,465	8,027	109	60	49	325.4	457.5	163.7

TABLE 48  
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: 2021  
(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
Electrical equipment, appliances, and components	335	7,374	5,494	1,880	47	26	21 i	155.7	208.0	89.7
Transportation equipment	336	58,423	50,760	7,663	272	196	77	214.5	259.6	99.7
Motor vehicles, bodies, trailers, and parts	3361-63	33,111	26,391	6,720	168	108	60	196.9	244.8	111.3
Aerospace products and parts	3364	22,180 i	21,468 i	711	86	75	11	258.7	285.6	67.4
Aircraft, aircraft engine, and aircraft parts	336411-13	20,538 i	19,845 i	693	79	69	10	259.9	289.0	66.9
Guided missile, space vehicle, and related parts	336414-15, 336419	1,642	1,623	18	7	7	*	244.7	249.5	91.2
Military armored vehicle, tank, and tank components	336992	24	21 - 25	0 - 3	*	*	0	95.5	D	NA
Other transportation	other 336	3,109	2,875 - 2,880	228 - 233	18	12	6	170.8	D	D
Furniture and related products	337	464	426	37	4	4	*	104.3	107.0	81.0
Miscellaneous	339	25,564	21,133	4,431	118	83	35	216.2	254.8	125.6
Medical equipment and supplies	3391	22,444	18,438	4,007	96	65	31	233.7	283.3	129.4
Other miscellaneous manufacturing	3399	3,120	2,695	424	22	18	4 i	140.7	150.9	98.2
Nonmanufacturing industries	21-23, 42-81	333,462	276,439	57,024	1,637	1,117	520	203.7	247.4	109.8
Mining, quarrying, oil and gas extraction, and support activities	21	1,339 i	1,260 - 1,334	5 - 79	9 - 91	9 i	0 - 82	D	D	D
Utilities	22	168 - 19,125	168 - 17,997	0 - 1,129	3 - 33	3 - 24	0 - 10	D	D	D
Wholesale trade	42	1,855 i	1,745 - 1,855 i	0 - 109 i	23 - 127 i	24 i	0 - 103 i	D	D	D
Electronic shopping and electronic auctions	454111-12	10,538 - 29,503 i	5,936 - 24,040 i	4,330 - 6,357 i	98 - 221	98 - 120	0 - 103	D	D	D
Transportation and warehousing	48-49	7,282	7,208	73	21 - 125	22	0 - 103	D	332.8	D
Information	51	177,113	147,855	29,258	692	449	242	256.1	329.2	120.7
Publishing	511	49,085	39,152	9,933	216	127	90	227.2	309.3	111.0
Newspaper, periodical, book, and directory publishers	5111	103	103	* i	1 i	1 i	0	89.7	89.7	NA
Software publishers	5112	48,981	39,049	9,933	215	125	90	227.9	311.3	111.0
Telecommunications	517	3,912	3,835	77 i	23	22	1	172.9	177.4	76.1
Data processing, hosting, and related services	518	55,072	45,192	9,881	282	168	114	195.1	269.3	86.4
Other information	other 51	69,044	59,676	9,367 i	171	133	38	404.6	448.4	249.2
Finance and insurance	52	23,409	20,947	2,461	113	87	26	207.2	241.3	94.1
Real estate and rental and leasing	53	2,199	2,096	103	4 - 22	4	0 - 17	D	472.0	D
Lessors of nonfinancial intangible assets (except copyrighted works)	533	7	5 - 8	0 - 2	*	*	0	26.2	D	NA

TABLE 48  
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: 2021  
(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
Other real estate and rental and leasing	other 53	2,192	2,088 - 2,091	100 - 104	4 - 22	4	0 - 17	D	D	D
Professional, scientific, and technical services	54	85,259	66,496	18,763	i 494	343	150	172.7	193.7	124.9
Architectural, engineering, and related services	5413	4,598	4,560	39	r 68	65	3	r 68.0	70.4	13.3
Computer systems design and related services	5415	25,041	20,409	4,632	145	102	44	172.6	200.9	106.5
Scientific research and development services	5417	47,772	i 34,142	i 13,630	i 229	i 130	99	i 209.0	262.8	138.1
Research and development in nanotechnology	541713	244	228	16	1	1	*	i 181.5	175.3	364.7
Research and development in biotechnology (except nanobiotechnology)	541714	13,441	9,039	4,402	79	36	43	170.8	253.7	102.2
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	33,519	i 24,312	i 9,207	i 139	i 84	i 55	i 240.6	289.7	166.2
Research and development in the social sciences and humanities	541720	568	563	5	9	9	*	61.7	62.2	31.9
Other professional, scientific, and technical services	other 54	7,847	7,385	463	52	47	5	150.3	156.9	89.9
Health care services	621-23	2,140	2,060 - 2,138	2 - 81	8 - 22	9	0 - 13	D	D	D
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	3,200	2,564 - 3,199	1 - 637	49 - 153	50	0 - 103	D	D	D
All companies (number of domestic employees)	-	737,911	602,499	135,412	3,161	2,132	1,029	233.4	282.6	131.6
Small companies										
10-19 <sup>a</sup>	-	5,836	5,477	359	40	36	5	144.6	153.1	78.4
20-49	-	15,969	15,061	909	110	99	12	144.6	152.8	76.8
Medium companies										
50-99	-	15,406	14,540	866	102	92	9	151.6	157.5	92.9
100-249	-	26,406	24,023	2,382	178	157	21	148.3	152.7	115.2
Large companies										
250-499	-	27,592	23,932	3,660	148	110	38	186.2	217.0	96.7
500-999	-	31,961	27,432	4,528	154	110	43	208.2	248.3	105.3
1,000-4,999	-	115,278	94,615	20,663	507	340	168	227.2	278.6	123.2
5,000-9,999	-	78,388	62,817	15,571	315	211	103	249.2	297.3	150.9
10,000-24,999	-	133,088	104,607	28,481	541	309	232	246.0	338.9	122.6
25,000 or more	-	287,987	229,995	57,992	1,066	668	399	270.1	344.5	145.5



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

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**  
Detail may not add to total because of rounding. Ratios were calculated using unrounded data. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 49  
Worldwide, domestic, and foreign R&D employment, by sex, industry, and company size: 2021  
(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	3,161	2,229	933	2,132	1,536	596	1,029	693	336
Manufacturing industries	31–33	1,524	1,104	421	1,015	744	270	510	359	150
Food	311	40	23	18	27	16	11	13	7	6
Beverage and tobacco products	312	8	5	4	5	3	2	3	2	2
Textile, apparel, and leather products	313–16	9	5	3	7	4	2	2	1	1
Wood products	321	6	5	1 i	6	5	1 i	*	*	*
Paper	322	8	6	2	6	4	2	2	1	1
Printing and related support activities	323	3	2	1	3	2	1	*	*	*
Petroleum and coal products	324	7	5	2	5	4	2	2	1	1
Chemicals	325	278	140	137	201	104	96	77	36	41
Basic chemicals	3251	19	12	7 i	12	8	4	8	4	4 i
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	10	8	3	6	5	2	4	3	1
Pesticide, fertilizer, and other agricultural chemicals	3253	5	3	2	5	3	2	1	*	*
Pharmaceuticals and medicines	3254	211	99	113	157	76	82	54	23	31
Soap, cleaning compound, and toilet preparations	3256	18	9	9	11	6 i	6	6	3	3
Paint, coating, adhesive, and other chemicals	3255, 3259	14	10	4	9	7	3	4	3	1
Plastics and rubber products	326	29	23	6	23	18	5	6	4 i	1 i
Nonmetallic mineral products	327	9	7	2	8	6	2	1	1	*
Primary metals	331	10	9	1	9	8	1	1	* i	*
Fabricated metal products	332	52	45	7	50	43	7	2	2	*
Machinery	333	159	135	24	100	86	14	59	49	10
Agricultural implement	33311	17	15	2	10	9	1	7	6	1
Semiconductor machinery	333242	27	23	4	14	12	2	13	11	2
Engine, turbine, and power transmission equipment	3336	11	9	2	8	6	1	3	3	1
Other machinery	other 333	104	88	16	68	59	10	35	29	6
Computer and electronic products	334	464	353	111	256	199	57	208	154	54
Communications equipment	3342	81	66	15	49	40	9	32	26	6
Semiconductor and other electronic components	3344	188	137	51	93	69	24	95	68	28
Navigational, measuring, electromedical, and control instruments	3345	86	66	20	54	43	12	31	23	8
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	10	7	3	8	5	2	3	2	1
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	25	20	5	21	18	4	3	3	1
Other measuring and controlling devices	other 3345	51	38	12	25	20	6	25	19	7
Other computer and electronic products	other 334	109	85	24	60	47	13	49	37	12
Electrical equipment, appliances, and components	335	47	36	12	26	20	7	21 i	16 i	5 i
Transportation equipment	336	272	223	49	196	162	34	77	62	15

TABLE 49  
Worldwide, domestic, and foreign R&D employment, by sex, industry, and company size: 2021  
(Thousands)

Industry and company size	NAICS code	Worldwide			Domestic			Foreign		
		Total	Male	Female	Total	Male	Female	Total	Male	Female
Motor vehicles, bodies, trailers, and parts	3361–63	168	137	i 31	108	89	18	60	48	13
Aerospace products and parts	3364	86	72	14	75	63	12	11	9	2
Aircraft, aircraft engine, and aircraft parts	336411–13	79	66	13	69	58	11	10	9	2
Guided missile, space vehicle, and related parts	336414–15, 336419	7	5	1	7	5	1	*	*	*
Military armored vehicle, tank, and tank components	336992	*	*	*	*	*	*	0	0	0
Other transportation	other 336	18	14	4	12	9	3	6	5	1
Furniture and related products	337	4	3	1	4	3	1	*	*	* i
Miscellaneous	339	118	80	39	83	56	26	35	23	12
Medical equipment and supplies	3391	96	63	33	65	43	22	31	20	11
Other miscellaneous manufacturing	3399	22	17	6	18	13	4	4 i	3 i	1 i
Nonmanufacturing industries	21–23, 42–81	1,637	1,125	512	1,117	791	326	520	334	186
Mining, quarrying, oil and gas extraction, and support activities	21	9 - 91	7 - 90	i 1 - 46	9 i	8 i	2	0 - 82	0 - 82	0 - 44
Utilities	22	3 - 33	3 - 14	0 - 30	3 - 24	4	0 - 20	0 - 10	0 - 10	0 - 10
Wholesale trade	42	23 - 127 i	18 - 106 i	4 - 50 i	24 i	19 i	5 i	0 - 103 i	0 - 86 i	0 - 44 i
Electronic shopping and electronic auctions	454111–12	98 - 221	59 - 203	0 - 72	98 - 120	59 - 120	0 - 56	0 - 103	0 - 86	0 - 44
Transportation and warehousing	48–49	21 - 125	16 - 103	5 - 50	22	16	5	0 - 103	0 - 86	0 - 44
Information	51	692	504	188	449	330	119	242	174	68
Publishing	511	216	150	66	127	92	35	90	58	31
Newspaper, periodical, book, and directory publishers	5111	1 i	1 i	* i	1 i	1 i	* i	0	0	0
Software publishers	5112	215	149	66	125	91	34	90	58	31
Telecommunications	517	23	16 i	6	22	16 i	6	1	1	* i
Data processing, hosting, and related services	518	282	207	76	168	120	48	114	86	28
Other information	other 51	171	131	39	133	102	31	38	29	9
Finance and insurance	52	113	69	44	87	42 - 70	17 - 45	26	0 - 27	0 - 27
Real estate and rental and leasing	53	4 - 22	2 - 21	0 - 19	4	3	1	0 - 17	0 - 17	0 - 17
Lessors of nonfinancial intangible assets (except copyrighted works)	533	*	*	*	*	*	*	0	0	0
Other real estate and rental and leasing	other 53	4 - 22	2 - 21	0 - 19	4	3	1	0 - 17	0 - 17	0 - 17
Professional, scientific, and technical services	54	494	300	194	343	224	119	150	75	75 i
Architectural, engineering, and related services	5413	68	51	16	65	49	16	3 r	2 r	1

TABLE 49  
Worldwide, domestic, and foreign R&D employment, by sex, industry, and company size: 2021  
(Thousands)

Industry and company size	NAICS code	Worldwide			Domestic			Foreign		
		Total	Male	Female	Total	Male	Female	Total	Male	Female
Computer systems design and related services	5415	145	108	37	102	76	26	44	32	12
Scientific research and development services	5417	229 i	106 i	123 i	130	68 i	62 i	99 i	38 i	61 i
Research and development in nanotechnology	541713	1	1	*	1	1	*	* i	*	* i
Research and development in biotechnology (except nanobiotechnology)	541714	79	34	45	36	16	20	43	18	25
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	139 i	69 i	71 i	84 i	49 i	35 i	55 i	20 i	36 i
Research and development in the social sciences and humanities	541720	9	2	7	9	2	7	*	*	*
Other professional, scientific, and technical services	other 54	52	35	17	47	31	16	5	4	2 i
Health care services	621–23	8 - 22	3 - 17	4 - 18	9	4	5	0 - 13	0 - 13	0 - 13 i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	49 - 153	0 - 137	0 - 72	50	0 - 51	0 - 51	0 - 103	0 - 86	0 - 44
All companies (number of domestic employees)	–	3,161	2,229	933	2,132	1,536	596	1,029	693	336
Small companies										
10–19 <sup>a</sup>	–	40	32	9	36	28	8	5	4	1
20–49	–	110	86	24	99	77	21	12	9	3
Medium companies										
50–99	–	102	81	20	92	74	18	9	7	2
100–249	–	178	139	39	157	124	34	21	16	5
Large companies										
250–499	–	148	110	38	110	82	29	38	29	9
500–999	–	154	113	41	110	82	29	43	31	12
1,000–4,999	–	507	359	148	340	242	98	168	117	50
5,000–9,999	–	315	223	92	211	149	62	103	74	30
10,000–24,999	–	541	346	195	309	200	109	232	146	86 i
25,000 or more	–	1,066	739	327	668	478	189	399	261	138

\* = amount < 500 employees; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 50  
Worldwide total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2021  
(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
All industries	21–23, 31–33, 42–81	35,574	3,161	2,127	169	734	300
Manufacturing industries	31–33	18,325	1,524	1,066	103	285	173
Food	311	1,702	40	21	3	12	7
Beverage and tobacco products	312	992	8	5	1	2	1
Textile, apparel, and leather products	313–16	367	9	3	1	4	1
Wood products	321	142	6	2	* i	2	2
Paper	322	281	8	6	*	2	1
Printing and related support activities	323	159	3	2	i *	1	1
Petroleum and coal products	324	168	7	2	*	4	2
Chemicals	325	2,416	278	177	42	45	56
Basic chemicals	3251	334	19	11	3	7 i	2
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	165	10	6	1 i	2	2
Pesticide, fertilizer, and other agricultural chemicals	3253	100	5	3	1	1	1
Pharmaceuticals and medicines	3254	1,072	211	134	33	30	48
Soap, cleaning compound, and toilet preparations	3256	486	18	14	2	2	2
Paint, coating, adhesive, and other chemicals	3255, 3259	258	14	10	1 i	3	1
Plastics and rubber products	326	691	29	14	2 i	11	3
Nonmetallic mineral products	327	216	9	5	1	3	1
Primary metals	331	169	10	3	*	2	5
Fabricated metal products	332	976	52	17	1	26	9
Machinery	333	1,899	159	110	7	37	12
Agricultural implement	33311	175	17	13	*	3	1
Semiconductor machinery	333242	116	27	17	3	10	1
Engine, turbine, and power transmission equipment	3336	217	11	9	*	2	*
Other machinery	other 333	1,391	104	72	4	23	9
Computer and electronic products	334	2,425	464	383	24 i	45	36
Communications equipment	3342	308	81	59	2 i	7	14
Semiconductor and other electronic components	3344	774	188	166	12	15	7 i
Navigational, measuring, electromedical, and control instruments	3345	710	86	68	7	13	5
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	82	10	7	2 i	3	1
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	177	25	20	1	4	1
Other measuring and controlling devices	other 3345	452	51	42	4	6	3
Other computer and electronic products	other 334	633	109	89	3 i	10 i	10 i

TABLE 50  
Worldwide total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2021  
(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
Electrical equipment, appliances, and components	335	673	47	31	5 i	12	4
Transportation equipment	336	3,202	272	204	11	47	21
Motor vehicles, bodies, trailers, and parts	3361-63	2,035	168	132	6	25	11 i
Aerospace products and parts	3364	939	86	63	4	17	5
Aircraft, aircraft engine, and aircraft parts	336411-13	901	79	60	4	14	5
Guided missile, space vehicle, and related parts	336414-15, 336419	38	7	4	*	3	*
Military armored vehicle, tank, and tank components	336992	2	*	*	*	*	*
Other transportation	other 336	226	18	9	* i	5	4
Furniture and related products	337	173	4	2	* i	1	1
Miscellaneous	339	1,672	118	79	7	29	11
Medical equipment and supplies	3391	1,255	96	66	6	22	8
Other miscellaneous manufacturing	3399	417	22	13	*	7	2
Nonmanufacturing industries	21-23, 42-81	17,249	1,637	1,060	65 i	449	128
Mining, quarrying, oil and gas extraction, and support activities	21	239	9 - 91	4 - 66	* i	2 - 54	1 - 10 i
Utilities	22	350	3 - 33	2 - 13	* i	0 - 31	0 - 8
Wholesale trade	42	784 i	23 - 127 i	9 - 71 i	1 i	8 - 60 i	5 - 14 i
Electronic shopping and electronic auctions	454111-12	98 - 5,964	98 - 221	67 - 163	*	17 - 69	12
Transportation and warehousing	48-49	1,410	21 - 125	10 - 72	* i	8 - 60	1 - 10
Information	51	3,210	692	507	32 i	131	53
Publishing	511	776	216	166	11 i	30	20
Newspaper, periodical, book, and directory publishers	5111	7	1 i	* i	0	1 i	* i
Software publishers	5112	769	215	165	11 i	29	20
Telecommunications	517	610	23	11 i	1 i	9 i	2
Data processing, hosting, and related services	518	1,264	282	195	5 i	61	26
Other information	other 51	561	171	135	15	31	4
Finance and insurance	52	2,133	113	76	2 i	31	6
Real estate and rental and leasing	53	110	4 - 22	3 - 21	*	0 - 18	* i
Lessors of nonfinancial intangible assets (except copyrighted works)	533	3	*	* i	*	* i	* i
Other real estate and rental and leasing	other 53	107	4 - 22	3 - 21	*	0 - 18	* i
Professional, scientific, and technical services	54	2,572	494	274	28 i	179	41 i
Architectural, engineering, and related services	5413	380	68	48	2	15	4

TABLE 50  
Worldwide total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2021  
(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
Computer systems design and related services	5415	1,025	145	106	7 i	27	12
Scientific research and development services	5417	463	229 i	91	17 i	115 i	23 i
Research and development in nanotechnology	541713	2	1	1	*	*	*
Research and development in biotechnology (except nanobiotechnology)	541714	161	79	35	4	43	1
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	287	139 i	53 i	12 i	71 i	16 i
Research and development in the social sciences and humanities	541720	12	9	3	*	1	6
Other professional, scientific, and technical services	other 54	703	52	28	2 i	21	3 i
Health care services	621–23	432	8 - 22	4 - 18	1	2 - 16	1
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	49 - 5,915	49 - 153	6 - 103	1 r	0 - 70	0 - 8
All companies (number of domestic employees)	–	35,574	3,161	2,127	169	734	300
Small companies							
10–19 <sup>b</sup>	–	96	40	24	4	12	4
20–49	–	343	110	63	8	35	12
Medium companies							
50–99	–	473	102	60	7	31	11
100–249	–	1,111	178	96	11	63	19
Large companies							
250–499	–	1,003	148	97	8	36	15
500–999	–	1,343	154	103	8	37	14
1,000–4,999	–	5,009	507	334	24 i	119	54
5,000–9,999	–	3,218	315	210	19	66	38
10,000–24,999	–	5,986	541	344	32 i	153 i	44
25,000 or more	–	16,993	1,066	795	48	182	89

\* = amount < 500 employees; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

<sup>a</sup> Researchers include R&D scientists and engineers and their managers.  
<sup>b</sup> The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.



**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 51  
Domestic total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2021  
(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
All industries	21–23, 31–33, 42–81	23,654	2,132	1,426	130	501	205
Manufacturing industries	31–33	10,334	1,015	680	78	215	120
Food	311	1,142	27	13	2	9	5
Beverage and tobacco products	312	425	5	3	*	1	1
Textile, apparel, and leather products	313–16	207	7	3	1	3	1
Wood products	321	129	6	2	i *	2	2
Paper	322	194	6	4	*	2	1
Printing and related support activities	323	130	3	1	i *	1	1
Petroleum and coal products	324	103	5	1	*	3	1
Chemicals	325	1,392	201	131	35	34	35
Basic chemicals	3251	208	12	7	2	3	1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	82	6	4	1	2	1
Pesticide, fertilizer, and other agricultural chemicals	3253	70	5	3	1	1	1
Pharmaceuticals and medicines	3254	638	157	103	28	25	29
Soap, cleaning compound, and toilet preparations	3256	253	11	8	1	2	2
Paint, coating, adhesive, and other chemicals	3255, 3259	140	9	7	1	2	1
Plastics and rubber products	326	493	23	12	i 2	9	3
Nonmetallic mineral products	327	136	8	5	1	3	1
Primary metals	331	127	9	3	*	2	5
Fabricated metal products	332	709	50	15	1	26	9
Machinery	333	932	100	65	4	26	9
Agricultural implement	33311	101	10	7	*	2	1
Semiconductor machinery	333242	40	14	8	2	6	*
Engine, turbine, and power transmission equipment	3336	84	8	6	*	2	*
Other machinery	other 333	706	68	44	2	17	7
Computer and electronic products	334	1,058	256	207	18	28	21
Communications equipment	3342	168	49	34	i 1	4	11
Semiconductor and other electronic components	3344	270	93	80	9	10	4
Navigational, measuring, electromedical, and control instruments	3345	362	54	42	4	9	3
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	54	8	5	i 1	2	1
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	120	21	17	1	3	1
Other measuring and controlling devices	other 3345	188	25	20	3	4	1
Other computer and electronic products	other 334	258	60	52	i 3	5	i 3

TABLE 51  
Domestic total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2021  
(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
Electrical equipment, appliances, and components	335	271	26	16	2	7	3
Transportation equipment	336	1,863	196	143	8	37	16
Motor vehicles, bodies, trailers, and parts	3361-63	889	108	82	4	17	9
Aerospace products and parts	3364	794	75	54	3	16	5
Aircraft, aircraft engine, and aircraft parts	336411-13	759	69	50	3	14	5
Guided missile, space vehicle, and related parts	336414-15, 336419	35	7	4	*	3	*
Military armored vehicle, tank, and tank components	336992	2	*	*	*	*	*
Other transportation	other 336	177	12	7	* i	3	3
Furniture and related products	337	137	4	2	* i	1	1
Miscellaneous	339	886	83	53	5	21	8
Medical equipment and supplies	3391	619	65	44	5	15	6
Other miscellaneous manufacturing	3399	267	18	10	*	6	2
Nonmanufacturing industries	21-23, 42-81	13,320	1,117	747	52 i	286	84
Mining, quarrying, oil and gas extraction, and support activities	21	158	9 i	5	0 - 1 i	3 i	2 i
Utilities	22	341	3 - 24	3	* i	0 - 21	0 - 8
Wholesale trade	42	651 i	24 i	10 i	1 i	9 i	6 i
Electronic shopping and electronic auctions	454111-12	98 - 5,080	98 - 120	67 - 102	*	18	0 - 13
Transportation and warehousing	48-49	1,087	22	11	* i	9	2
Information	51	2,186	449	327	25 i	92	29
Publishing	511	460	127	99	8 i	18	9
Newspaper, periodical, book, and directory publishers	5111	6	1 i	* i	0	1 i	* i
Software publishers	5112	454	125	99	8 i	17	9
Telecommunications	517	542	22	10 i	1 i	9 i	2
Data processing, hosting, and related services	518	786	168	112	4 i	41	14
Other information	other 51	399	133	105	13	24	3
Finance and insurance	52	1,729	87	50 - 68	0 - 3 i	13 - 32	0 - 7
Real estate and rental and leasing	53	94	4	4	*	1	* i
Lessors of nonfinancial intangible assets (except copyrighted works)	533	3	*	* i	*	* i	* i
Other real estate and rental and leasing	other 53	90	4	4	*	1	* i
Professional, scientific, and technical services	54	1,530	343	207	23 i	104	33 i
Architectural, engineering, and related services	5413	296	65	45	2	15	4

TABLE 51  
Domestic total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2021  
(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
Computer systems design and related services	5415	540	102	71	4 i	23	8
Scientific research and development services	5417	277	130	65	14 i	47 i	18 i
Research and development in nanotechnology	541713	2	1	1	*	*	*
Research and development in biotechnology (except nanobiotechnology)	541714	108	36	16	3	19	1
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	155	84 i	45 i	11 i	28 i	11 i
Research and development in the social sciences and humanities	541720	12	9	3	*	*	6
Other professional, scientific, and technical services	other 54	416	47	26	2 i	19	2 i
Health care services	621–23	420	9	5	0 - 2	3	1
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	49 - 5,031	50	6 - 51	0 - 2	0 - 38	0 - 8
All companies (number of domestic employees)	–	23,654	2,132	1,426	130	501	205
Small companies							
10–19 <sup>b</sup>	–	85	36	20	3	12	4
20–49	–	298	99	56	8	32	11
Medium companies							
50–99	–	418	92	53	6	29	10
100–249	–	886	157	82	9	58	18
Large companies							
250–499	–	741	110	66	7	31	13
500–999	–	926	110	71	6	28	12
1,000–4,999	–	3,148	340	223	19 i	82	34
5,000–9,999	–	1,933	211	140	15	41	30
10,000–24,999	–	3,260	309	204	23	79	26
25,000 or more	–	11,959	668	511	34 i	109	48

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

NAICS = 2017 North American Industry Classification System.

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

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 52  
Foreign total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2021  
(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
All industries	21–23, 31–33, 42–81	11,920	1,029	700	38	233	96
Manufacturing industries	31–33	7,991	510	387	25	71	53
Food	311	560	13	8	1	3	2
Beverage and tobacco products	312	567	3	2	*	1	*
Textile, apparel, and leather products	313–16	160	2	1 i	* i	1	*
Wood products	321	13	*	*	0	*	*
Paper	322	87	2	2	* i	*	*
Printing and related support activities	323	29	*	*	*	*	*
Petroleum and coal products	324	65	2	*	*	1	*
Chemicals	325	1,024	77	45	7	11 i	21
Basic chemicals	3251	126	8	4	1	4 i	1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	83	4	2	* i	1	1
Pesticide, fertilizer, and other agricultural chemicals	3253	31	1	*	* i	*	*
Pharmaceuticals and medicines	3254	434	54	31	5	5	19
Soap, cleaning compound, and toilet preparations	3256	232	6	6	1	*	1
Paint, coating, adhesive, and other chemicals	3255, 3259	118	4	3	* i	1	*
Plastics and rubber products	326	198	6	3 i	* i	2 i	1 i
Nonmetallic mineral products	327	80	1	1	*	*	*
Primary metals	331	42	1	*	*	* i	* i
Fabricated metal products	332	268	2	1	* i	1	*
Machinery	333	967	59	45	2	11	3
Agricultural implement	33311	74	7	6	*	1	*
Semiconductor machinery	333242	76	13	9	1	4	*
Engine, turbine, and power transmission equipment	3336	132	3	3	*	*	*
Other machinery	other 333	685	35	27	1	6	2
Computer and electronic products	334	1,367	208	176	6 i	17	15 i
Communications equipment	3342	140	32	26	1 i	3	4
Semiconductor and other electronic components	3344	504	95	87	3	5	3 i
Navigational, measuring, electromedical, and control instruments	3345	348	31	26	2 i	3	2
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	28	3	2	1 i	1	*
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	57 i	3	3	* i	*	*
Other measuring and controlling devices	other 3345	264	25	22	2	3	1
Other computer and electronic products	other 334	375	49	37	1 i	5 i	7 i

TABLE 52  
Foreign total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2021  
(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers <sup>a</sup>				R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD				
Electrical equipment, appliances, and components	335	402	21 i	15 i	3 i			4	2
Transportation equipment	336	1,339	77	62	3			10	5
Motor vehicles, bodies, trailers, and parts	3361–63	1,146	60	49	2			8	3 i
Aerospace products and parts	3364	145	11	10	1			1	*
Aircraft, aircraft engine, and aircraft parts	336411–13	142	10	9	1			1	*
Guided missile, space vehicle, and related parts	336414–15, 336419	3	*	*	* i			*	0
Military armored vehicle, tank, and tank components	336992	0	0	0	0			0	0
Other transportation	other 336	48	6	3 i	* i			1	2
Furniture and related products	337	36	*	*	*			*	* i
Miscellaneous	339	787	35	25	1			8	2
Medical equipment and supplies	3391	636	31	22	1			7	2
Other miscellaneous manufacturing	3399	150	4 i	3 i	*			1	*
Nonmanufacturing industries	21–23, 42–81	3,929	520	314	14 i			163	43
Mining, quarrying, oil and gas extraction, and support activities	21	81	0–82	0–61	0–1			0–50	0–8
Utilities	22	9	0–10	0–10	*			0–10	0–8
Wholesale trade	42	133 i	0–103 i	0–61 i	*			0–50 i	0–8
Electronic shopping and electronic auctions	454111–12	0–888	0–103	0–61	0			0–50	0–12
Transportation and warehousing	48–49	323	0–103	0–61	0			0–50	0–8
Information	51	1,024	242	179	7 i			39	24
Publishing	511	316	90	67	3 i			12	11
Newspaper, periodical, book, and directory publishers	5111	*	0	0	0			0	0
Software publishers	5112	315	90	67	3 i			12	11
Telecommunications	517	68	1	1	* i			*	*
Data processing, hosting, and related services	518	478	114	82	1 i			20	12
Other information	other 51	162	38	30	3			7	1
Finance and insurance	52	405	26	8–26	0–2 i			0–18	0–7
Real estate and rental and leasing	53	17	0–17	0–17	0			0–17	0

TABLE 52  
Foreign total employment, R&D employment, and level of education of researchers, by activity, industry, and company size: 2021  
(Thousands)

Industry and company size	NAICS code	Total employment	Total R&D employment	Researchers <sup>a</sup>		R&D technicians and equivalent staff	Other R&D supporting staff
				Total	With PhD		
Lessors of nonfinancial intangible assets (except copyrighted works)	533	*	0	0	0	0	0
Other real estate and rental and leasing	other 53	17	0 - 17	0 - 17	0	0 - 17	0
Professional, scientific, and technical services	54	1,042	150	67	6 i	75 i	9 i
Architectural, engineering, and related services	5413	84	3 r	3 r	*	*	* r
Computer systems design and related services	5415	485	44	36	3 i	4	4
Scientific research and development services	5417	186 i	99 i	27	2	68 i	5 i
Research and development in nanotechnology	541713	*	* i	*	* i	* i	* i
Research and development in biotechnology (except nanobiotechnology)	541714	54	43	19	2	24	*
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	132 i	55 i	8 i	1 i	43 i	4 i
Research and development in the social sciences and humanities	541720	*	*	*	*	*	*
Other professional, scientific, and technical services	other 54	288	5	2 i	* i	3	* i
Health care services	621–23	12	0 - 13	0 - 13	0 - 2	0 - 13 i	* i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	0 - 888	0 - 103	0 - 61	0 - 2	0 - 50	0 - 8
All companies (number of domestic employees)	–	11,920	1,029	700	38	233	96
Small companies							
10–19 <sup>b</sup>	–	11	5	4	*	1	*
20–49	–	45	12	8	*	3	1
Medium companies							
50–99	–	56	9	6	*	3	1
100–249	–	225	21	15	2	5	1
Large companies							
250–499	–	262	38	30	1 i	5	3
500–999	–	416	43	32	2 i	9	3
1,000–4,999	–	1,860	168	111	6 i	37	20
5,000–9,999	–	1,285	103	70	4	25 i	8
10,000–24,999	–	2,726	232	141	9 i	74 i	18 i
25,000 or more	–	5,034	399	284	14	73	41



\* = amount < 500 employees; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 53  
Domestic full-time equivalent R&D employees and researchers, by work status, industry, and company size: 2021  
(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	1,941	1,590	327	24	1,311	1,113	187	10
Manufacturing industries	31–33	923	792	123	8	622	564	54	4
Food	311	24	19	4	*	12	11	1	*
Beverage and tobacco products	312	4	4	1	*	3	3	*	*
Textile, apparel, and leather products	313–16	5	4	1	*	2	2	*	*
Wood products	321	4	1	2	*	1	1	*	0
Paper	322	5	4	1	*	4	3	*	*
Printing and related support activities	323	2	1	1	*	1	1	*	*
Petroleum and coal products	324	5	4	*	*	1	1	*	*
Chemicals	325	190	176	13	2	121	118	3	1
Basic chemicals	3251	11	10	1	*	7	6	*	*
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	6	5	*	*	4	3	*	*
Pesticide, fertilizer, and other agricultural chemicals	3253	4	4	*	*	3	3	*	*
Pharmaceuticals and medicines	3254	149	139	10	1	94	91	2	*
Soap, cleaning compound, and toilet preparations	3256	11	10	1	*	8	8	*	*
Paint, coating, adhesive, and other chemicals	3255, 3259	9	8	1	*	6	6	*	*
Plastics and rubber products	326	19	14	5	*	10	8	2	*
Nonmetallic mineral products	327	7	5	1	1	4	3	1	*
Primary metals	331	7	2	5	*	2	1	1	*
Fabricated metal products	332	35	20	15	1	12	8	4	*
Machinery	333	86	66	20	1	57	46	11	1
Agricultural implement	33311	9	9	1	*	6	6	*	*
Semiconductor machinery	333242	14	13	*	*	8	7	*	*
Engine, turbine, and power transmission equipment	3336	7	7	1	*	6	6	*	*
Other machinery	other 333	56	37	18	1	37	26	10	*
Computer and electronic products	334	247	229	17	1	194	183	10	1
Communications equipment	3342	48	47	1	*	33	33	*	*
Semiconductor and other electronic components	3344	88	81	7	*	76	72	4	*
Navigational, measuring, electromedical, and control instruments	3345	51	43	8	1	33	28	5	*
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	8	7	1	*	5	4	*	*
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	19	14	5	*	10	7	4	*
Other measuring and controlling devices	other 3345	24	22	2	*	18	17	1	*

TABLE 53  
Domestic full-time equivalent R&D employees and researchers, by work status, industry, and company size: 2021  
(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 computer and electronic products	other 334	60	58	1	r	*		51	51	1		*			
Electrical equipment, appliances, and components	335	24	21	2		*		15	14	1		*			
Transportation equipment	336	176	148	27		1		130	113	16	i	1	i		
Motor vehicles, bodies, trailers, and parts	3361–63	104	98	6		*		80	77	3		*			
Aerospace products and parts	3364	61	40	20		1		44	31	i	13	i	*	i	
Aircraft, aircraft engine, and aircraft parts	336411–13	57	38	i	18	1	i	42	i	29	i	12	i	*	i
Guided missile, space vehicle, and related parts	336414–15, 336419	4	2	2		*		3	1	1		*			
Military armored vehicle, tank, and tank components	336992	*	*	*		*	i	*	*	*		0			
Other transportation	other 336	11	9	2		*		5	5	*	i	*			
Furniture and related products	337	3	2	1		*		2	1	*		*			
Miscellaneous	339	78	71	7		1		51	48	2		*	i		
Medical equipment and supplies	3391	63	58	4		1		42	41	1		*	i		
Other miscellaneous manufacturing	3399	16	13	3		*		9	7	1		*			
Nonmanufacturing industries	21–23, 42–81	1,017	798	204		16		689	549	132		7	i		
Mining, quarrying, oil and gas extraction, and support activities	21	7	6	1	i	*	i	4	4	*	i	*	i		
Utilities	22	2	i	1	i	1	i	1	i	1	i	*	i	*	i
Wholesale trade	42	17	i	9	i	8	i	8	i	5	i	3	i	*	
Electronic shopping and electronic auctions	454111–12	98 - 120	12 - 73	27 - 88		*		66 - 102	0 - 48	17 - 71		*	i		
Transportation and warehousing	48–49	17	10	7		*	i	10	6	4		*	i		
Information	51	434	405	28		1		317	302	14		1			
Publishing	511	122	115	7		*		96	92	3		*			
Newspaper, periodical, book, and directory publishers	5111	1	i	1	i	*	i	*	i	*	i	*	r	*	r
Software publishers	5112	121	114	7		*		95	92	3		*			
Telecommunications	517	21	18	i	3	i	*	10	i	9	i	1	i	*	
Data processing, hosting, and related services	518	159	143	16		1		107	i	98	i	9		*	i
Other information	other 51	132	130	2		*		105	103	1		*			
Finance and insurance	52	72	56	i	16	*		51	i	44	i	7	i	*	i
Real estate and rental and leasing	53	4	4	*	i	*		4	4	*	i	*			
Lessors of nonfinancial intangible assets (except copyrighted works)	533	*	i	*	i	*	0	*	i	*	i	*	i	0	
Other real estate and rental and leasing	other 53	4	4	*		*		3	3	*		*			
Professional, scientific, and technical services	54	303	232	59		13		177	136	36		5	i		

TABLE 53  
Domestic full-time equivalent R&D employees and researchers, by work status, industry, and company size: 2021  
(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	Total	Full-time R&D employees	Full-time employees working on R&D part time	Part-time employees working on R&D
Architectural, engineering, and related services	5413	46	19	25	2	32	13	17	1				
Computer systems design and related services	5415	92	76	15	2	64	54	9	i	1			
Scientific research and development services	5417	122	i	104	i	57	i	4	i	3	i		
Research and development in nanotechnology	541713	1	1	*	i	1	1	*	i	*	i		
Research and development in biotechnology (except nanobiotechnology)	541714	34	34	*	*	13	12	*		*			
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	78	i	67	i	41	i	4	i	1	i		
Research and development in the social sciences and humanities	541720	9	3	1	6	3	i	*	i	1	i		
Other professional, scientific, and technical services	other 54	43	i	33	i	24	i	6		*			
Health care services	621–23	8	7	1	i	4	4	*	i	*	i		
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	29 - 51	0 - 51	0 - 51	*	6 - 51	0 - 48	0 - 51		*			
All companies (number of domestic employees)	–	1,941	1,590	327	24	1,311	1,113	187		10	i		
Small companies													
10–19 <sup>c</sup>	–	31	22	8	1	18	13	4		*			
20–49	–	82	56	25	2	48	36	11		1			
Medium companies													
50–99	–	76	51	23	2	45	34	10		1			
100–249	–	133	100	31	2	70	57	12		1			
Large companies													
250–499	–	91	70	20	1	57	48	9		1			
500–999	–	96	81	15	1	63	56	7		*			
1,000–4,999	–	308	263	43	3	206	183	22		1	i		
5,000–9,999	–	200	170	22	7	133	119	11		3	i		
10,000–24,999	–	287	257	27	i	184	168	15	i	1	i		
25,000 or more	–	636	521	113	2	486	400	84		2			

\* = amount < 500 employees; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

FTE = full-time equivalent; NAICS = 2017 North American Industry Classification System.

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

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

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

**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 54

**Domestic employment and R&D employment, by state: 2021**

(Thousands)

State	Employees	
	Total	R&D
All states	23,654	2,132
Alabama	262	13
Alaska	27	1
Arizona	508	28
Arkansas	167	4
California	2,842	490
Colorado	454	41
Connecticut	301	23
Delaware	79	7
District of Columbia	47	4
Florida	1,022	63
Georgia	739	36
Hawaii	38	2
Idaho	107	7
Illinois	1,104	71
Indiana	561	36
Iowa	278	18
Kansas	265	16
Kentucky	345	9
Louisiana	166	5
Maine	62	3
Maryland	355	35
Massachusetts	522	96
Michigan	847	102
Minnesota	503	45
Mississippi	130	3
Missouri	378	21
Montana	34	3
Nebraska	161	8
Nevada	156	6
New Hampshire	90	14
New Jersey	660	67
New Mexico	61	3
New York	822	92
North Carolina	784	58
North Dakota	49	3
Ohio	899	61
Oklahoma	176	9
Oregon	299	32
Pennsylvania	836	71
Rhode Island	44	3
South Carolina	275	12
South Dakota	50	3
Tennessee	515	20
Texas	1,976	127
Utah	250	23
Vermont	31	2
Virginia	568	52
Washington	724	152
West Virginia	69	3

TABLE 54  
Domestic employment and R&D employment, by state: 2021  
(Thousands)

State	Employees			
	Total		R&D	
Wisconsin	546		45	
Wyoming	18		1	
Undistributed <sup>a</sup>	1,451		84	

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

**Note(s):**  
Detail may not add to total because of rounding. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 55

**Foreign employment and R&D employment, by location: 2021**

(Thousands)

Location	Employees	
	Total	R&D
Total	11,920	1,029
Puerto Rico <sup>a</sup>	47	5 i
Canada	596	66
Latin America and other Western Hemisphere <sup>b</sup>	1,991	46
Argentina	74	4
Brazil	375	13
Chile	47	1
Mexico	1,182	20
Other Latin American and Western Hemisphere locations	313	9
Africa	135	6
South Africa	63	4
Other African locations	72	1
Asia and Pacific	3,529	477
Australia	154	15
China	982	93
Hong Kong	48	2
India	1,134	270
Indonesia	87	1
Japan	256	23
Malaysia	114	9
New Zealand	19	2
Singapore	141	14
South Korea	99	12
Taiwan	110	19
Thailand	124	5
Other Asian or Pacific locations	261	12
Europe	3,441	338
Austria	47	3
Belgium	111	12
Czechia	77	7
Denmark	30	5
Finland	17	3
France	296	24
Germany	550	58
Hungary	62	4
Ireland	143	20
Italy	172	15
Luxembourg	14	3
Netherlands	119	11
Norway	25	3
Poland	249	14
Russia	99	6
Spain	149	13
Sweden	51	8
Switzerland	69	14
Turkey	48	2
United Kingdom	789	87
Other European locations	322	28
Middle East	197	36
Israel	77	31



TABLE 55  
Foreign employment and R&D employment, by location: 2021

(Thousands)

Location	Employees			
	Total		R&D	
Other Middle Eastern locations	120		6	
Undistributed <sup>c</sup>	1,985	i	56	i

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

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

<sup>b</sup> Other Western Hemisphere is defined as Argentina, Brazil, Chile, Mexico, and other Latin America.

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

**Note(s):**

Detail may not add to total because of rounding. Beginning in survey year 2018, statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D. No systematic item imputation was applied. These statistics include an adjustment to the weight to account for unit nonresponse.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 56  
Domestic temporary R&D employment, by activity, industry, and company size: 2021  
(Thousands)

Industry and company size	NAICS code	Total	Researchers <sup>a</sup>	R&D technicians and equivalent staff	Other R&D supporting staff
All industries	21–23, 31–33, 42–81	295 i	174 i	86 i	35 i
Manufacturing industries	31–33	113 i	75 i	22 i	16 i
Food	311	2 i	1 i	1 i	1
Beverage and tobacco products	312	*	*	*	*
Textile, apparel, and leather products	313–16	* i	* i	*	* i
Wood products	321	* r	* r	* r	0
Paper	322	* i	* i	* i	* i
Printing and related support activities	323	* i	* i	* i	* i
Petroleum and coal products	324	*	* i	* i	* i
Chemicals	325	49 i	35 i	6 i	8 i
Basic chemicals	3251	1 i	* i	* i	* i
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	* i	* i	* i	*
Pesticide, fertilizer, and other agricultural chemicals	3253	*	* i	* i	* i
Pharmaceuticals and medicines	3254	46 i	33 i	5 i	7 i
Soap, cleaning compound, and toilet preparations	3256	2 i	1 i	1 i	1 i
Paint, coating, adhesive, and other chemicals	3255, 3259	*	* i	*	* i
Plastics and rubber products	326	1 i	* i	* i	* i
Nonmetallic mineral products	327	4 i	1 i	2 i	1 i
Primary metals	331	* i	* i	*	* i
Fabricated metal products	332	3 i	1 i	1 i	* i
Machinery	333	10 i	8 i	1 i	1 i
Agricultural implement	33311	*	*	* i	* i
Semiconductor machinery	333242	* i	* i	*	* i
Engine, turbine, and power transmission equipment	3336	*	*	*	*
Other machinery	other 333	10 i	8 i	1 i	1 i
Computer and electronic products	334	16 i	10 i	4 i	2 i
Communications equipment	3342	4 i	3 i	* i	* i
Semiconductor and other electronic components	3344	7 i	4 i	2 i	1 i
Navigational, measuring, electromedical, and control instruments	3345	3 i	2 i	* i	* i
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	* i	* i	* i	* i
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	1 i	1 i	*	* i
Other measuring and controlling devices	other 3345	1 i	1 i	* i	* i
Other computer and electronic products	other 334	3 i	1 i	1 i	* i

TABLE 56  
Domestic temporary R&D employment, by activity, industry, and company size: 2021  
(Thousands)

Industry and company size	NAICS code	Total	Researchers <sup>a</sup>		R&D technicians and equivalent staff		Other R&D supporting staff	
Electrical equipment, appliances, and components	335	2 i	1	i	*	i	*	i
Transportation equipment	336	11 i	7	i	3	i	1	i
Motor vehicles, bodies, trailers, and parts	3361–63	8 i	5	i	2	i	1	i
Aerospace products and parts	3364	2 i	2		1	i	*	i
Aircraft, aircraft engine, and aircraft parts	336411–13	2 i	1		1	i	*	i
Guided missile, space vehicle, and related parts	336414–15, 336419	*	*		*		*	
Military armored vehicle, tank, and tank components	336992	* i	*	i	*	i	*	i
Other transportation	other 336	1 i	*	i	*	i	*	i
Furniture and related products	337	*	*		*		*	
Miscellaneous	339	14	8		3	i	2	
Medical equipment and supplies	3391	13	8		3	i	2	
Other miscellaneous manufacturing	3399	* i	*	i	*	i	*	i
Nonmanufacturing industries	21–23, 42–81	181 i	99	i	64		19	i
Mining, quarrying, oil and gas extraction, and support activities	21	* i	*	i	*	i	*	i
Utilities	22	*	*		*		*	
Wholesale trade	42	2 i	1	i	*	i	1	i
Electronic shopping and electronic auctions	454111–12	52	14		33		4	i
Transportation and warehousing	48–49	1	*		*		*	
Information	51	60 i	39	i	13	i	8	i
Publishing	511	21 i	10	i	6	i	5	
Newspaper, periodical, book, and directory publishers	5111	* i	*	i	*	i	0	
Software publishers	5112	21 i	10	i	6	i	5	
Telecommunications	517	1 i	1	i	*	i	*	
Data processing, hosting, and related services	518	16 i	11	i	4	i	1	i
Other information	other 51	21 i	17	i	3	i	2	i
Finance and insurance	52	30 i	23	i	6		1	
Real estate and rental and leasing	53	1 i	*		*	i	*	i
Lessors of nonfinancial intangible assets (except copyrighted works)	533	*	*		0		0	
Other real estate and rental and leasing	other 53	1 i	*		*	i	*	i
Professional, scientific, and technical services	54	28 i	16	i	9	i	3	i
Architectural, engineering, and related services	5413	1	1		*	i	*	
Computer systems design and related services	5415	13 i	8	i	4	i	1	i
Scientific research and development services	5417	10 i	5	i	4	i	1	i

TABLE 56  
Domestic temporary R&D employment, by activity, industry, and company size: 2021  
(Thousands)

Industry and company size	NAICS code	Total	Researchers <sup>a</sup>		R&D technicians and equivalent staff		Other R&D supporting staff	
Research and development in nanotechnology	541713	* i	*	i	*	i	0	
Research and development in biotechnology (except nanobiotechnology)	541714	3 i	2	i	1		*	i
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	6 i	3	i	3	i	1	i
Research and development in the social sciences and humanities	541720	1 i	1	i	*		0	
Other professional, scientific, and technical services	other 54	5 i	2	i	2		1	i
Health care services	621–23	3 i	1	i	1	i	1	r
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	6 i	4	r	1	i	1	i
All companies (number of domestic employees)	–	295 i	174	i	86	i	35	i
Small companies								
10–19 <sup>b</sup>	–	3 i	2	i	1	i	*	
20–49	–	9 i	5	i	3	i	2	i
Medium companies								
50–99	–	10 i	7	i	2	i	1	i
100–249	–	8 i	4	i	2	i	2	i
Large companies								
250–499	–	12 i	7	i	3	i	2	i
500–999	–	11 i	5	i	4	i	1	i
1,000–4,999	–	28 i	16	i	8	i	5	i
5,000–9,999	–	35 i	19	i	9	i	6	i
10,000–24,999	–	54 i	36	i	9	i	9	i
25,000 or more	–	125 i	73	i	45		7	i

\* = amount < 500 employees; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 57  
R&D costs paid for by the company and others projected for 2022, by industry and company size: 2021  
(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											
					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	808,021	105,528	i	661,993	56,078		605,915	80,708		26,320		54,388	i	146,028				
Manufacturing industries	31–33	459,977	46,835		368,837	49,430		319,406	39,659		16,172	i	23,487		91,141				
Food	311	6,353	421		4,944	357		4,586	410		0		410		1,409				
Beverage and tobacco products	312	2,695	28		1,442	188		1,254	27		0		27		1,253				
Textile, apparel, and leather products	313–16	1,039	12		856	12		843	11		1	i	10		184				
Wood products	321	486	0 - 55		481	15		466	0 - 55		0		0 - 55		5	i			
Paper	322	1,425	i	*	i	1,367	i	5		1,362	i	0		0		58			
Printing and related support activities	323	221	i	1	i	198	i	5	i	193	i	1	i	0		23			
Petroleum and coal products	324	1,315		7		1,120		448		671		6		0		196			
Chemicals	325	179,875		16,419		147,317		36,011		111,306		12,367		787		32,558			
Basic chemicals	3251	4,214		170	i	2,916		61		2,855		165	i	11		1,297	i		
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,966		113	i	1,349		11		1,338		76	i	0 - 19	i	57 - 77	i	617	
Pesticide, fertilizer, and other agricultural chemicals	3253	1,249		0 - 274		1,074		121		953		0 - 260		0		0 - 260		175	
Pharmaceuticals and medicines	3254	166,881		15,604		137,674		35,479		102,195		11,625		759		10,867		29,207	
Soap, cleaning compound, and toilet preparations	3256	3,965		261		2,965		303		2,662		243		0		243		1,001	
Paint, coating, adhesive, and other chemicals	3255, 3259	1,600		0 - 274		1,339		36		1,303		0 - 260		0 - 19		0 - 260		261	
Plastics and rubber products	326	3,888		126		3,217		119		3,098		123		2	r	120	i	671	
Nonmetallic mineral products	327	1,832		19		1,629		19	i	1,611		19		3		16		203	
Primary metals	331	556		23	i	498		6		492		22	i	*	i	22	i	58	i
Fabricated metal products	332	4,555		192		4,177		453	r	3,724		165		12		153		377	
Machinery	333	24,246		1,369		19,010		367	i	18,643		1,075		561		514		5,236	
Agricultural implement	33311	3,426		0 - 378		2,683		171	i	2,512	i	0 - 324		*	i	0 - 324		743	
Semiconductor machinery	333242	6,783		205		5,548		3		5,545		171		22	i	150		1,235	
Engine, turbine, and power transmission equipment	3336	2,012		358		1,418		14		1,405		151		109		42		593	
Other machinery	other 333	12,025		429 - 808		9,360		179		9,181		429 - 754		430		0 - 324		2,665	
Computer and electronic products	334	142,861	i	7,919		107,993	i	4,108	i	103,885	i	7,479		2,779		4,700		34,868	i
Communications equipment	3342	16,176		1,607	i	12,532		893		11,639		1,448	i	396 - 542	i	906 - 1,052	i	3,644	
Semiconductor and other electronic components	3344	70,273	i	2,479		51,601	i	454		51,146	i	2,313		132		2,181		18,673	
Navigational, measuring, electromedical, and control instruments	3345	14,077		3,682		10,644		249		10,394		3,575		2,107		1,469		3,434	
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,264		269		2,793		75		2,718		249		4	i	245		471	

TABLE 57  
R&D costs paid for by the company and others projected for 2022, by industry and company size: 2021  
(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 others	Paid for by the company			Paid for by others									
		Paid for by the company			Total	Purchased and collaborative R&D	R&D performed by the company	Total	U.S. government	Non-U.S. government sources							
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	2,592		3,204		2,283	35		2,248		3,147	1,922 - 2,104		1,043 - 1,225		309	
Other measuring and controlling devices	other 3345	8,222		209		5,568	140		5,429		179	0 - 180	i	0 - 180		2,654	
Other computer and electronic products	other 334	42,334	i	151		33,216	i	2,511	i	30,706	i	142	0 - 143		0 - 143	i	9,118
Electrical equipment, appliances, and components	335	7,331		614		5,795	76		5,720		574	31		542		1,536	
Transportation equipment	336	52,076		19,298	i	44,523	5,815		38,708		17,059	i	11,908	i	5,151		7,553
Motor vehicles, bodies, trailers, and parts	3361–63	37,041		5,271	i	30,368	5,004		25,364		3,768	i	80		3,688	i	6,673
Aerospace products and parts	3364	12,943		12,861	i	12,302	770	i	11,532		12,151	i	10,741	i	1,410		641
Aircraft, aircraft engine, and aircraft parts	336411–13	12,055		11,802	i	11,435	0 - 771	i	10,664 - 11,436		11,173	i	9,979	i	1,195		620
Guided missile, space vehicle, and related parts	336414–15, 336419	888		1,059		867	0 - 771		96 - 868		978		762		216	i	21
Military armored vehicle, tank, and tank components	336992	23		*	i	21	*		21	*	i	*	i	*	i	2	
Other transportation	other 336	2,068		1,166		1,832	40		1,791		1,140		1,087		53	i	236
Furniture and related products	337	510		4	i	468	15	i	453		4	i	0		4	i	42
Miscellaneous	339	28,714		327 - 391		23,802	1,411	i	22,391		270 - 325		87		183 - 239		4,912
Medical equipment and supplies	3391	25,555		317		21,118	1,300	i	19,817		260		76	i	184		4,437
Other miscellaneous manufacturing	3399	3,159		10 - 75		2,684	111		2,574	i	10 - 66		11		0 - 55		475
Nonmanufacturing industries	21–23, 42–81	348,043		58,693	i	293,156	6,647		286,509		41,049	i	10,148		30,901	i	54,887
Mining, quarrying, oil and gas extraction, and support activities	21	1,391		163	i	1,298	82		1,217		150	i	0		150	i	93
Utilities	22	713		34	i	703	331		371		29	i	23	i	6		10
Wholesale trade	42	2,031 - 10,175	i	98	i	2,032	211	i	1,821	i	91	i	0		91	i	0 - 8,143
Electronic shopping and electronic auctions	454111–12	45 - 40,989	i	10	r	45 - 32,850	46	i	0 - 32,805	i	10	r	8	r	2	r	0 - 8,143
Transportation and warehousing	48–49	7,306	i	10		7,237	47	i	7,190	i	10		0		10		69
Information	51	215,665		1,505		178,927	3,187		175,740		1,325		363		962		36,738
Publishing	511	57,964		784		46,615	1,560		45,055		719		12		707		11,349
Newspaper, periodical, book, and directory publishers	5111	93	i	0		93	5	i	88	i	0		0		0		*
Software publishers	5112	57,871		784		46,522	1,555		44,967		719		12		707		11,349
Telecommunications	517	5,188		3 - 127		5,092	576		4,516	i	3 - 125		4		0 - 121		97
Data processing, hosting, and related services	518	64,751		596		51,910	833		51,077		483		347		136		12,841
Other information	other 51	87,761	i	0 - 123		75,310	217		75,092		0 - 121		0		0 - 121		12,452

TABLE 57  
R&D costs paid for by the company and others projected for 2022, by industry and company size: 2021  
(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				
Finance and insurance	52	31,350	86	27,796	203	27,593	48	0	48	3,554			
Real estate and rental and leasing	53	2,642	*	2,531	4	2,527	*	0	*	111			
Lessors of nonfinancial intangible assets (except copyrighted works)	533	8	0	8	1	7	0	0	0	*			
Other real estate and rental and leasing	other 53	2,634	*	2,523	3	2,520	*	0	*	111			
Professional, scientific, and technical services	54	43,003	56,504	36,913	1,891	35,022	39,145	9,710	29,436	6,090			
Architectural, engineering, and related services	5413	2,676	2,432	2,637	203	2,433	2,325	1,614	711	40			
Computer systems design and related services	5415	24,350	3,455	19,337	610	18,727	3,376	615	2,761	5,013			
Scientific research and development services	5417	8,606	49,021	7,870	1,001	6,869	32,067	6,583	25,483	736			
Research and development in nanotechnology	541713	213	94	198	17	181	89	56	33	15			
Research and development in biotechnology (except nanobiotechnology)	541714	2,901	12,472	2,513	275	2,238	7,823	1,985	5,838	388			
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	5,454	35,890	5,122	702	4,420	23,649	4,057	19,591	333			
Research and development in the social sciences and humanities	541720	37	564	37	7	30	506	485	21	0			
Other professional, scientific, and technical services	other 54	7,371	1,596	7,069	76	6,994	1,378	897	481	302			
Health care services	621–23	2,654	129	2,570	342	2,228	118	27	91	84			
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	303 - 41,247	156	303 - 33,108	304	0 - 32,805	122	17	105	0 - 8,143			
All companies (number of domestic employees)	–	808,021	105,528	661,993	56,078	605,915	80,708	26,320	54,388	146,028			
Small companies													
10–19 <sup>a</sup>	–	6,538	1,192	5,860	968	4,892	1,113	521	592	678			
20–49	–	19,127	2,756	17,390	3,545	13,845	2,467	925	1,542	1,737			
Medium companies													
50–99	–	20,244	2,545	18,245	3,293	14,952	2,225	772	1,453	1,999			
100–249	–	29,230	5,082	26,005	2,429	23,576	4,264	1,512	2,752	3,225			
Large companies													
250–499	–	30,444	4,152	25,968	3,075	22,893	3,642	1,291	2,350	4,476			
500–999	–	33,823	4,771	28,770	2,956	25,814	4,419	1,508	2,910	5,053			
1,000–4,999	–	131,981	12,881	106,988	5,736	101,252	11,187	1,667	9,520	24,993			
5,000–9,999	–	82,301	13,781	66,227	4,747	61,480	10,088	1,091	8,997	16,074			
10,000–24,999	–	127,840	36,828	104,583	12,709	91,874	23,146	5,190	17,956	23,258			

TABLE 57  
R&D costs paid for by the company and others projected for 2022, by industry and company size: 2021  
(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				
25,000 or more	–	326,493	21,539	261,958	16,619	245,339	18,158	11,842	6,316	64,535			

\* = amount < \$500,000; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**  
Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.



TABLE 58  
Worldwide R&D paid for by the company and others and performed by the company, by industry and company size: 2009–21  
(Millions of U.S. dollars)

Industry and company size	NAICS code	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
All industries	21–23, 31–33, 42–81	336,571	338,451	359,490	374,916	396,352	416,343	429,174	457,591	484,740	543,369	595,683	648,421	737,911
Manufacturing industries	31–33	236,858	243,611	253,821	261,697	276,110	285,661	287,895	303,044	314,167	339,076	348,904	375,180	404,449
Food	311	4,916	D	5,589	5,163	6,335	6,136	6,058 i	5,824	5,424	5,459	5,014	6,395	6,456
Beverage and tobacco products	312	933	D	D	D	1,358	1,423	1,529	1,076 - 1,654	1,769	1,628	1,755	1,901	2,139
Textile, apparel, and leather products	313–16	519	522	656	605	759	734	818	1,247 i	1,131	1,223	1,060	973	997
Wood products	321	283	254	211	282	222	341 i	198	166 - 751	174	206	193	193 - 200	447
Paper	322	NA	1,665	769	858	1,022	880	867	943	1,594	1,013	1,161	1,021	1,206
Printing and related support activities	323	217	269	212	291 i	258 i	238	198 i	223 i	236	246	422 i	297	231
Petroleum and coal products	324	NA	D	1,281	D	327	298	252	312	377	1,460 - 1,463	1,477 - 1,481	165 - 2,807	1,131
Chemicals	325	64,442	72,610	72,068	70,218	74,551	79,428	80,961	84,612	90,236	101,132	115,781	120,665	133,231
Basic chemicals	3251	NA	2,671	5,166	3,400	3,336	3,633	3,677	536 - 5,694	3,101	3,046	3,102	3,454	3,710
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	NA	1,038	1,117	D	1,794	1,842	1,780	332 - 5,490	805	2,435	1,695	1,745	1,969 i
Pesticide, fertilizer, and other agricultural chemicals	3253	NA	D	2,049	D	1,966 i	2,042 i	3,405	0 - 5,157	1,864	1,782 - 1,797	2,272 - 2,297	1,173	1,279
Pharmaceuticals and medicines	3254	53,456	60,537	58,866	58,920	62,480	66,731	D	73,193	79,004	88,776	103,636	108,843	121,157
Soap, cleaning compound, and toilet preparations	3256	NA	3,285	3,386	3,212	3,358	3,501	D	3,589	3,699	3,567	3,517	3,432	3,611
Paint, coating, adhesive, and other chemicals	3255, 3259	NA	D	1,485	D	1,617	1,679 i	1,664	1,806 - 1,830	1,764	1,508 - 1,529	1,531 - 1,562	2,017	1,505
Plastics and rubber products	326	2,982	2,515	2,640	4,446	4,576	4,519	2,906	4,583	4,626	3,170	3,348	3,143	3,752
Nonmetallic mineral products	327	1,153 i	1,596	1,428	1,588 i	1,578	1,599	1,487	1,474	1,485	1,567 i	1,699 i	1,902 i	1,731
Primary metals	331	993	802	763	818	700	770	711	662	862	990	721 - 747	848	963
Fabricated metal products	332	2,174	1,818	1,993	1,949 i	2,303 i	2,329	2,467 i	2,273	2,405	2,533	3,144	3,739	4,669
Machinery	333	11,156	12,403	18,312	17,462	15,420	15,089	16,827	15,958	16,626	19,279	19,283	20,529	23,073
Agricultural implement	33311	NA	D	1,570	2,142	2,243	D	2,152	2,189	2,132	2,730	2,777	2,451	2,774
Semiconductor machinery	333242	NA	2,469	2,727	1,357	3,645	3,434	3,812	4,138	4,530	5,077	5,374	5,836	6,648
Engine, turbine, and power transmission equipment	3336	NA	D	D	D	1,795	2,894	2,920	2,484	2,577	3,418 - 3,440	1,780	2,211	1,920
Other machinery	other 333	NA	6,566	D	D	7,736	D	7,943	7,147	7,387	8,030 - 8,057	9,352	10,031	11,731
Computer and electronic products	334	68,772	75,345	79,145	87,406	90,114	94,199	92,860	98,319	101,910	112,188	110,836	126,055	132,597
Communications equipment	3342	NA	17,069	15,197	18,877	20,392	22,048	23,049	16,124	15,568	16,467	15,814	15,483	15,968

TABLE 58  
Worldwide R&D paid for by the company and others and performed by the company, by industry and company size: 2009–21  
(Millions of U.S. dollars)

Industry and company size	NAICS code	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Semiconductor and other electronic components	3344	26,082	29,354	32,146	38,300	40,611	42,028	40,348	41,789	41,362	45,795	48,175 i	56,207	63,917
Navigational, measuring, electromedical, and control instruments	3345	16,498	17,905	18,242	18,640	18,046	18,993	17,020	18,112	17,965	20,828	21,596	21,616	17,220
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	NA	4,548	4,987	4,999	2,837	5,049	3,599	3,553	3,702	1,167 - 14,309 i	4,621 i	3,371	3,554
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	NA	8,769	8,641	8,312	8,753	8,486	8,033	8,372	8,347	0 - 13,142	10,541	11,271	5,895
Other measuring and controlling devices	other 3345	NA	4,588	4,615	5,329	6,456	5,458	5,387	6,187	5,916	6,520	6,434	6,975	7,771
Other computer and electronic products	other 334	NA	11,017	13,559	11,589	11,065	11,130	12,443	22,294	27,016	29,099	25,251	32,748	35,492
Electrical equipment, appliances, and components	335	4,475	4,767	5,319	4,140	5,738	5,705	5,710	6,207	6,154	6,179	7,025	6,864	7,374
Transportation equipment	336	56,183	51,362	49,030	50,415	51,547	56,597	57,698	60,161	59,432	59,850	53,518	55,736	58,423
Motor vehicles, bodies, trailers, and parts	3361–63	NA	17,764	D	D	23,610	D	25,735	6,671 - 54,230	30,069	31,869 - 31,899	31,440	29,308	33,111
Aerospace products and parts	3364	36,409	31,627	26,858	D	25,684	D	29,113	3,240 - 50,799	26,189	25,006	18,943 i	23,453	22,180 i
Aircraft, aircraft engine, and aircraft parts	336411–13	NA	D	D	D	D	D	27,463	1,812 - 49,371	24,666	23,683	17,476 i	21,791	20,538 i
Guided missile, space vehicle, and related parts	336414–15, 336419	NA	D	D	1,425	D	D	1,649 i	1,428 i	1,523	1,323	1,467	1,662	1,642
Military armored vehicle, tank, and tank components	336992	NA	D	52	D	9 i	D	16	3 - 38	9	11	35	11	24
Other transportation	other 336	NA	D	D	D	2,245	D	2,834	2,653 - 2,690 i	3,164	2,936 - 2,961	3,100	2,964	3,109
Furniture and related products	337	433	407	347	383	401	422	477	381	470	418 - 444	444	456	464
Miscellaneous	339	NA	9,528	D	D	18,900	14,951	15,869	18,045	19,257	20,515	22,005	21,650 - 24,298	25,564
Medical equipment and supplies	3391	NA	7,461	D	10,311	15,938	12,091	13,166	15,387 - 15,400	16,470	17,443	19,068	19,893	22,444
Other miscellaneous manufacturing	3399	NA	2,066	D	D	2,962	2,860	2,703 i	2,646 - 2,657 i	2,788	3,072	2,937	1,758 - 4,406	3,120
Nonmanufacturing industries	21–23, 42–81	99,713	94,840	105,669	113,220	120,242	130,682	141,279	154,547	170,574	204,293	246,779	273,240	333,462
Mining, quarrying, oil and gas extraction, and support activities	21	NA	2,785	2,597	D	4,452	D	4,348	3,604	3,647	1,990	3,306	1,290 i	1,339 i

TABLE 58  
Worldwide R&D paid for by the company and others and performed by the company, by industry and company size: 2009–21  
(Millions of U.S. dollars)

Industry and company size	NAICS code	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Utilities	22	NA	442	396	368	317	314	483	353	336	283	284	271	168 - 19,125
Wholesale trade	42	NA	1,145	1,697 i	2,165 i	459 i	D	1,723 i	489 i	0 - 12,105	883 i	1,298	1,098	1,855 i
Electronic shopping and electronic auctions	454111–12	NA	D	D	D	1,845	D	D	0 - 14,624	0 - 12,105	11,715 - 15,515 i	69 - 21,372 i	18,875 - 25,758 i	10,538 - 29,503 i
Transportation and warehousing	48–49	NA	124	159	186	D	692	416	495	1,221	2,562 i	9,952 i	6,217 i	7,282
Information	51	43,197	45,099	52,341	56,815	68,375	78,013	77,965	84,400	94,412	111,653	129,742	152,284	177,113
Publishing	511	33,171	33,883	36,310	36,947	43,821	46,806	42,190	42,156	42,368	39,890	39,918	42,677 - 42,710	49,085
Newspaper, periodical, book, and directory publishers	5111	NA	826	401	221 i	348 i	92 i	107 i	84 i	72	150	61	30 - 63	103
Software publishers	5112	NA	33,058	35,910	36,726	43,473	46,714	42,083	42,073	42,296	39,739	39,857	42,647	48,981
Telecommunications	517	1,609	2,043	2,267	2,787 i	3,112	3,830	3,648	3,617 - 3,659	3,828	3,827 - 3,833	119 - 46,668	3,505 - 3,538	3,912
Data processing, hosting, and related services	518	3,008	2,895	5,450	5,574	7,787	10,356	10,600	14,051 - 14,099	18,893	28,214 - 28,226	37,071	49,620	55,072
Other information	other 51	5,410	6,278	8,313	11,506	13,654	17,022	21,526	24,530	29,323	39,713	6,086 - 52,635	56,449	69,044
Finance and insurance	52	NA	2,568	3,943	4,159	4,999	4,748	6,359	8,468	8,582	8,347	10,081	13,820	23,409
Real estate and rental and leasing	53	NA	367	D	400	202	268	313	477	892	1,072	1,472	3,412	2,199
Lessors of nonfinancial intangible assets (except copyrighted works)	533	NA	NA	365	379	D	58	D	27	77	6	48	6 - 13	7
Other real estate and rental and leasing	other 53	NA	NA	D	21 i	D	210	D	450	814	1,066	1,423	3,399 - 3,406	2,192
Professional, scientific, and technical services	54	47,709	37,108	39,731	40,843	37,345	37,995 i	46,255	39,585 - 54,209	46,587	58,333	66,987	67,606	85,259
Architectural, engineering, and related services	5413	3,384	4,156	D	2,541 i	3,173	3,374	4,158 i	56 - 9,557	2,575	4,005	4,192	4,223	4,598
Computer systems design and related services	5415	15,310	12,458	13,181	13,404 i	10,535 i	12,579 i	17,227	15,483 - 20,617	17,190	20,378	26,357	21,242	25,041
Scientific research and development services	5417	19,307	16,408	19,295	20,225	18,478	17,870	20,630	20,194	22,635	28,620	30,131	35,171 i	47,772 i
Research and development in nanotechnology	541713	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	179 i	244
Research and development in biotechnology (except nanobiotechnology)	541714	8,492	6,266	7,985	8,364	5,889	4,898	7,114 i	6,062	6,076	8,428 - 8,442	8,884	8,745 - 9,233	13,441

TABLE 58  
Worldwide R&D paid for by the company and others and performed by the company, by industry and company size: 2009–21

(Millions of U.S. dollars)

Industry and company size	NAICS code	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	10,129	9,591	10,697	11,261	11,794	12,291	12,807	13,409	15,680	19,507	20,473 i	25,569 i	33,519 i
Research and development in the social sciences and humanities	541720	686	551	613	600	795	682	709	723	879	672 - 683	774	190 - 678	568
Other professional, scientific, and technical services	other 54	9,708	4,086	D	4,674	5,158	4,172 i	4,240	3,852	4,188	5,330	6,307	6,970	7,847
Health care services	621–23	NA	D	D	708 i	535 i	501 i	771 i	1,002	1,132	1,497	2,290	1,485	2,140
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	NA	NA	D	D	D	D	D	1,054 - 6,188 i	1,665	2,162 - 5,963	0 - 21,303	0 - 6,883	3,200
All companies (number of domestic employees) <sup>a</sup>	–	336,571	338,451	359,490	374,916	396,352	416,343	429,174	457,591	484,740	543,369	595,683	648,421	737,911
Micro companies														
5–9	–	NA	3,792	4,143	3,025 i	3,442 i	3,409 i	3,101 i	1,728 i	NA	NA	NA	NA	NA
Small companies														
10–19	–	NA	NA	NA	NA	NA	NA	5,750 i	5,031 i	3,532	4,511	5,647	5,352	5,836
20–49	–	NA	NA	NA	NA	NA	NA	10,654 i	9,972	9,513	11,825	12,753	13,542	15,969
Medium companies														
50–99	–	13,785	9,470	9,834	9,728	9,289	10,677	11,946	9,639	10,635	13,095	14,566	13,810	15,406
100–249	–	14,365	12,989	13,354	13,665	14,980	15,081	14,964	16,160	18,584	20,486	21,707	27,382	26,406
Large companies														
250–499	–	12,315	11,439	14,573	12,693	13,379	13,675	14,837	14,751	16,522	21,971	21,517	23,862	27,592
500–999	–	12,124	11,794	11,388	12,955	13,663	15,422	17,442	16,601	20,173	20,309	26,988	24,460	31,961
1,000–4,999	–	54,600	60,782	63,801	62,729	69,212	71,679	71,259	79,017	79,494	83,959	92,592	107,102	115,278
5,000–9,999	–	27,461	34,453	32,578	41,006	43,087	51,305	48,399	49,479	54,572	61,047	62,772	61,221	78,388
10,000–24,999	–	61,681	50,710	61,593	60,544	60,844	63,818	70,864	81,547	87,965	108,249	111,685	111,585	133,088
25,000 or more	–	118,424	125,067	132,719	144,097	152,547	155,180	159,959	173,666	183,750	197,916	225,456	260,105	287,987

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

NAICS = 2017 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey did not include companies with fewer than 5 domestic employees from 2008 to 2016 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 \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. For survey years 2009–13, industry classification was based on the 2007 NAICS. For survey years 2014–19, industry classification was based on the 2012 NAICS. For survey years beginning in 2020, classification was based on the 2017 NAICS. Beginning with survey year 2011, the composition of the Other nonmanufacturing industry changed. Most statistics for years prior to 2021 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

**Source(s):**

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

TABLE 59  
Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2008–21  
(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
All industries	21–23, 31–33, 42–81	290,680	282,505	279,289	290,240	302,759	323,107	340,539	355,671	378,590	396,979	443,633	491,434	538,870	602,499
Manufacturing industries	31–33	203,755	196,441	199,147	202,363	208,577	222,718	231,705	236,170	249,999	255,602	274,315	284,673	309,021	326,060
Food	311	2,100	4,099	D	4,393	4,087	5,021	4,854 i	4,828	4,830	4,588	4,595	4,179	5,234 - 5,245	5,266
Beverage and tobacco products	312	780	477	D	D	D	827	920	1,006	1,076 - 1,099	1,098	1,113	1,082	1,169	1,247
Textile, apparel, and leather products	313–16	815	439	482	608	553	662	631	748	1,166 i	959	1,005	903	822	829
Wood products	321	273	280	252	211	280	220	336 i	195	166 - 204	173	203	186	185 - 192	444
Paper	322	NA	NA	1,341	676	752	920	723	766	854	1,327	933	1,059	928	1,139
Printing and related support activities	323	349	210	231	181	256 i	252 i	234	196 i	219 i	231	242	412 i	287	204 i
Petroleum and coal products	324	NA	NA	D	D	888	281	234	214	268	324	1,269	1,306	0 - 2,641	957
Chemicals	325	58,250	54,753	58,343	55,853	56,748	62,086	66,134	68,032	71,803	75,733	84,367	97,180	101,359	109,490
Basic chemicals	3251	NA	NA	1,810	D	2,705	2,620	2,849	3,042	0 - 5,157	2,544	2,443	2,360	2,697	2,713
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	NA	NA	783	798	997	1,197	1,154	1,201	0 - 5,157	541	1,636 - 1,662	1,172	1,233	1,389 i
Pesticide, fertilizer, and other agricultural chemicals	3253	NA	NA	D	D	D	1,691 i	1,743 i	D	0 - 5,157	1,469	1,460	1,822 - 1,846	961 - 1,173	1,157
Pharmaceuticals and medicines	3254	48,131	46,415	49,469	46,308	47,851	52,790	56,482	57,332	62,346 - 67,504	66,870	74,815	87,735	92,050	100,220
Soap, cleaning compound, and toilet preparations	3256	NA	NA	2,400	2,476	2,342	2,434	2,548	2,579	2,800	2,860	2,720	2,760	2,665	2,740
Paint, coating, adhesive, and other chemicals	3255, 3259	NA	NA	D	1,290	D	1,354	1,357 i	D	1,500 - 1,523	1,450	1,265 - 1,294	1,302 - 1,334	1,540 - 1,753	1,271
Plastics and rubber products	326	1,817	2,388	2,129	2,278	3,585	3,647	3,614	2,549	3,752	3,722	2,742	2,857	2,616	3,144
Nonmetallic mineral products	327	1,556	1,098 i	1,314 i	1,175	1,327 i	1,329 i	1,445 i	1,259	1,289	1,304	1,385	1,507 i	1,696 i	1,533
Primary metals	331	695	863	681	655	741	618	677	625	592	747	839	663	816	912
Fabricated metal products	332	2,419	2,057	1,727	1,857	1,827 i	2,194 i	2,107 i	2,273 i	2,094	2,234	2,316	2,866	3,390	4,291
Machinery	333	10,104	9,226	10,260	14,725	13,752	12,586	12,106	13,539	12,718	13,341	14,770	15,182	16,243	17,730
Agricultural implement	33311	NA	NA	1,345	1,277	1,546	1,597	1,578	1,531	1,565	1,565	1,872	1,920	1,807 - 1,811	1,867
Semiconductor machinery	333242	NA	NA	2,173	2,351	1,291	3,194	2,941	3,214	3,411	3,737	4,166	4,459	4,809	5,349
Engine, turbine, and power transmission equipment	3336	NA	NA	1,430	4,273	4,336	1,448	2,356	2,515	2,060	649 - 2,579	2,483	1,301	1,653 - 1,657	1,374

TABLE 59  
Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2008–21  
(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Other machinery	other 333	NA	NA	5,312	6,824	6,579	6,347	5,229	6,280	5,683	5,459 - 7,388	6,249	7,503	7,969	9,140
Computer and electronic products	334	60,464	55,856	61,623	62,438	66,290	68,629	73,256	72,182	77,451	78,003	83,948	85,571	99,523	101,063
Communications equipment	3342	NA	NA	13,875	12,335	14,352	15,663	18,345	19,424	13,156	12,492	13,090	12,497 - 12,503	12,096	12,557
Semiconductor and other electronic components	3344	22,324	20,023	23,011	24,237	28,218	30,176	31,668	30,451	31,413	30,373	30,232 - 43,377	35,178	43,184	47,396
Navigational, measuring, electromedical, and control instruments	3345	15,460	14,318	15,747	15,852	15,918	15,119	15,871	14,202	14,885	14,325	4,671 - 17,814	17,644	18,505	13,644
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	NA	NA	4,189	4,430	4,413	2,634	3,975	2,676	2,632	2,632	0 - 13,142	3,342	2,874	3,087
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	NA	NA	8,293	8,066	7,734	8,106	7,861	7,360	7,532	7,379	0 - 13,142	9,662	10,587	5,301
Other measuring and controlling devices	other 3345	NA	NA	3,265	3,356	3,772	4,379	4,035	4,165	4,722	4,314	4,672	4,640	5,044	5,256
Other computer and electronic products	other 334	NA	NA	8,990	10,014	7,801	7,671	7,372	8,105	17,997	20,814	22,811	20,244 - 20,254	25,738	27,465
Electrical equipment, appliances, and components	335	3,143	3,317	3,320	3,624	3,078	4,133	4,323	4,359	4,771	4,319	4,487	5,282	5,029	5,494
Transportation equipment	336	50,552	48,209	42,940	41,094	42,340	43,648	46,977	49,286	51,569	50,698	52,446	45,482	49,223	50,760
Motor vehicles, bodies, trailers, and parts	3361–63	NA	NA	D	D	D	16,733	18,518	19,113	0 - 47,558	23,542	25,393	24,223	23,516 - 23,521	26,391
Aerospace products and parts	3364	36,941	34,563	29,857	26,086	24,874	24,783	26,292	27,440	1,423 - 48,982	24,154	24,301	18,358	22,944	21,468
Aircraft, aircraft engine, and aircraft parts	336411–13	NA	NA	24,777	24,839	23,454	D	25,002	25,793	0 - 47,558	22,629 - 24,155	22,978	16,891	21,291	19,845
Guided missile, space vehicle, and related parts	336414–15, 336419	NA	NA	5,080	1,247	1,420	D	1,290	1,647	1,424	0 - 1,524	1,323	1,467	1,652	1,623
Military armored vehicle, tank, and tank components	336992	NA	NA	D	51	D	9	18	16	3 - 38	9	11	35	11	21 - 25
Other transportation	other 336	NA	NA	D	D	D	2,124	2,148	2,716	2,549 - 2,586	2,993	2,741	2,866	2,748 - 2,753	2,875 - 2,880
Furniture and related products	337	477	395	374	319	360	374	377	452	359	430	409	409	418	426
Miscellaneous	339	NA	NA	D	D	D	15,292	12,757	13,662	14,988	16,370	17,245	18,546	17,431 - 20,077	21,133

TABLE 59  
Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2008–21  
(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Medical equipment and supplies	3391	NA	NA	6,459	7,796	8,333	12,741	10,309	11,353	12,647 - 12,660	13,930	14,559	16,022	16,071	18,438
Other miscellaneous manufacturing	3399	NA	NA	D	D	D	2,551	2,449	2,309 i	2,329 - 2,340 i	2,439	2,686	2,524	1,360 - 4,006	2,695
Nonmanufacturing industries	21–23, 42–81	86,926	86,064	80,142	87,877	94,183	100,389	108,834	119,501	128,591	141,377	169,318	206,761	229,849	276,439
Mining, quarrying, oil and gas extraction, and support activities	21	NA	NA	2,545	2,365	3,031	4,000	4,633	4,012	3,296	3,292	1,827	2,716	1,165 - 1,167	1,260 - 1,334
Utilities	22	NA	NA	425	358	348	294	313	480	351	326	275	275	264	168 - 17,997
Wholesale trade	42	NA	NA	1,092	1,556 i	2,053 i	452 i	339 i	1,698 i	467 i	0 - 9,599	851 i	1,186	1,053	1,745 - 1,855 i
Electronic shopping and electronic auctions	454111–12	NA	NA	D	949 i	1,353	1,356 i	1,388	D	0 - 9,499 i	0 - 9,599	11,652 i	17,176 i	14,518 - 20,878 i	5,936 - 24,040 i
Transportation and warehousing	48–49	NA	NA	95	132	178	D	679	403	488	1,214	2,548 i	9,890 i	6,180 i	7,208
Information	51	37,695	35,953	37,088	42,697	46,900	56,608	64,277	65,457	70,946	80,120	94,507	110,665	129,379	147,855
Publishing	511	28,427	26,838	26,957	28,411	29,067	34,365	36,621	33,348	33,459	33,868	32,716	32,973	34,994 - 35,027	39,152
Newspaper, periodical, book, and directory publishers	5111	NA	NA	770	372	219 i	342 i	88 i	98 i	79 i	66	131	61	30 - 63	103
Software publishers	5112	NA	NA	26,187	28,039	28,848	34,023	36,533	33,250	33,379	33,802	32,585	32,912	34,964	39,049
Telecommunications	517	1,684	1,523	1,912	2,169	2,729 i	3,049	3,768	3,607	3,568 - 3,611 i	3,733	3,696	0 - 46,548	3,411 - 3,444	3,835
Data processing, hosting, and related services	518	6,567	2,741	2,753	5,111	4,914	7,156	9,062	9,355	9,344 - 14,099	16,623	23,472	31,146	41,468	45,192
Other information	other 51	1,016	4,850	5,466	7,006	10,190	12,039	14,826	19,147	19,820 - 24,532	25,896	34,623	46,548	49,473	59,676
Finance and insurance	52	NA	NA	2,101	3,447	3,530	4,412	4,122	5,409	7,331	7,611	7,425	8,906	12,280	20,947
Real estate and rental and leasing	53	NA	NA	330	343	363	191	262	300	475	772 - 852	1,021	1,368	3,249	2,096
Lessors of nonfinancial intangible assets (except copyrighted works)	533	NA	NA	NA	324	342	58 i	55	68	27	0 - 79	6	45	7	5 - 8
Other real estate and rental and leasing	other 53	NA	NA	NA	19	21 i	133	207	232	448	773	1,015	1,323	3,242	2,088 - 2,091
Professional, scientific, and technical services	54	37,954	42,380	31,798	33,307	34,121	30,926	31,461 i	38,601	33,839 - 43,338	36,024	45,575	52,318	53,937	66,496
Architectural, engineering, and related services	5413	3,422	3,258	4,008	3,114	2,483 i	3,132	3,309	4,100 i	0 - 9,499	2,525	3,463 - 4,007	4,154	4,202	4,560



TABLE 59  
Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2008–21  
(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Computer systems design and related services	5415	12,146	13,351	10,359	10,938	11,006	i 9,241	i 11,053	i 14,334	15,484	13,702	16,553	20,988	17,932	20,409
Scientific research and development services	5417	17,913	16,402	13,712	15,713	16,415	14,219	13,324	16,249	14,778	16,029	20,225	21,218	25,164	34,142 i
Research and development in nanotechnology	541713	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	175 - 180	i 228
Research and development in biotechnology (except nanobiotechnology)	541714	NA	7,809	5,537	7,043	7,387	4,492	3,459	5,594 i	4,445	4,207	5,848	6,119	5,868 - 6,356	9,039
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	NA	7,916	7,628	8,058	8,431	8,935	9,187	9,950	9,613	10,946	13,707	14,333 i	18,445 i	24,312 i
Research and development in the social sciences and humanities	541720	NA	676	547	612	598	792	678	705	719	876	671	766	184 - 676	563
Other professional, scientific, and technical services	other 54	4,474	9,370	3,720	3,542	4,216	4,334	3,775	3,918	3,579	3,770	4,788 - 5,332	5,958	6,639	7,385
Health care services	621–23	NA	NA	1,049	542	672 i	528 i	501 i	758 i	848	921	1,475	2,266	1,456 - 1,475	2,060 - 2,138
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	NA	NA	NA	2,181	1,635	D	857 i	D	1,055 i	1,503	2,163	0 - 17,176	0 - 6,356	2,564 - 3,199
All companies (number of domestic employees) <sup>a</sup>	–	290,680	282,505	279,289	290,240	302,759	323,107	340,539	355,671	378,590	396,979	443,633	491,434	538,870	602,499
Micro companies															
5–9	–	NA	NA	3,614	4,060	2,926 i	3,390 i	3,314 i	2,983 i	1,583 i	NA	NA	NA	NA	NA
Small companies															
10–19	–	NA	NA	NA	NA	NA	NA	NA	5,674 i	4,930 i	3,390	4,383	5,509	5,064	5,477
20–49	–	NA	NA	NA	NA	NA	NA	NA	10,281 i	9,635 i	9,084	11,255	12,301	12,938	15,061
Medium companies															
50–99	–	9,351	13,277	8,781	9,295	9,100 i	8,939	10,130 i	11,538	9,275	10,164	12,412	13,829	13,014	14,540
100–249	–	14,662	12,791	11,631	12,303	12,454	13,704	13,606	13,586	14,860	17,205	18,611	19,667	25,331	24,023
Large companies															
250–499	–	10,219	11,330	10,194	13,013	11,387	12,021	12,228	13,686	12,978	14,312	19,775	18,799	20,977	23,932
500–999	–	11,886	10,131	10,053	9,993	11,499	12,013	13,129	15,005	14,441	17,736	17,753	24,062	21,273	27,432
1,000–4,999	–	46,336	44,197	49,108	51,110	50,311	55,974	57,336	57,998	63,431	64,838	68,764	75,990	88,584	94,615

TABLE 59  
Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2008–21

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
5,000–9,999	–	24,764	21,769	27,546	24,452	30,708	31,657	38,327	38,858	40,530	40,340	45,509	50,852	49,376	62,817
10,000–24,999	–	48,737	51,239	41,853	49,107	50,226	51,103	54,452	59,330	66,032	73,540	86,463	88,144	88,512	104,607
25,000 or more	–	100,820	97,056	99,291	102,222	110,042	119,493	122,533	126,732	140,895	146,369	158,707	182,282	213,801	229,995

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

NAICS = 2017 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey did not include companies with fewer than 5 domestic employees from 2008 to 2016 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 \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. For survey years 2014–19, industry classification was based on the 2012 NAICS. For survey years beginning in 2020, classification was based on the 2017 NAICS. Beginning with survey year 2011, the composition of the Other nonmanufacturing industry changed. Most statistics for years prior to 2021 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

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

TABLE 60  
Foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2008–21  
(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
All industries	21–23, 31–33, 42–81	61,475	54,066	59,162	69,251	72,157	73,245	75,804	73,503	79,001	87,761	99,736	104,248	109,551	135,412
Manufacturing industries	31–33	46,572	40,417	44,464	51,458	53,120	53,392	53,955	51,725	53,045	58,565	64,761	64,230	66,159	78,389
Food	311	596	817	1,006	1,195	1,076	1,315	1,282	1,231	994	835	865	835	1,150 - 1,161	1,190
Beverage and tobacco products	312	123	455	783 i	599	532	531	503	523	0 - 555	671	516	674	732	893
Textile, apparel, and leather products	313–16	367	80	39	49	52	98	103	70	81	172	218	157	152	169
Wood products	321	4	2	3	1	2	2	5 i	3	0 - 555	1	3	7	8	4
Paper	322	274	257	324	93	106	103	158	102	89	267	80	101	93	67
Printing and related support activities	323	9	7	38	30	35	6	3	2	4	5	4	9 i	10	27
Petroleum and coal products	324	D	156	D	D	D	46	64	38	44	53	192 - 194	171 - 176	165	175
Chemicals	325	13,990	9,689	14,267	16,215	13,470	12,464	13,294	12,929	12,809	14,503	16,766	18,601	19,305	23,741
Basic chemicals	3251	1,198	797	861	D	695	716	784	636	537	557	603	742	758	997
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	224	260	255	319	D	597	688	579	333	264	774 - 798	523	512	580 i
Pesticide, fertilizer, and other agricultural chemicals	3253	371	D	D	D	D	275 i	299 i	D	0 - 5,157	396	321 - 337 i	450	0 - 212	123
Pharmaceuticals and medicines	3254	10,862	7,041	11,068	12,557	11,069	9,690	10,249	D	5,688 - 10,846	12,133	13,962	15,900	16,793	20,936
Soap, cleaning compound, and toilet preparations	3256	965	873	884	910	870	924	952	D	789	839	847	757	767	871
Paint, coating, adhesive, and other chemicals	3255, 3259	370	D	D	195	210	263	321 i	D	307	314	235 - 259	227	264 - 477	234
Plastics and rubber products	326	341	595	386	362	861	929	905	358	831	904	428	491	527	607
Nonmetallic mineral products	327	106	54	282 i	253	261	249 i	155 i	228	185	181	181 i	192 i	205 i	198
Primary metals	331	114	130	121	108	77	82	94	86	69	116	151	58 - 85	32	50 i
Fabricated metal products	332	188	117	91	135	122	109	222	194	179	171	216	278	349	378
Machinery	333	1,929	1,930	2,143	3,587	3,710	2,833	2,984	3,288	3,239	3,285	4,509	4,101	4,286	5,343
Agricultural implement	33311	399	391	D	293	596	646	D	621	625	566 i	858	857	640 - 644	907
Semiconductor machinery	333242	366	285	296	376	66	451	493	599	727	793	911	915	1,027	1,299
Engine, turbine, and power transmission equipment	3336	92	83	D	D	D	347	537	405	424	0 - 1,928	935 - 958	479	554 - 558	546
Other machinery	other 333	1,072	1,170	1,254	D	D	1,389	D	1,664	1,464	0 - 1,928	1,781 - 1,807	1,850	2,062	2,591
Computer and electronic products	334	15,774	12,917	13,722	16,708	21,117	21,485	20,943	20,678	20,868	23,907	28,240	25,264 i	26,531	31,535
Communications equipment	3342	2,951	2,862	3,194	2,863	4,525	4,730	3,702	3,625	2,967	3,076	3,377	3,312 - 3,316	3,387	3,411

TABLE 60  
Foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2008–21  
(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Semiconductor and other electronic components	3344	7,075	6,058	6,343	7,909	10,082	10,434	10,360	9,896	10,377	10,989	2,418 - 15,563	12,996 i	13,023	16,521
Navigational, measuring, electromedical, and control instruments	3345	2,308	2,180	2,158	2,390	2,722	2,927	3,122	2,819	3,227	3,640	3,015 - 16,157	3,952	3,112	3,576
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	838	522	360	557	586	202	1,073	923	922	1,069	1,168 i	1,280 i	497	467
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	D	508	475	575	578	647	625	673	840	968	0 - 13,142	878	684	594
Other measuring and controlling devices	other 3345	D	1,149	1,324	1,258	1,557	2,077	1,423	1,222	1,465	1,603	1,848	1,794	1,931	2,516
Other computer and electronic products	other 334	3,440	1,817	2,027	3,546	3,788	3,395	3,759	4,338	4,297	6,202 i	6,287	4,997 - 5,007 i	7,010	8,027
Electrical equipment, appliances, and components	335	1,162	1,158	1,447	1,695	1,062	1,605	1,382	1,351	1,436	1,835	1,692	1,742	1,835	1,880
Transportation equipment	336	10,267	7,974	8,422	7,936	8,075	7,899	9,621	8,412	8,592	8,734	7,404	8,036	6,513	7,663
Motor vehicles, bodies, trailers, and parts	3361–63	8,448	6,023	D	D	D	6,877	D	6,622	6,672	6,527	6,476 - 6,506	7,217	5,787 - 5,792	6,720
Aerospace products and parts	3364	1,816	1,846	1,770	772	D	901	D	1,672	1,817	2,035	705	585	509	711
Aircraft, aircraft engine, and aircraft parts	336411–13	1,742	1,760	D	D	D	D	D	1,670	1,813	511 - 2,036	705	585	500	693
Guided missile, space vehicle, and related parts	336414–15, 336419	74	85	D	D	5	D	D	2	4	0 - 1,524	1	*	10	18
Military armored vehicle, tank, and tank components	336992	0	D	D	1	0	0	D	0	0	0	0	0	0	0 - 3
Other transportation	other 336	3	D	D	D	D	121	D	118	104	171	195 - 221	234	211 - 216	228 - 233
Furniture and related products	337	27	38	33	28	23	28	45	25	22	40	9 - 33	35	39	37
Miscellaneous	339	D	4,044	D	D	D	3,608	2,194	2,207	3,057	2,888	3,271	3,459	4,215 - 4,226	4,431
Medical equipment and supplies	3391	766	3,813	1,003	D	1,978	3,197	1,782	1,813	2,739	2,539	2,884	3,046	3,821	4,007
Other miscellaneous manufacturing	3399	D	231	D	D	D	411	412	394 i	317 i	348	386	413	393 - 404	424
Nonmanufacturing industries	21–23, 42–81	14,903	13,648	14,698	17,792	19,037	19,853	21,849	21,778	25,956	29,196	34,975	40,018	43,391	57,024
Mining, quarrying, oil and gas extraction, and support activities	21	D	D	239	232	D	452	D	336	308	355 i	163	589	123 - 125 i	5 - 79
Utilities	22	6	13	17	38	21	23	1	3	1	10	8	9	6	0 - 1,129
Wholesale trade	42	509	D	53	141 i	112 i	7	D	25 i	21 i	0 - 2,590	32	112	45	0 - 109 i

TABLE 60  
Foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2008–21  
(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Electronic shopping and electronic auctions	454111–12	NA	NA	D	D	D	490	D	D	0 - 5,132 i	0 - 2,590	63 - 3,863 i	69 - 4,198 i	4,345 - 4,891 i	4,330 - 6,357 i
Transportation and warehousing	48–49	2	1	29	28 i	8 i	D	13	13	7	7	14	62	37	73
Information	51	7,657	7,243	8,011	9,644	9,915	11,767	13,736	12,508	13,454	14,292	17,146	19,077	22,905	29,258
Publishing	511	6,301	6,332	6,926	7,899	7,880	9,456	10,185	8,842	8,698	8,500	7,174	6,945	7,683	9,933
Newspaper, periodical, book, and directory publishers	5111	27	47	55	29	2 i	6 i	4 i	9	4	6	19	0	0	* i
Software publishers	5112	6,274	6,285	6,871	7,870	7,878	9,450	10,181	8,833	8,693	8,494	7,154	6,945	7,683	9,933
Telecommunications	517	175	86	131	98	59	63	61	41	49	96	131 - 138	120	94	77 i
Data processing, hosting, and related services	518	1,089 i	266	142 i	339	661	631	1,294	1,245	0 - 4,710	2,270	4,742 - 4,753	5,924	8,152	9,881
Other information	other 51	93	559	812	1,308	1,316	1,616	2,196	2,378	0 - 4,710	3,427	5,090	6,087	6,976	9,367 i
Finance and insurance	52	74	518	467	496	628	587	625	950	1,136	971	923	1,175	1,540	2,461
Real estate and rental and leasing	53	65	28	37	D	38	11	6	13	2	40 - 120	51	104	163	103
Lessors of nonfinancial intangible assets (except copyrighted works)	533	NA	NA	NA	41	37	D	3	D	*	0 - 79	0	4	0 - 6	0 - 2
Other real estate and rental and leasing	other 53	NA	NA	NA	D	* i	D	3	D	2	41	51	101	157 - 164	100 - 104
Professional, scientific, and technical services	54	6,150	5,328	5,309	6,424	6,723	6,418	6,534	7,653	5,744 - 10,877	10,563	12,758	14,669	13,668 i	18,763 i
Architectural, engineering, and related services	5413	200	126	148 i	D	57	41	65	58	57 i	50	0 - 542 i	37	20	39 r
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	3,488	3,825	5,369	3,310	4,632
Scientific research and development services	5417	3,544	2,905	2,696	3,581	3,810	4,259	4,546	4,380	5,416	6,606	8,394	8,913 i	10,007 i	13,630 i
Research and development in nanotechnology	541713	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0 - 4	16
Research and development in biotechnology (except nanobiotechnology)	541714	NA	683	729	942	977	1,398	1,438	1,520	1,616	1,869	2,580 - 2,594	2,764	2,877	4,402
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	NA	2,213	1,962	2,638	2,830	2,859	3,103	2,858	3,796	4,733	5,801	6,140 i	7,124 i	9,207 i
Research and development in the social sciences and humanities	541720	NA	9	5	1	2	3	4 i	3	4	3	1 - 12	8	2 - 6	5

TABLE 60  
Foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2008–21

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Other professional, scientific, and technical services	other 54	241	338	366	D	458	825	398 i	322	273	418	0 - 542	349	331	463
Health care services	621–23	1	10	D	D	36	7	*	12 i	154	211	22	24	10 - 29	2 - 81
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	NA	NA	NA	D	D	D	D	D	0 - 5,132	162	0 - 3,800	0 - 4,131	0 - 527	1 - 637
All companies (number of domestic employees) <sup>a</sup>	–	61,475	54,066	59,162	69,251	72,157	73,245	75,804	73,503	79,001	87,761	99,736	104,248	109,551	135,412
Micro companies															
5–9	–	NA	NA	178	83	99 i	52 i	95 i	118 i	145	NA	NA	NA	NA	NA
Small companies															
10–19	–	NA	NA	NA	NA	NA	NA	NA	76	101	142	128	138	288	359
20–49	–	NA	NA	NA	NA	NA	NA	NA	373	337	429	569	452	604	909
Medium companies															
50–99	–	976	509	688 i	539	628	351	547	407	364	471	684	737	796	866
100–249	–	1,735	1,574	1,358 i	1,051	1,212	1,276	1,475	1,378	1,300	1,379	1,875	2,040	2,052	2,382
Large companies															
250–499	–	1,178	985	1,245	1,561	1,306	1,359	1,446	1,151	1,773	2,210	2,196	2,718	2,884	3,660
500–999	–	1,753	1,992	1,741	1,396	1,455	1,650	2,293	2,437	2,159	2,437	2,557	2,925	3,187	4,528
1,000–4,999	–	11,350	10,403	11,674	12,691	12,419	13,238	14,343	13,261	15,587	14,656	15,195	16,602	18,518	20,663
5,000–9,999	–	7,000	5,692	6,907	8,126	10,298	11,430	12,979	9,541	8,949	14,232	15,538	11,919	11,845	15,571
10,000–24,999	–	11,785	10,442	8,856	12,485	10,317	9,741	9,366	11,534	15,515	14,425	21,787	23,541	23,073	28,481
25,000 or more	–	24,671	21,368	25,777	30,497	34,056	33,054	32,647	33,226	32,771	37,381	39,208	43,175	46,304	57,992

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

NAICS = 2017 North American Industry Classification System.

<sup>a</sup> The Business Enterprise Research and Development Survey did not include companies with fewer than 5 domestic employees from 2008 to 2016 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 \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. For survey years 2014–19, industry classification was based on the 2012 NAICS. For survey years beginning in 2020, classification was based on the 2017 NAICS. Beginning with survey year 2011, the composition of the Other nonmanufacturing industry changed. Most statistics for years prior to 2021 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

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

TABLE 61  
Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
All business activities	21100–81000	328,040	311,170	316,262	336,629	352,951	376,974	399,656	412,590	440,429	471,440	523,512	570,184	613,845	709,663
Oil and gas extraction	21100	1,215	1,223	1,268	1,379	D	1,487	1,308	1,486	1,089	986	0 - 23,467	902	790	950
Mining	21200	NA	D	75	128	92	114	56	71	63	170	114	0 - 25,025	114	102 i
Support activities for mining, including oil and gas	21300	NA	993	1,638	1,386	1,814	1,749	1,995	1,831	1,380	1,577	951 i	1,650 i	928	660
Utilities	22100	NA	1,607	903	639	686	615	549	726	515	501	0 - 23,467	415	424	0 - 5,917
Construction	23000	NA	198	918	269	393 i	307	297	700	276	501	691	880	1,069	780
Food manufacturing	31100	2,983	4,039	4,478	4,970	4,635	7,028	6,842	5,892	6,073	5,827	5,806	5,905	6,334	6,512
Beverage manufacturing	31210	605	564	926	668	641	772	753	728	787 i	851	762	723	817	941
Tobacco manufacturing	31220	D	792	800	717	662	668	672	681	731	853	722	807	821	999
Textile, apparel, and leather products manufacturing	31990	NA	673	658	712	759	787	780	847	1,333	1,093	1,155	965	918	942
Wood products manufacturing	32100	264	304	239	208	D	244	336 i	251	0 - 7,094	263	297	0 - 25,025	271	506
Paper manufacturing	32200	1,130	1,144	1,231	1,156	1,362	1,588	1,614	D	1,555	1,743	1,592	1,784	1,531	1,841
Printing and related support activities	32300	297	241	244	265	356 i	391	390	321	340	286	359	468	395	371
Petroleum refineries	32401	NA	NA	708	591	807	558	617	526	625	567	640	0 - 25,025	0 - 26,968	537
Asphalt paving, roofing, and saturated materials manufacturing	32402	NA	NA	35	39	45	123	78	75	93	137	134	134	225	174
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	NA	NA	403	415	382	488	460 i	416	339	383	258	0 - 25,025	238	220
Basic chemicals manufacturing	32510	3,806	2,978	3,133	3,614	4,271	4,136	4,036	3,505	3,579	3,576	3,540	3,267	3,776	4,033
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	1,152	1,459	1,444	1,228	1,437	1,383	1,771	1,703	1,401	1,200	1,743	1,803	1,800	1,756
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	2,100	1,990	1,722	2,333	2,307	2,364 i	2,508 i	D	2,338 i	2,479 i	3,196 i	2,919	1,696	1,830
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing <sup>c</sup>	32541	70,016	68,588	71,603	67,688	69,473	68,318	68,846	63,606	69,518	71,762	77,733	80,548	81,181	92,561
In vitro diagnostic substances manufacturing <sup>c</sup>	32542	1,988	1,159	1,207	1,544	1,371 i	1,066	1,159	972	1,286	1,567	1,381	1,582	1,913	2,035



TABLE 61  
Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	NA	NA	NA	NA	NA	10,356	14,947	23,172	24,458	30,555	36,012	41,733	43,753	52,963
Soap, cleaning compound, and toilet preparations manufacturing	32591	2,787	2,883	3,147	3,472	3,266	3,406	3,493	3,353	3,361	3,257	3,380	3,196	3,053	3,212
Paint, adhesive, and other chemical manufacturing	32592	2,152	2,320	2,238	2,011	2,087	1,979	2,131	D	2,121	2,094	1,666	1,747	1,775	1,765
Plastics and rubber products manufacturing	32600	2,536	2,842	3,128	3,689	3,739	3,586	3,592	3,251	3,926	3,904	3,643	3,491	3,501	3,804
Clay and glass products manufacturing	32710	966 i	312	1,056 i	920 i	1,154 i	1,077	1,130	1,145	1,198	1,345	1,521	1,511	1,647	1,598
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	738	555	522	590	621	618 i	800	601	652	443	446	543	432	435
Primary metal manufacturing	33100	NA	840	933	783	882	792	853	719	0 - 7,094	714	808	849	987	1,095
Fabricated metal products manufacturing	33200	2,935	2,438	1,971	2,471	2,517	2,460	2,560	2,521	2,562	2,695	2,798	3,110	3,980	4,705
Agricultural machinery and equipment manufacturing	33311	1,404	1,507	1,523	1,430	1,893	2,055	1,990	1,916	1,977	1,867	2,440	2,458	2,208	2,303
Construction machinery manufacturing	33312	581	653	682	875	816	1,693	1,729	1,556	1,462	1,588	1,880 i	1,871	1,525	1,895
Mining, oil, and gas field machinery and equipment manufacturing	33319	NA	1,629	1,765	2,204	2,589	1,942 i	1,462	2,115	1,528	1,586	1,739	1,300	1,308	1,476
Semiconductor machinery manufacturing	33321	2,553	1,978	2,279	2,574	1,266 i	3,500	3,363	3,459	3,688	3,996	4,465	4,687	5,082	6,409
Industrial machinery manufacturing (except semiconductor machinery)	33322	1,191	853	806	1,128	1,031	1,006	1,237	1,181	893	1,222	0 - 23,467	1,406	1,131	1,373
Photographic and photocopying equipment manufacturing	33331	NA	852	270	757	25 i	108	25	114	59	52	67	0 - 25,025	171	77
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	NA	977	1,268	1,143	1,621	1,661	2,251	1,947	0 - 7,094	2,245	2,263	2,169	1,951	2,401
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	33	587 i	519	571	274	458	364 i	447
Engine, turbine, and power transmission equipment manufacturing	33360	2,386	1,589	3,481	3,623	4,068	3,870	3,346	2,626	2,641	3,164	2,756	0 - 25,025	2,942	2,761
Metalworking and other general purpose machinery manufacturing	33390	2,039	1,618	1,998	2,359	1,916	2,052	2,585	2,728	2,591	2,547	2,996	2,860	3,222	3,165
Computers and peripheral equipment manufacturing and magnetic and optical media <sup>d</sup>	33412	NA	13,094	12,672	13,319	14,716	15,113	13,437	16,547	23,130	27,553	27,801	25,331	31,371	35,035

TABLE 61  
Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	6,739	7,758	9,010	9,530	9,335	9,622	10,526	12,366	10,715	10,403	11,487	11,254	10,135	10,454
Radio, television, and wireless communication equipment manufacturing	33422	5,958	5,181	5,719	4,383	4,773	5,967	5,848 i	3,542	2,839	2,482	0 - 23,467	2,475	2,329	3,939
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	2,482	1,352	715	1,092	2,111	1,826	1,782	1,844 i	1,660	1,977	0 - 23,467	2,192	2,497	838
Audio and video equipment manufacturing	33430	773	977	1,352	1,019	1,081	1,108	1,282	1,587	1,535	1,252	1,461	1,686	1,667	1,945
Semiconductor and other electronic components manufacturing	33440	29,911	26,118	29,457	32,354	38,109	40,001	41,125	39,810	40,585	41,053	44,130	46,545	55,227	62,109
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	3,822	2,544	3,046	3,230	3,494	3,816	4,330	3,875	4,053	3,865	4,815	4,646	4,470	4,877
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	1,845	2,229	2,417	2,161	2,337	2,564	2,424	2,033	2,614	2,378	3,136	3,198	2,921	1,897
Measuring and control instruments manufacturing (not listed elsewhere)	33459	3,458	4,425	4,579	4,566	4,871	5,308	5,424	5,637	5,662	5,505	5,469	5,430	5,733	6,091
Electrical equipment, appliances, and components manufacturing	33500	4,687	4,229	4,500	4,768	4,773	5,272	5,501	5,313	5,905	6,177	5,456	6,455	6,511	6,601
Motor vehicles manufacturing	33610	18,296	13,165	14,524	17,011	18,362	17,743	18,984	18,357	20,573	22,481	23,693	21,666	20,639	24,829
Motor vehicle body and trailer manufacturing	33620	70	96	190	73	98 i	107 i	104	160	118	47	99	0 - 25,025	117	189
Motor vehicle parts manufacturing	33630	5,401	4,158	4,310	4,681	4,736	5,600	7,146	7,285	6,801	7,621	8,852	9,459	9,089	9,420
Aircraft manufacturing	33641	4,053	7,390	4,430	4,512	4,716 i	4,373	4,221	4,859	5,639	4,671	6,467	5,404	4,993	5,205
Aircraft engine and engine parts manufacturing	33642	2,433	1,765	1,978	2,136	D	1,787	2,068 i	D	0 - 7,094	1,455	1,759	1,474	1,310	3,223
Other aircraft parts and auxiliary equipment manufacturing	33643	1,222	1,135	1,825	1,752	3,121	3,270	2,980	3,482	3,047	3,239	2,054	1,347	1,412	1,302
Guided missiles, space vehicles, and related parts manufacturing	33644	1,402	1,176	1,132	1,050	659	487	877	1,034	954	1,055	1,210	1,140	1,906	950
Railroad rolling stock manufacturing	33651	195	83	177	165	237	224	363	310	224	251	213	0 - 25,025	299	247
Ship and boat building	33660	151	616 i	608 i	154	143 i	192	489	251	618	157	144	0 - 25,025	154	161

TABLE 61  
Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Motorcycle, bicycle, and parts manufacturing	33691	199	194	186	234	197	231	283	320	335	355	429	437	489	548
Military armored vehicle, tank, and tank components manufacturing	33692	107	228	182	118	135	90	159	202	130	367	0 - 23,467	381	275	437
All other transportation equipment manufacturing	33699	176	135	232	367	437	425	361	430	478	505	521	496	546	534
Furniture and related products manufacturing	33700	511	495	402	344	431	433	455	509	411	479	467	517	522	519
Medical equipment and supplies manufacturing	33910	11,587	11,457	13,226	13,701	14,259	15,264	14,317	15,145	15,939	17,055	16,832	18,877	19,383	22,134
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	2,976	2,793	2,341	2,698	D	2,976	2,816	D	3,121	3,130	3,415	3,052	3,744	3,798
Merchant wholesalers, durable goods	42300	449	923	714	711	1,277	589	516	1,551	637	448	771	702	835	1,330
Merchant wholesalers, nondurable goods	42400	257	365	348	605	699	327	209	484	219	273	322	0 - 25,025	529	739
Wholesale electronic markets and agents and brokers (business to business)	42500	14	43	19	70	173	18	D	35	24	0 - 12,866	89	0 - 25,025	61	52
Retail trade (except electronic shopping and electronic auctions)	44000	NA	50	164	74	100	120	65	D	120	119	263	0 - 25,025	0 - 26,968	361 - 4,960
Electronic shopping and electronic auctions	45411	NA	NA	753	D	1,749	1,284	D	D	8,200	0 - 12,866	0 - 23,467	0 - 25,025	0 - 26,968	11,931 - 16,530
Transportation	48000	NA	319	211	111	199	377	412	229	123	722	2,080	9,072	0 - 26,968	5,995
Couriers, messengers, and express delivery services	49200	D	14	6	D	D	90	348	D	394	425	451	290	949	1,114 - 5,713
Warehousing and storage	49300	26	17	19	16	17	4	3	D	0	82	79	162	35	0 - 5,917
Newspaper, periodical, book, and directory publishers (except Internet)	51110	180	748	853	408	257	339	103	117	87	99	175	88	74	109
Software publishers (except Internet) <sup>e</sup>	51120	31,369	26,362	28,457	29,992	31,209	35,047	41,052	36,040	34,699	31,400	32,842	31,525	30,456	37,337
Motion picture and sound recording (except Internet)	51200	104	135	93	67	67	38	83	12	20	42	155	0 - 25,025	86	0 - 5,917
Broadcasting (except Internet)	51500	NA	89	100	115	165	179	206	306	347	460	424	500	0 - 26,968	0 - 5,917
Wired telecommunications carriers	51710	673	D	1,499	1,685	1,631	1,012	1,166	1,269	1,180	1,027	476	428	504	598
Wireless telecommunications carriers (except satellite)	51720	532	186	724	815	860	1,732	2,500	1,192	1,458	1,969	2,439	2,641	2,414	2,974

TABLE 61  
Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Satellite telecommunications	51740	153	108	229	114	163	176	134	705 i	746	625	476	486	0 - 26,968	529
Other telecommunications (not listed elsewhere)	51790	501	351	338	462	399	377	330	536	362	381	745	0 - 25,025	501	379
Data processing, hosting, and related services <sup>e</sup>	51800	NA	2,889	3,051	5,293	4,406	4,381	5,402	6,895	7,040	6,975	7,699	9,985	12,675	15,110
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	4,344	6,730	6,801	11,913	19,581	24,607	33,733	47,436	53,118
Other information services, including Internet publishing, broadcasting, and Web search portals <sup>e</sup>	51910	NA	5,519	7,270	9,456	12,998	15,433	17,443	25,330	27,524	32,484	43,287	53,057	60,972	73,561
Finance: banking and credit intermediation	52200	NA	D	1,235	1,703	2,454	3,238	3,553	3,299	5,171	5,657	4,975	5,718	9,013	14,212
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	NA	678	903	1,347	1,110	1,323	1,147	1,597	1,683	1,785	1,445	1,654	2,061	5,150
Insurance carriers and related activities	52400	NA	798	611	872	1,429	1,772	1,069	1,573	1,444	1,430	0 - 23,467	2,596	2,967	4,015
Real estate	53100	20	32	3	13	27	105	199	288	440	253	380	0 - 25,025	372	0 - 5,917
Rental and leasing services	53200	NA	129	146	51	59	94	80	80	106 i	571 i	699	1,067	2,925	1,525
Lessors of nonfinancial intangible assets, including patent licensing	53300	80	259	268	369	437	100	97	104	45	97	24 i	71	75	95
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	NA	D	505	705 i	535	696	1,128	1,587	1,052	1,130	1,426	2,040	2,611	2,960
Architectural, engineering, and related services	54130	1,742	1,115	1,390	1,380	1,232	1,495	1,649	2,449	1,975	1,795	2,575	0 - 25,025	2,592	3,097
Specialized design services	54140	75	76	65	283	157 i	81	42	13	26	133	0 - 23,467	0 - 25,025	0 - 26,968	97
Computer systems design and related services <sup>e</sup>	54150	11,476	12,292	11,528	13,673	13,909 i	12,577	13,288	14,090	14,864	13,998	18,287	22,535	17,395	20,106
Management, scientific, and technical consulting services	54160	1,110	2,246	1,380	1,618	2,066 i	1,428	1,681	1,531	1,668	1,591	2,443	1,689	1,995	3,036
Research and development services in the social sciences and humanities	54172	NA	96	8	19	64	36	47	15	0 - 7,094 i	348	27	28	0 - 26,968	38
Research and development services in biotechnology <sup>c,f</sup>	54173	NA	6,850	2,601	6,238	6,294	1,723	1,344	2,387	1,176	930	1,147	1,244	1,633	2,526

TABLE 61  
Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–21

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Research and development services in the physical, engineering, and life sciences (except biotechnology)	54174	NA	3,208	1,447	2,751	3,166	2,143	3,040	3,197	2,767	2,226	2,324	2,750	5,706	5,054
Research and development services in nanotechnology	54175	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	122	i 173
Advertising and related services	54180	37	1,950	422	97	375	i 390	424	452	373	412	1,160	i 1,262	i 26,968	i 2,495
Professional, scientific, and technical services (not listed elsewhere)	54190	439	1,036	543	1,242	1,199	1,627	810	944	622	695	912	1,266	1,574	1,419
Management of companies and enterprises	55100	11	40	23	43	18	76	43	D	20	71	0 - 23,467	0 - 25,025	51	0 - 5,917
Administrative and support services	56100	NA	419	640	348	609	589	459	375	588	1,558	2,668	3,575	3,806	3,400
Waste management and remediation services	56200	NA	15	684	20	D	23	D	D	8	0 - 12,866	0 - 23,467	0 - 25,025	0 - 26,968	513
Offices of physicians	62110	40	37	371	36	42	i 43	39	28	70	102	i 113	196	195	248
Medical and diagnostic laboratories	62150	903	246	409	287	364	347	410	424	0 - 7,094	i 855	1,739	i 2,104	1,630	i 2,336
Other ambulatory health care services (ambulance, dental, home health care)	62199	NA	47	145	i 15	45	i 52	37	39	23	70	48	150	83	307
Hospitals and nursing care facilities	62200	NA	62	i 68	2	2	i 2	2	4	6	18	0 - 23,467	0 - 15,636	0 - 26,968	0 - 5,917
Social assistance services	62400	NA	D	15	13	36	47	17	2	2	6	13	0 - 25,025	0 - 26,968	0 - 5,917
Arts, entertainment, and recreation	71000	NA	161	137	85	70	29	103	i 50	45	42	45	479	0 - 26,968	90
Accommodation and food services	72000	NA	50	119	84	149	i 163	D	106	76	62	126	0 - 25,025	0 - 26,968	115
Other services (not listed elsewhere)	81000	NA	89	465	345	484	405	550	669	0 - 7,094	0 - 12,866	0 - 23,467	507	581	8,635
Undistributed <sup>g</sup>	–	10,660	14,175	5,373	i D	491	359	i 69	0	0	0	0	0	0	0

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

<sup>a</sup> Data are tabulated independent of the industry classification of the company. Companies were asked to report their sales and R&D activity in one or more business activity codes.  
<sup>b</sup> Business codes and descriptions are based on 2017 North American Industry Classification System (NAICS) industry definitions.  
<sup>c</sup> Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2013 and beyond: 32543, Biotechnology-based pharmaceutical and biological products (except diagnostic substances).  
<sup>d</sup> Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2014 and beyond: 33333, Digital cameras manufacturing.

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

<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 2020 and beyond: 54175, Research and development services in nanotechnology.

<sup>g</sup> Includes data reported that were not allocated to a business activity.

**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 \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. For survey years 2014–19, industry classification was based on the 2012 NAICS. For survey years beginning in 2020, classification was based on the 2017 NAICS. Most statistics for years prior to 2021 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

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

TABLE 62  
Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
All business activities	21100–81000	10,976,518	10,221,923	12,204,773	12,874,185	12,975,886	13,279,075	13,409,822	12,201,595	12,246,930	12,878,032	14,493,394	14,927,124	14,743,459	17,410,590
Oil and gas extraction	21100	271,493	153,939	212,469	331,320	271,983	250,884	241,227	141,687	117,720	108,940	178,064	58,355 - 1,966,830	119,554	189,343
Mining	21200	NA	D	38,302	57,661	43,857	54,531	D	D	29,976	23,057	44,867	18,307	15,388	85,707 i
Support activities for mining, including oil and gas	21300	NA	45,184	61,062	68,523	79,788	100,175	129,989	74,421	44,705	64,412	84,366	89,793	53,234	45,307
Utilities	22100	NA	317,243	310,768	348,763	318,893	324,150	356,225	346,925	309,116	407,052	4,778 - 1,152,314	304,369	288,293	344,086
Construction	23000	NA	42,287	93,305	107,286	107,685	94,057	91,507	64,463	52,363	69,900	87,053	93,308	99,450	84,600
Food manufacturing	31100	475,588	630,500	694,763	690,698	688,804	941,309	844,673	744,318	705,021	789,784	718,760	785,374	812,493	919,547
Beverage manufacturing	31210	143,008	129,396	141,259	180,153	167,003	164,270	166,544	170,059	155,459	146,561	138,524	119,571	151,446	206,419
Tobacco manufacturing	31220	28,970	134,972	133,993	140,998	130,759	69,191	D	D	64,978	72,291	67,629	70,749	72,251	59,978
Textile, apparel, and leather products manufacturing	31990	NA	56,131	68,515	66,416	89,086	70,260	66,546	83,170	109,296	88,817	84,900	24,172 - 1,932,647	80,328	91,292
Wood products manufacturing	32100	34,563	27,826	28,342	24,165	32,908	42,472	51,879	33,713	0 - 373,524	36,180	41,001	41,880	43,544	68,558
Paper manufacturing	32200	139,953	110,534	136,302	144,064	142,335	146,748	148,797	D	129,369	146,927	157,969	0 - 2,264,461	138,023	151,395
Printing and related support activities	32300	26,426	37,743	37,398	32,823	32,152	29,576	34,227	42,885	31,310	47,910	36,015	65,568 i	36,283	35,800
Petroleum refineries	32401	NA	NA	837,945	954,108	911,784	968,046	787,825	512,224	415,433	325,034 - 733,821	586,670	565,849	379,018	588,711
Asphalt paving, roofing, and saturated materials manufacturing	32402	NA	NA	7,566	8,872	8,563	14,504	11,150	10,324	12,322	16,662	17,798	18,422	2,927 - 841,993	24,933
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	NA	NA	32,282	43,514	D	23,425	22,348	20,440	15,665	20,790	16,008	11,434	8,950	14,687
Basic chemicals manufacturing	32510	273,809	179,494	243,193	299,476	473,666 i	278,661	270,287	212,951	264,935	231,673	262,007	228,984	168,370 - 731,814	331,658
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	89,805	94,915	108,693	88,762	97,410	95,249	108,867	92,708	91,399	92,324	128,075	111,483	96,372	133,227
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	40,337	71,003	51,940	47,381	57,246	67,823	68,738	72,737	58,476	74,274	83,310	67,388	67,401	78,109

TABLE 62  
Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing <sup>c</sup>	32541	582,910	438,687	471,763	577,607	594,394	577,930	569,968	564,398	608,453	636,157	669,845	555,403	707,534	839,753
In vitro diagnostic substances manufacturing <sup>c</sup>	32542	22,317	16,940	20,637	25,005	27,022	13,871	25,365	14,159	7,892 - 171,885	15,915	17,050	9,160 - 594,175	6,845 - 845,912	19,811
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	NA	NA	NA	NA	NA	40,409	56,454	84,437	0 - 373,524	90,419	110,160	126,736	125,500	155,385
Soap, cleaning compound, and toilet preparations manufacturing	32591	142,212	151,565	167,258	170,417	166,942	185,266	196,651	180,201	164,810	179,865	192,314	178,596	181,974	181,410
Paint, adhesive, and other chemical manufacturing	32592	113,118	104,308	103,452	120,242	128,998	113,108	128,730	107,146	118,885	124,026	131,768	122,393	121,528	126,384
Plastics and rubber products manufacturing	32600	162,401	161,057	193,471	243,447	265,623	219,020	241,780	201,164	232,466	229,347	227,659	207,637	238,278	271,663
Clay and glass products manufacturing	32710	36,417	27,803	37,853	34,184	36,960	39,365	34,863	39,676	47,603	41,355	48,534	39,769	34,268	41,741
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	48,680	35,530	31,789	32,864	40,193	42,592	35,322	35,377	34,503	29,688	41,567	46,610	43,556	44,069
Primary metal manufacturing	33100	NA	124,478	197,315	179,318	176,544	161,443	128,532	103,093	121,321	100,279	158,304	162,531	106,419	137,595
Fabricated metal products manufacturing	33200	188,359	132,465	161,593	179,228	207,423	199,678	235,784	194,098	165,184	175,986	203,494	183,323	195,877	484,400
Agricultural machinery and equipment manufacturing	33311	48,185	46,695	53,946	43,410	59,651	68,793	63,617	53,559	51,776	60,038	67,224	36,554 - 621,568	57,346	68,463
Construction machinery manufacturing	33312	32,109	23,195	30,685	42,974	43,355	63,344	65,348	56,090	49,267	60,563	74,106	80,257	70,436	76,105
Mining, oil, and gas field machinery and equipment manufacturing	33319	NA	69,074	75,563	101,549	110,356	84,384	76,466	73,725	48,023	65,286	86,513	68,944	55,005	51,236
Semiconductor machinery manufacturing	33321	20,019	10,505	21,588	25,960	9,973	24,420	27,333	24,653	30,749	38,320	47,008	24,628 - 609,643	49,316	67,019
Industrial machinery manufacturing (except semiconductor machinery)	33322	26,984	21,368	30,723	44,666	42,619	39,357	51,615	39,189	37,659	38,252	44,624	38,113	48,714	60,068
Photographic and photocopying equipment manufacturing	33331	NA	7,471	D	D	307 i	7,502	9,162	8,602	6,775 - 170,768	6,849	0 - 1,147,536	836	1,452 - 564,897	1,389



TABLE 62  
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(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015		2016	2017	2018	2019	2020	2021
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	NA	49,546	76,811	73,896	90,814	97,984	111,674	101,920		113,832	100,874	116,411	115,647	93,227	113,315
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	15	D		5,579 i	5,947 i	0 - 1,147,536	3,372	0 - 1,108,164	2,079
Engine, turbine, and power transmission equipment manufacturing	33360	86,660	46,879	84,686	112,562	120,116	146,129	D	85,560		87,887	106,205 i	95,099	55,890 - 640,904	103,427	129,923
Metalworking and other general purpose machinery manufacturing	33390	90,067	66,350	95,017	112,947	125,495	105,487	149,607	140,673		116,838	117,535	124,745	101,458	95,205	123,723
Computers and peripheral equipment manufacturing and magnetic and optical media <sup>d</sup>	33412	NA	273,429	330,020	342,416	304,309	307,523	297,193	282,890		414,641	452,483	479,840	453,517	454,726	544,417
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	48,816	66,123	87,159	64,811	64,652	75,886	72,421	202,399 i		76,218	74,054	80,804	0 - 2,264,461	70,067	72,948
Radio, television, and wireless communication equipment manufacturing	33422	76,167	64,808	79,675	92,884	136,470	148,680	168,774 i	D		39,937 - 203,930	37,092	0 - 1,147,536	37,124	34,494	44,090
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	17,976	13,324	12,856	21,004	15,949	23,299	14,548	15,997		0 - 373,524	13,808	14,852 - 257,625	15,898	18,845	11,023
Audio and video equipment manufacturing	33430	13,212	15,041	22,242	11,476	17,926	19,596	18,333	38,954 i		35,473	3,724 - 417,696	11,671	15,984	16,339	12,414
Semiconductor and other electronic components manufacturing	33440	220,272	196,399	296,058	336,789	332,771	320,780	350,779	D		323,512	373,892	464,768	0 - 2,264,461	418,715	451,443
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	41,395	27,437	29,041	38,560	39,590	43,130	43,537	44,739		46,152	44,317	54,101 i	50,472	45,536	41,958
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	38,474	55,866	68,907	47,701	63,724	66,326	67,154	58,670		59,653	65,730 i	72,999	73,068	78,660	36,390
Measuring and control instruments manufacturing (not listed elsewhere)	33459	57,989	78,228	88,305	84,368	99,774	97,153	102,909	101,098		102,226	91,098	80,604	85,037	94,116	109,876
Electrical equipment, appliances, and components manufacturing	33500	154,206	129,174	160,532	165,156	164,998	182,490	198,505	195,327		213,284	185,233	189,043	219,931	202,458	204,520

TABLE 62  
Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Motor vehicles manufacturing	33610	521,541	399,125	476,726	539,595	541,730	615,136	539,139	646,110	693,548	616,741	700,801	618,116	460,577	482,782
Motor vehicle body and trailer manufacturing	33620	D	15,688	23,105	15,325	34,284	25,913	32,719	23,229	63,232	20,086	26,219	45,941	30,285	40,201
Motor vehicle parts manufacturing	33630	163,993	126,638	242,201	224,450	228,418	269,022	379,492	294,414	238,521	270,643	284,735	291,175	241,892	289,837
Aircraft manufacturing	33641	97,635	75,960	89,235	121,480	97,484	154,241	139,924	148,986	136,497	128,861	190,692	144,845	120,777	112,168
Aircraft engine and engine parts manufacturing	33642	42,829	37,086	34,925	42,514	40,376	54,024	48,134	D	38,176	42,340	60,557	54,264	42,789	101,036
Other aircraft parts and auxiliary equipment manufacturing	33643	30,319	36,714	41,704	56,509	44,556	60,520	84,966	97,198	85,111	103,682	67,880	58,258	68,808	59,199
Guided missiles, space vehicles, and related parts manufacturing	33644	D	51,326	D	D	16,554	17,200	30,237	31,776	30,600	37,204	51,013	35,217	43,681	45,508
Railroad rolling stock manufacturing	33651	7,248	3,639	9,075	8,870	14,255	12,639	19,679	19,353	14,852	13,416	14,083	13,505	16,856	14,276
Ship and boat building	33660	16,461	37,439	D	D	23,966	16,927	39,049	15,426	33,496 - 134,100	22,538	16,295	24,056	18,200	20,558
Motorcycle, bicycle, and parts manufacturing	33691	8,423	6,677	6,646	8,948	7,829	11,331	9,142	9,067	9,507	9,107	4,253 - 1,151,789	4,030 - 1,912,506	9,727	13,464
Military armored vehicle, tank, and tank components manufacturing	33692	13,341	10,136	D	6,239	4,893	4,354	7,502	D	77 - 229,474	11,306	18,524	15,404	10,764	17,819
All other transportation equipment manufacturing	33699	9,513	6,332	13,008	13,415	18,469	28,933	12,026	14,565	14,435	14,658	21,096	17,727	21,050	18,746
Furniture and related products manufacturing	33700	43,401	35,821	37,487	39,031	43,719	41,407	45,760	43,530	43,362	47,260	48,896	51,330	56,126	53,564
Medical equipment and supplies manufacturing	33910	164,066	159,611	243,406	304,215	217,549	237,729	234,177	235,706	244,748	250,637	271,188	301,591	516,551	354,587
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	122,669	114,088	101,526	D	118,660	140,793	134,415	D	131,728	135,910	170,909	117,115	99,609 - 663,053	148,520
Merchant wholesalers, durable goods	42300	412,269	313,095	334,004	214,772	246,702	378,550	180,014	260,038	221,852	165,345	247,956	163,818	180,636	273,073
Merchant wholesalers, nondurable goods	42400	340,956	273,118	280,982	496,309	587,019	571,742	698,182	547,921	512,867	506,120	633,916	593,435	651,694	1,244,756
Wholesale electronic markets and agents and brokers (business to business)	42500	2,600	8,684	3,347	4,722	115,452	53,497	86,215	41,905	60,197	50,155	435 - 1,147,971	5,355	20,646	26,909
Retail trade (except electronic shopping and electronic auctions)	44000	NA	206,489	223,211	104,922	257,466	156,839	442,527	210,412	296,019	322,049	537,429	662,767	685,526	612,483
Electronic shopping and electronic auctions	45411	NA	NA	D	D	88,213	96,577	D	130,399	110,617 - 274,610	198,755	191,380 - 434,154	168,466 - 753,481	212,452 - 775,897	177,183 - 451,673

TABLE 62  
Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Transportation	48000	NA	D	182,535	109,842	139,615	95,821	117,267	D	0 - 373,524	278,263	277,801	387,962	41,226 - 880,292	262,617
Couriers, messengers, and express delivery services	49200	D	D	47,619	D	D	D	170,934	D	187,345	136,436	90,988	2,034	0 - 1,108,164	77,787 - 352,277
Warehousing and storage	49300	31,235	1,536	24,457	22,885	3,983	13,530	2,585	D	4,652	15,714	0 - 1,147,536	15,943	17,093	3,820 - 278,310
Newspaper, periodical, book, and directory publishers (except Internet)	51110	17,053	24,528	26,671	30,831	33,557	i 17,955	10,520	7,008	8,704	6,010	0 - 1,147,536	7,146	1,490 - 840,557	7,116
Software publishers (except Internet) <sup>e</sup>	51120	210,186	195,833	214,359	230,898	237,602	266,587	278,159	272,944	256,293	231,880	244,928	237,538	238,637	261,541
Motion picture and sound recording (except Internet)	51200	16,774	20,697	18,011	14,964	9,467	20,861	D	7,142	9,353	8,936	37,326	46,569	36,032	37,689
Broadcasting (except Internet)	51500	NA	39,734	53,313	44,029	67,429	81,499	D	74,473	84,879	88,160	151,227	185,522	168,015	161,160
Wired telecommunications carriers	51710	D	187,439	210,704	268,345	223,829	181,992	230,630	216,588	181,904	222,699	129,766	139,245	150,710	156,938
Wireless telecommunications carriers (except satellite)	51720	135,248	154,682	138,479	156,696	193,408	D	247,759	D	172,416	201,063	264,219	264,976	254,772	275,173
Satellite telecommunications	51740	19,330	12,662	i 16,021	2,783	3,056	D	3,581	44,400	61,927	57,588	53,333	51,337	191 - 839,257	34,165
Other telecommunications (not listed elsewhere)	51790	5,603	9,122	7,737	18,803	17,803	18,504	6,507	14,561	8,524	16,040	12,551 - 255,324	13,862 - 598,877	0 - 1,108,164	15,314
Data processing, hosting, and related services <sup>e</sup>	51800	NA	36,196	38,523	60,641	95,872	i 58,502	81,059	79,017	76,345	77,859	141,006	97,846	102,549	139,242
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	27,442	D	33,792	57,770	98,224	167,679	220,609	323,373	347,399
Other information services, including Internet publishing, broadcasting, and Web search portals <sup>e</sup>	51910	NA	41,660	77,319	39,551	45,729	65,134	102,254	94,541	113,123	160,826	191,042	215,354	0 - 1,108,164	337,368
Finance: banking and credit intermediation	52200	NA	D	1,068,703	631,129	673,238	i 347,139	364,224	377,622	400,369	472,203	536,280	629,461	634,637	647,339
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	NA	148,454	148,014	152,435	104,915	107,027	74,030	75,325	72,115	102,310	20,889 - 1,168,425	97,894	129,317	160,242
Insurance carriers and related activities	52400	NA	294,233	281,344	280,278	358,159	397,971	380,117	420,526	372,903	312,922	0 - 1,147,536	37,829 - 1,946,303	914,179	956,121

TABLE 62  
Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
Real estate	53100	D	7,738	D	D	D	D	D	8,537	9,292	10,114	11,565	222 - 1,908,697	11,838	28,907	
Rental and leasing services	53200	NA	32,231	36,299	23,830	29,033	35,488	21,986	29,238	14,235	21,642	3,607 - 1,151,143	12,718	10,152	35,633	
Lessors of nonfinancial intangible assets, including patent licensing	53300	D	1,835	1,927	2,709	2,890	11,404	i 2,125	2,150	1,468	3,513	0 - 1,147,536	1,672	3,190 - 566,635	8,950	
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	NA	D	16,188	D	11,315	14,588	22,315	22,259	19,526	21,336	24,044	28,797	29,251	30,913	
Architectural, engineering, and related services	54130	42,680	96,534	147,309	102,126	114,240	i 125,923	134,541	139,846	103,412	84,387	102,795	126,787	95,342	122,015	
Specialized design services	54140	D	6,504	3,976	2,581	3,646	i 3,614	2,165	D	706	4,584	i 25,655	12,684	1,441 - 564,885	543	
Computer systems design and related services <sup>e</sup>	54150	210,916	216,477	224,026	377,919	i 272,065	249,600	272,937	243,790	249,430	223,281	251,167	238,436	225,488	276,104	
Management, scientific, and technical consulting services	54160	52,497	60,125	43,190	76,910	85,161	81,834	93,077	92,120	63,143	49,057	69,344	58,335	59,529	72,593	
Research and development services in the social sciences and humanities	54172	NA	980	1,170	827	D	1,301	992	D	1,131	1,185	941	1,233	1,016	1,545	
Research and development services in biotechnology <sup>c,f</sup>	54173	NA	22,354	i 8,493	8,657	11,316	12,390	17,543	10,962	9,026	9,340	3,772 - 1,151,308	4,159 - 1,912,634	13,755	18,474	
Research and development services in the physical, engineering, and life sciences (except biotechnology)	54174	NA	19,858	18,840	23,446	33,296	36,913	32,703	36,038	37,997	37,955	41,855	49,247	54,288	61,543	
Research and development services in nanotechnology	54175	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	360	i 317	
Advertising and related services	54180	D	48,883	12,992	i D	52,764	D	D	D	44,669 - 208,661	107,640	140,254	84,187 - 669,202	101,594 - 665,038	136,087 - 410,577	
Professional, scientific, and technical services (not listed elsewhere)	54190	19,146	30,323	35,320	50,949	63,254	47,353	32,811	30,775	12,204 - 176,196	31,239	21,496	23,047	2,694 - 841,760	31,870	
Management of companies and enterprises	55100	828	2,333	3,613	17,275	5,435	177,880	9,213	16,180	11,794	i 18,180	13,915	13,249	11,906	i 13,688	i
Administrative and support services	56100	NA	35,867	45,135	32,735	50,684	i 44,004	243,644	50,037	55,602	49,518	66,944	27,043 - 1,935,519	63,580	63,477	
Waste management and remediation services	56200	NA	6,242	14,172	8,182	6,564	6,245	4,766	24,985	27,470	22,609	88,502	11,624	2,614 - 566,058	18,548	r
Offices of physicians	62110	7,492	25,752	24,133	23,844	35,513	36,233	19,041	36,724	40,586	61,118	50,891	102,827	65,786	46,737	

TABLE 62  
Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–21

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021		
Medical and diagnostic laboratories	62150	20,968	15,216	37,950	17,047	21,038	17,914	5,919	20,904	27,539	i	28,636	39,514	i	38,605	52,096	59,662
Other ambulatory health care services (ambulance, dental, home health care)	62199	NA	8,127	8,487	D	3,361	i	10,919	5,274	5,651	0 - 229,395	10,819	176 - 1,147,712	22,636	30,620	35,085	
Hospitals and nursing care facilities	62200	NA	D	D	D	D	D	26,866	27,616	32,896		32,276	35,119	25,798	0 - 839,065	20,567	
Social assistance services	62400	D	286	448	326	249	1,065	1,338	63	77		112	0 - 1,147,536	0 - 1,908,473	1,826	98	
Arts, entertainment, and recreation	71000	NA	17,339	16,089	16,023	18,344	D	D	18,677	17,509 - 181,502		24,540	34,697	37,590	14,473 - 577,917	17,999	
Accommodation and food services	72000	NA	D	69,474	39,421	88,878	i	107,255	46,228	76,898		26,196	54,566	84,342	52,991	66,202	
Other services (not listed elsewhere)	81000	NA	15,585	43,778	129,084	57,612	142,029	78,365	70,781	237,671		0 - 413,972	0 - 1,147,536	18,845 - 1,927,321	20,962 - 860,028	245,169	
Less: intersegment eliminations	–	381,031	237,743	234,289	281,460	309,288	301,615	316,930	240,217	226,993		196,040	255,127	182,826	215,518	242,276	
Undistributed <sup>g</sup>	–	1,092,275	1,590,109	516,754	598,369	i	167,240	i	D	4,602		9,547	i	0	0	0	

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

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

<sup>b</sup> Business codes and descriptions are based on 2017 North American Industry Classification System (NAICS) industry definitions.

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

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

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

<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 2020 and beyond: 54175, Research and development services in nanotechnology.

<sup>g</sup> Includes data reported that were not allocated to a business activity.

**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 \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. For survey years 2014–19, industry classification was based on the 2012 NAICS. For survey years beginning in 2020, classification was based on the 2017 NAICS. Most statistics for years prior to 2021 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

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

TABLE 63  
Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
All business activities	21100–81000	7,796,340	7,448,495	8,831,739	9,059,299	9,260,168	9,663,848	9,785,269	9,084,789	9,151,764	9,583,098	10,680,515	11,279,821	11,186,163	13,097,756
Oil and gas extraction	21100	127,788	61,582	85,797	178,926	124,569	120,495	124,534	71,385	58,231	51,790	91,319	0 - 1,908,473	80,519	118,647
Mining	21200	NA	D	33,072	38,109	24,837	38,270	22,962	37,589	19,449	17,583	25,823	16,117	13,997	37,647
Support activities for mining, including oil and gas	21300	NA	23,022	34,840	42,645	51,327	72,553	97,302	47,711	25,825	39,547	54,528	52,894	28,321	30,030
Utilities	22100	NA	D	301,613	337,871	309,573	316,082	347,997	336,457	304,643	400,104	0 - 1,147,536	299,495	286,720	340,381
Construction	23000	NA	27,180	81,641	88,626	64,402	60,516	66,835	49,892	45,660	64,968	79,414	85,005	89,040	80,164
Food manufacturing	31100	394,404	503,047	501,332	494,683	503,915	693,438	608,765	541,557	520,546	617,230	527,904	570,617	583,246	676,826
Beverage manufacturing	31210	83,691	78,740	84,764	95,236	83,774	106,580	109,397	D	111,431	96,676	92,210	78,312	104,710	141,303
Tobacco manufacturing	31220	28,680	32,431	31,357	29,645	27,706	35,864	36,177	31,715	34,196	35,945	35,691	38,302	41,250	22,846
Textile, apparel, and leather products manufacturing	31990	NA	45,893	56,890	52,532	68,545	55,066	51,532	70,105	89,019	66,734	59,379	0 - 1,908,473	56,466	64,054
Wood products manufacturing	32100	28,183	26,213	25,241	22,344	28,764	36,703	44,706	28,998	0 - 229,395	31,890	34,871	35,769	40,414	63,266
Paper manufacturing	32200	100,057	80,030	99,820	103,867	101,033	106,399	106,178	108,659	95,481	110,534	118,261	0 - 1,908,473	104,667	118,821
Printing and related support activities	32300	22,678	33,532	32,163	26,809	26,267	26,281	29,178	35,056	26,808	39,492	31,019	55,231	32,668	30,837
Petroleum refineries	32401	NA	NA	540,612	581,297	578,075	639,569	521,504	336,271	245,323	325,035	332,542	362,266	235,874	367,747
Asphalt paving, roofing, and saturated materials manufacturing	32402	NA	NA	7,549	8,781	8,489	13,260	8,873	9,694	9,088	13,350	11,426	12,622	0 - 839,065	20,762
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	NA	NA	21,658	20,509	20,440	13,722	12,852	11,797	10,565	15,821	13,238	10,453	8,479	11,595
Basic chemicals manufacturing	32510	158,621	103,950	150,240	206,723	344,515	198,843	195,066	154,351	205,221	164,502	181,046	0 - 228,985	168,371	229,364
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	60,269	61,805	64,684	58,263	68,104	67,845	73,542	61,729	58,345	56,121	76,816	71,460	57,050	76,117
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	28,010	47,317	41,528	33,380	40,317	45,660	55,122	D	41,963	55,687	53,085	55,218	56,536	68,671
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing <sup>c</sup>	32541	445,985	309,750	324,266	414,284	428,486	415,199	414,154	410,983	463,633	486,877	510,204	384,923	539,429	615,406
In vitro diagnostic substances manufacturing <sup>c</sup>	32542	15,353	9,805	12,835	13,735	14,646	8,141	14,006	6,219	7,893	9,215	8,119	9,161	0 - 839,065	10,883

TABLE 63  
Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	NA	NA	NA	NA	NA	36,856	48,419	71,205	0 - 229,395	0 - 90,420	96,814	111,134	114,261	118,135
Soap, cleaning compound, and toilet preparations manufacturing	32591	69,942	71,452	81,151	70,851	82,518	87,034	101,458	94,015	83,083	94,133	107,951	98,948	100,249	103,084
Paint, adhesive, and other chemical manufacturing	32592	63,149	62,724	60,506	64,497	79,372	67,504	73,975	68,020	73,446	78,668	86,077	79,965	78,245	80,271
Plastics and rubber products manufacturing	32600	118,523	114,191	137,777	173,290	194,568	153,705	165,082	156,033	175,524	162,892	171,981	147,603	177,138	202,034
Clay and glass products manufacturing	32710	24,394	19,014	25,143	21,754	20,164	22,987	21,577	23,739	30,753	27,302	29,698	24,222	19,882	26,769
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	43,373	31,599	24,141	24,235	33,359	33,428	25,941	27,882	28,170	25,524	36,064	40,811	37,413	36,887
Primary metal manufacturing	33100	NA	97,493	161,558	148,670	153,926	137,000	104,419	90,956	105,884	82,674	124,934	124,538	82,316	115,715
Fabricated metal products manufacturing	33200	142,788	102,595	119,246	130,090	155,294 i	160,359	168,139	150,860	129,779	128,532	149,664	132,941	146,085	408,141 r
Agricultural machinery and equipment manufacturing	33311	27,543	25,669	29,904	29,258	35,667	45,717	36,857	32,054	30,092	38,891	37,208	36,555	36,338	43,538
Construction machinery manufacturing	33312	18,228	13,180	19,480	25,854	31,853	42,912	41,256	35,668	34,984	39,464	44,655	49,631	44,963	46,519
Mining, oil, and gas field machinery and equipment manufacturing	33319	NA	33,167	39,264	53,050	60,556	46,949	43,531	37,351	21,606	31,187	46,305	41,573	22,622	28,140
Semiconductor machinery manufacturing	33321	9,091	4,765	11,918	15,018	6,839	10,807	11,067	8,215	15,676	20,114	21,685	24,629	26,327	28,910
Industrial machinery manufacturing (except semiconductor machinery)	33322	19,452	15,372	21,762	29,736	31,127	29,265	35,077	32,599	25,317	27,103	31,884	28,414	37,552	47,208
Photographic and photocopying equipment manufacturing	33331	NA	5,392	3,927 i	4,791 i	D	6,885	7,246	7,124	6,776	5,993	0 - 1,147,536	710	1,453	1,196
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	NA	33,493	48,407	43,626	54,363	64,333	71,628	74,207	76,436	68,201	77,939	80,289	66,337	78,388
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	15	D	0 - 5,580 i	1,423	0 - 1,147,536 i	1,762	0 - 839,065	1,987
Engine, turbine, and power transmission equipment manufacturing	33360	58,560	30,093	46,693	68,243	74,148	89,526	45,367	50,302	51,113	57,548	49,399	55,891	52,429	67,284
Metalworking and other general purpose machinery manufacturing	33390	54,007	43,998	58,532	71,081	86,258	81,492	98,230	99,506	78,310	78,019	86,306	75,128	70,191	85,232
Computers and peripheral equipment manufacturing and magnetic and optical media <sup>d</sup>	33412	NA	136,666	167,290	174,898	143,492	180,146	165,617	153,211	211,415	196,854	214,860	211,233	215,119	240,413
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	26,447	35,592	40,631	32,334	34,783	39,026	40,004	92,411 i	44,009	41,110	44,162	0 - 1,908,473	40,721	40,402
Radio, television, and wireless communication equipment manufacturing	33422	46,641	46,769	61,641	55,217	82,027	94,606 i	96,564 i	D	39,938 i	31,253	0 - 1,147,536	30,685	27,772	36,858



TABLE 63  
Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–21

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	11,185	8,644	8,841	12,452	13,908	16,604	12,801	14,671	0 - 229,395	11,789	14,853	14,423	16,620	8,182
Audio and video equipment manufacturing	33430	10,969	10,929	19,142	7,296	14,633	14,832	13,162	D	25,739 i	0 - 413,972	6,363	7,797	13,077	9,270
Semiconductor and other electronic components manufacturing	33440	119,612	117,302	138,124	151,590	146,764	123,263	162,118	172,062	160,152	182,769	232,283	0 - 1,908,473	238,282	236,165
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	28,976	18,709	19,647	25,057	27,605	31,248	28,949	29,150	31,400	24,211	31,286	32,355	28,477	27,944
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	33,348	46,237	57,639	40,372	53,425	52,990	55,142	48,787	47,874	53,371 i	63,110	62,411	62,584	33,469
Measuring and control instruments manufacturing (not listed elsewhere)	33459	37,609	42,753	50,643	49,752	58,909	52,984	55,954	61,158	62,658	60,242	52,440	56,172	62,458	70,193
Electrical equipment, appliances, and components manufacturing	33500	106,551	85,758	105,982	106,576	110,094	133,238	141,600	143,695	139,311	120,116	115,004	145,779	132,963	132,548
Motor vehicles manufacturing	33610	346,591	274,985	329,874	373,194	375,113	459,721	385,647	526,522	561,193	207,956 - 616,742	580,129	495,402	355,452	348,358
Motor vehicle body and trailer manufacturing	33620	9,363	15,184	22,168	14,423	31,982	25,726	32,146	23,083	62,848	19,322	25,616	42,353	25,694	35,524
Motor vehicle parts manufacturing	33630	97,433	77,528	146,257	125,593	130,372	155,179	244,948	192,928	148,781	185,890	202,526	195,569	156,265	174,755
Aircraft manufacturing	33641	97,973	69,001 i	81,666	111,748	91,545 i	145,641	132,472	139,909	130,676	121,866	181,703	139,087	114,601	105,780
Aircraft engine and engine parts manufacturing	33642	35,056	24,737	25,563	27,491	26,706	46,618	41,051	D	36,861	40,556	35,583	32,679	29,626	70,572
Other aircraft parts and auxiliary equipment manufacturing	33643	21,141	26,755	31,157	43,898	34,541	47,588	68,545	77,236	68,063	83,469	56,053	47,651	0 - 68,810	50,612
Guided missiles, space vehicles, and related parts manufacturing	33644	38,114	D	25,391	35,889	14,656	14,770	27,872	29,343	30,261	35,725	46,748	32,443	38,371	42,741
Railroad rolling stock manufacturing	33651	6,354	2,763	7,095 i	7,204	11,800	10,875	16,122	16,100	11,092	8,252	8,576	8,090	9,422 i	10,646 i
Ship and boat building	33660	14,880	D	10,531	11,647	22,778 i	15,008	32,077 i	13,569	33,497 i	20,861	14,316	21,987	16,334	18,408
Motorcycle, bicycle, and parts manufacturing	33691	8,078	6,282	6,081	7,422	7,067	10,406	7,777	7,687	6,276 i	5,423	0 - 1,147,536	0 - 1,908,473	5,569	6,788
Military armored vehicle, tank, and tank components manufacturing	33692	13,092	9,674	9,072	5,755	4,668	4,190 i	4,895	4,304	0 - 229,395	9,662 i	15,846 i	13,847	9,397	16,026
All other transportation equipment manufacturing	33699	7,131	5,438	11,079	11,066	16,258	15,809	D	11,472	11,940	11,554	17,803	16,188	19,170	16,621
Furniture and related products manufacturing	33700	36,218	31,479	32,876	32,881	37,447 i	35,446	39,675	38,024	37,737	43,394	44,459	46,013	48,923	46,172
Medical equipment and supplies manufacturing	33910	105,647	102,585	169,760	225,177	136,664	160,263	155,890	154,650	166,341	165,204	28,416 - 271,189	200,521	404,214	233,592
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	80,689	84,846	71,000	78,674	80,879	93,078	90,517	95,353	86,197	96,947	104,968	87,408	99,610	100,515



TABLE 63  
Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–21

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Merchant wholesalers, durable goods	42300	238,101	196,341	206,240	171,815	221,488	353,401 i	161,500	232,112	194,976	142,659	225,389	147,049	155,289	246,611
Merchant wholesalers, nondurable goods	42400	274,190	239,385	247,311	266,388	349,833	362,965	457,745	387,489	359,871	349,751	454,966	438,340	519,753	1,047,955 i
Wholesale electronic markets and agents and brokers (business to business)	42500	2,481	D	3,331	3,008	65,076 i	33,264	65,562	21,530	59,653	49,844	0 - 1,147,536	5,104	19,913	26,624
Retail trade (except electronic shopping and electronic auctions)	44000	NA	D	195,958	70,424	214,728 i	128,479	400,192	196,896	278,755	305,293	481,549	582,400	608,344	564,943
Electronic shopping and electronic auctions	45411	NA	NA	32,624	40,254	53,712	59,174	43,787 i	D	110,618	0 - 198,757	191,381 i	168,467 i	212,453 i	177,184
Transportation	48000	NA	D	95,591	83,912	107,212	87,113	111,576	D	0 - 229,395	223,375	219,221	299,220	0 - 839,065	206,420
Couriers, messengers, and express delivery services	49200	D	D	36,420	D	D	D	123,456	D	141,429	103,001	68,939	2,014	0 - 839,065	77,788
Warehousing and storage	49300	28,723	1,296	23,982	21,910	3,157	12,235	1,971	2,305	3,358	9,877	0 - 1,147,536	8,407	11,392	3,821
Newspaper, periodical, book, and directory publishers (except Internet)	51110	12,383	16,369	18,917	22,488	26,549 i	15,003	8,481	5,743	7,263	4,383	0 - 1,147,536	5,584	0 - 839,065	5,427
Software publishers (except Internet) <sup>e</sup>	51120	121,028	118,001	129,649	132,970	136,905	154,237	163,059	159,688	155,068	133,983	148,758	142,948	149,525	163,090
Motion picture and sound recording (except Internet)	51200	10,053	14,356	11,375	9,824	7,281 i	13,722	D	5,203	6,863	6,353	32,874	43,304	33,951	36,551
Broadcasting (except Internet)	51500	NA	34,110	45,779	39,563	59,926	73,283	59,724	64,390	70,169	71,335	126,122	145,840	131,465	125,414
Wired telecommunications carriers	51710	99,917	D	209,490	261,484	216,736	181,127	227,778	213,921	179,239	220,350	127,438	137,019	146,787	153,019
Wireless telecommunications carriers (except satellite)	51720	134,162	153,937	138,473	156,525	193,254	205,148	247,714	210,820	172,357	200,979	264,216	264,970	253,127	274,485
Satellite telecommunications	51740	14,005	6,743 i	15,845	2,430	2,822	3,143	3,518	43,812	61,622	57,292	53,242	51,266	0 - 839,065	32,956
Other telecommunications (not listed elsewhere)	51790	4,374	8,108	7,222	15,929	14,610	16,325	5,973	13,669	7,684	14,142	12,552	13,863	0 - 839,065	14,546
Data processing, hosting, and related services <sup>e</sup>	51800	NA	29,903	31,417	51,197	82,997 i	49,201	67,167	64,916	59,491	57,183	114,191	69,067	69,419	91,782
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	19,455	26,461	26,654	44,759	77,556	131,826	171,301	226,651	253,071
Other information services, including Internet publishing, broadcasting, and Web search portals <sup>e</sup>	51910	NA	27,907	47,397	28,424	28,760	36,613	57,405	53,823	75,332	100,436	114,010	121,756	0 - 839,065	184,891
Finance: banking and credit intermediation	52200	NA	D	992,651	601,628	631,902 i	305,994	317,147	312,954	342,319	399,822	479,807	577,362	570,871	581,988
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	NA	D	113,669	117,167	88,244	83,913	54,342	60,239	55,068	83,537	0 - 1,147,536	67,833	94,101	127,753
Insurance carriers and related activities	52400	NA	282,640	265,110	265,293	349,252	363,799	347,710	398,746	353,842	294,467	0 - 1,147,536	0 - 1,908,473	883,433	938,357

TABLE 63  
Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
Real estate	53100	6,053	D	4,615	4,727	8,069	8,227	10,128	8,449	9,235	0 - 10,116	10,982	0 - 1,908,473	11,837	28,905	
Rental and leasing services	53200	NA	D	27,719	18,597	21,801	26,614	15,330	23,848	0 - 14,237	13,623	0 - 1,147,536	8,245	6,966	25,953	
Lessors of nonfinancial intangible assets, including patent licensing	53300	D	1,484	1,702	2,350	2,125	10,764	i 1,608	1,982	1,386	2,785	0 - 1,147,536	1,615	3,191	7,112	
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	NA	D	14,565	7,394	9,093	11,974	18,498	i 18,538	16,708	18,581	21,142	25,650	26,928	28,216	
Architectural, engineering, and related services	54130	37,749	81,565	113,603	65,209	94,868	i 80,859	85,535	90,666	76,622	65,138	84,645	110,265	81,025	106,100	
Specialized design services	54140	3,325	D	3,522	2,353	3,301	i 2,714	1,487	769	638	2,356	i 7,284	3,763	1,442	489	
Computer systems design and related services <sup>e</sup>	54150	124,832	140,234	143,787	224,144	167,759	158,858	168,793	165,417	176,418	152,680	154,615	152,057	0 - 225,490	196,449	
Management, scientific, and technical consulting services	54160	33,588	36,811	28,351	52,489	57,925	59,508	84,830	75,668	55,608	42,098	49,590	50,339	54,262	66,367	
Research and development services in the social sciences and humanities	54172	NA	978	1,168	820	934	1,297	969	1,042	1,124	1,179	934	1,144	1,003	1,543	
Research and development services in biotechnology <sup>c,f</sup>	54173	NA	18,691	i 7,194	7,388	9,769	10,689	15,872	9,381	6,548	6,476	0 - 1,147,536	0 - 1,908,473	9,660	12,334	
Research and development services in the physical, engineering, and life sciences (except biotechnology)	54174	NA	16,041	15,845	19,094	27,670	32,098	27,450	30,843	30,737	28,218	31,661	38,345	41,259	46,153	
Research and development services in nanotechnology	54175	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	360	i 315	
Advertising and related services	54180	14,574	D	11,336	i 21,227	27,500	34,889	34,379	38,454	44,670	52,884	72,957	84,188	101,595	136,088	
Professional, scientific, and technical services (not listed elsewhere)	54190	15,690	28,298	33,134	46,048	53,969	38,936	24,808	28,026	12,205	29,190	16,673	19,059	0 - 839,065	28,758	
Management of companies and enterprises	55100	752	2,310	3,347	11,847	4,131	176,993	8,497	D	11,172	i 16,588	12,189	13,209	11,701	i 13,584	i
Administrative and support services	56100	NA	29,045	25,660	22,146	38,874	i 26,981	214,331	23,581	27,504	26,915	38,514	0 - 1,908,473	55,368	54,124	
Waste management and remediation services	56200	NA	D	13,971	7,223	6,080	5,650	4,152	23,159	25,561	21,206	84,142	11,343	2,615	17,919	r
Offices of physicians	62110	7,492	25,751	24,133	23,844	35,513	36,233	19,041	36,724	40,586	61,117	50,891	102,827	65,786	46,737	
Medical and diagnostic laboratories	62150	19,930	14,359	36,288	15,778	19,655	17,027	5,024	19,415	25,614	i 27,361	35,193	34,474	47,851	54,021	
Other ambulatory health care services (ambulance, dental, home health care)	62199	NA	D	8,333	D	3,334	i 10,919	5,274	5,651	0 - 229,395	10,363	0 - 1,147,536	22,444	26,984	28,942	
Hospitals and nursing care facilities	62200	NA	D	7,831	16,084	870	i 1,227	26,866	27,485	32,609	32,276	35,118	25,798	0 - 839,065	20,567	
Social assistance services	62400	D	D	448	326	249	1,036	1,336	63	77	112	0 - 1,147,536	0 - 1,908,473	1,826	98	

TABLE 63  
Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–21

(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Arts, entertainment, and recreation	71000	NA	14,265	12,920	12,727	15,248	13,180	12,903	16,137	17,510	18,945	26,563	31,860	14,474	16,119
Accommodation and food services	72000	NA	D	37,218	27,476	54,266	i 57,908	31,664	44,505	32,404	21,272	33,736	56,338	35,128	43,144
Other services (not listed elsewhere)	81000	NA	9,638	35,994	118,268	44,823	120,458	60,949	51,253	173,078	0 - 413,972	0 - 1,147,536	0 - 1,908,473	0 - 839,065	172,482
Less: intersegment eliminations	–	219,384	110,499	132,754	117,417	136,579	136,540	160,374	126,960	129,858	131,717	152,902	117,364	152,867	146,835
Undistributed <sup>g</sup>	–	756,553	1,137,705	412,892	450,613	i 108,244	D	1,945	D	0	0	8	i 0	0	0

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

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

<sup>b</sup> Business codes and descriptions are based on 2017 North American Industry Classification System (NAICS) industry definitions.

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

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

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

<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 2020 and beyond: 54175, Research and development services in nanotechnology.

<sup>g</sup> Includes data reported that were not allocated to a business activity.

**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 \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. For survey years 2014–19, industry classification was based on the 2012 NAICS. For survey years beginning in 2020, classification was based on the 2017 NAICS. Most statistics for years prior to 2021 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

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

TABLE 64  
Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
All business activities	21100–81000	3,180,177	2,773,429	3,373,035	3,814,885	3,715,718	3,615,226	3,624,553	3,116,806	3,095,167	3,294,934	3,812,880	3,647,303	3,557,296	4,312,834
Oil and gas extraction	21100	143,705	92,357	126,671	152,394	147,415	130,389	116,693	70,302	59,489	57,150	86,746	58,356	39,035	70,696
Mining	21200	NA	D	5,230	19,552	19,020	16,261	D	D	10,528	5,473	19,044	2,191	1,391	48,060 i
Support activities for mining, including oil and gas	21300	NA	22,162	26,223	25,878	28,461	27,621	32,686	26,711 i	18,880	24,865 i	29,837	36,898	24,913 i	15,276
Utilities	22100	NA	D	9,155	10,892	9,320	8,068	8,229	10,468	4,473	6,948	4,779	4,874	1,573	3,705
Construction	23000	NA	15,107	11,664	18,660	43,283	33,541	24,672	14,571	6,703	4,932	7,639	8,303	10,410	4,437
Food manufacturing	31100	81,184	127,453	193,432	196,015	184,889	247,871	235,909	202,761	184,474	172,554	190,856	214,757	229,247	242,721
Beverage manufacturing	31210	59,317	50,655	56,495	84,916	83,229	57,690	57,147	D	44,029	49,885	46,313	41,260	46,736	65,115
Tobacco manufacturing	31220	290	102,541	102,636	111,353	103,052	33,327	D	D	30,782	36,346	31,938	32,447	31,001	37,132
Textile, apparel, and leather products manufacturing	31990	NA	10,239	11,625	13,883	20,542	15,193	15,014	13,065	20,278	22,083	25,521	24,173	23,862	27,238
Wood products manufacturing	32100	6,381	1,613	3,101 i	1,821	4,144	5,769	7,172	4,715	0 - 163,991	4,290	6,131	6,111	3,130	5,291
Paper manufacturing	32200	39,895	30,504	36,481	40,196	41,303	40,349	42,619	D	33,888	36,393	39,708	0 - 585,012	33,357	32,573
Printing and related support activities	32300	3,748	4,212	5,234	6,013	5,885	3,296	5,049	7,829 i	4,501	8,418	4,995	10,337 i	3,615	4,963
Petroleum refineries	32401	NA	NA	297,333	372,811	333,710	328,477	266,321	175,953	170,110	0 - 408,784	254,128	203,583	143,144	220,963
Asphalt paving, roofing, and saturated materials manufacturing	32402	NA	NA	17	91	74 i	1,244	2,278	630	3,234	3,312	6,373	5,800	2,928	4,171
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	NA	NA	10,623	23,005	D	9,703	9,496	8,643	5,100	4,968	2,770	981	471	3,091
Basic chemicals manufacturing	32510	115,189	75,544	92,953	92,754	129,151	79,818	75,221	58,600	59,714	67,172	80,961	0 - 228,985	0 - 563,442	102,294

TABLE 64  
Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	29,537	33,110	44,009	30,499	29,307	27,404	35,325	30,979	33,055	36,203	51,259	40,023	39,322	57,110
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	12,327	23,686	10,412	14,001	16,929	22,163 i	13,617	D	16,513	18,587	30,225	12,170	10,865	9,438
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing <sup>c</sup>	32541	136,925	128,937	147,497	163,323	165,908	162,730	155,814	153,415	144,820	149,280	159,641	170,480	168,105	224,347
In vitro diagnostic substances manufacturing <sup>c</sup>	32542	6,964	7,135	7,802	11,270	12,376	5,730	11,359	7,940	0 - 163,991	6,700	8,931 i	0 - 585,012	6,846	8,928
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	NA	NA	NA	NA	NA	3,553	8,035	13,232	0 - 163,991	0 - 90,420	13,346	15,602	11,239	37,250
Soap, cleaning compound, and toilet preparations manufacturing	32591	72,271	80,113	86,107	99,565	84,423	98,232	95,193	86,186	81,727	85,732	84,362	79,648	81,725	78,326
Paint, adhesive, and other chemical manufacturing	32592	49,968	41,584	42,946	55,746	49,627	45,604	54,754	39,126	45,439	45,358	45,691	42,428	43,283	46,113
Plastics and rubber products manufacturing	32600	43,878	46,866	55,694	70,156	71,055	65,315	76,697	45,131	56,942	66,455	55,679	60,034	61,140	69,629
Clay and glass products manufacturing	32710	12,023	8,789	12,710	12,430	16,796	16,378	13,287	15,938	16,850	14,053	18,837	15,547 i	14,387	14,972

TABLE 64  
Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	5,307	3,931	7,648	8,629	6,833	9,164	9,381	7,494	6,333	4,163	5,504	5,799	6,143	7,183
Primary metal manufacturing	33100	NA	26,985	35,756	30,648	22,619	24,443	24,114	12,138	15,437	17,605	33,370	37,994	24,103	21,880
Fabricated metal products manufacturing	33200	45,571	29,870	42,347	49,138	52,129	39,319	67,646	43,238	35,404	47,454	53,830	50,382	49,793	76,258
Agricultural machinery and equipment manufacturing	33311	20,642	21,025	24,042	14,152	23,984	23,076	26,760	21,505	21,684	21,146	30,017	0 - 585,012	21,007	24,924
Construction machinery manufacturing	33312	13,881	10,015	11,205	17,120	11,502	20,431	24,092	20,423	14,283	21,099	29,451	30,626	25,473	29,585
Mining, oil, and gas field machinery and equipment manufacturing	33319	NA	35,907	36,300	48,499	49,800	37,434	32,935	36,375	26,418	34,098	40,208	27,371	32,383	23,096
Semiconductor machinery manufacturing	33321	10,928	5,740	9,670	10,941	3,134	13,613	16,266	16,438	15,074	18,206	25,323	0 - 585,012	22,989	38,109
Industrial machinery manufacturing (except semiconductor machinery)	33322	7,532	5,996	8,961	14,930	11,492	10,092	16,537	6,590	12,341	11,149	12,740	9,699	11,163	12,860
Photographic and photocopying equipment manufacturing	33331	NA	2,080	D	D	D	618	1,915	1,477	0 - 163,991	857	0 - 242,771	127	0 - 563,442	194
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	NA	16,053	28,404	30,270	36,451	33,652	40,045	27,712	37,396	32,672	38,473	35,358	26,891	34,927
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	0	D	0 - 5,580	4,524	0 - 242,771	1,610	0 - 563,442	92

TABLE 64  
Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Engine, turbine, and power transmission equipment manufacturing	33360	28,100	16,787	37,994	44,319	45,968	56,604	D	35,258	36,775	48,658 i	45,700	0 - 585,012	50,998	62,639
Metalworking and other general purpose machinery manufacturing	33390	36,061	22,352	36,485	41,866	39,237	23,995	51,377	41,166	38,528	39,516	38,439	26,329	25,014	38,491
Computers and peripheral equipment manufacturing and magnetic and optical media <sup>d</sup>	33412	NA	136,763	162,729	167,518	160,818	127,377	131,576	129,679	203,226	255,629	264,980	242,284	239,607	304,004
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 i	32,209	32,943	36,643	0 - 585,012	29,345	32,546
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	5,839	0 - 242,771	6,439 i	6,721	7,231
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	2,019	0 - 242,771	1,476	2,225	2,841
Audio and video equipment manufacturing	33430	2,243	4,112	3,100	4,180	3,294	4,764	5,171	D	9,734	3,725	5,308	8,187	3,261	3,145
Semiconductor and other electronic components manufacturing	33440	100,661	79,098	157,934	185,199	186,007	197,516	188,661	D	163,360	191,123	232,485	0 - 585,012	180,433	215,279

TABLE 64  
Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	12,419	8,728	9,394	13,503	11,985	11,882	14,588	15,589	14,752	20,106 i	22,814 i	18,118 i	17,058	14,014
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	5,126	9,629	11,268	7,329	10,300	13,337	12,013	9,882 i	11,779	12,359 i	9,889	10,658	16,076	2,921
Measuring and control instruments manufacturing (not listed elsewhere)	33459	20,381	35,476	37,663	34,616	40,865	44,169	46,955	39,940	39,568	30,855	28,163	28,865	31,658	39,683
Electrical equipment, appliances, and components manufacturing	33500	47,654	43,416	54,549	58,580	54,904	49,253	56,905	51,633	73,973	65,117	74,039	74,152	69,495	71,971
Motor vehicles manufacturing	33610	174,950	124,140	146,852	166,401	166,616	155,415	153,493	119,588	132,355	0 - 408,784	120,673	122,714	105,124	134,424
Motor vehicle body and trailer manufacturing	33620	D	504	937	903	2,302	187	573	145	384	763	603	3,589	4,591	4,676
Motor vehicle parts manufacturing	33630	66,559	49,109	95,944	98,857	98,046	113,842	134,544	101,485	89,740	84,753	82,209	95,607 i	85,627	115,082
Aircraft manufacturing	33641	S	6,959	7,569	9,732 i	5,939	8,600 i	7,452	9,077	5,821	6,995	8,989	5,758	6,175	6,387
Aircraft engine and engine parts manufacturing	33642	7,773	12,349	9,361	15,023	13,670	7,406	7,083 i	D	1,316	1,784	24,974	21,585	13,163	30,464
Other aircraft parts and auxiliary equipment manufacturing	33643	9,178	9,959	10,547	12,611	10,015	12,933	16,421	19,962	17,048	20,212	11,827	10,607	0 - 68,810	8,587
Guided missiles, space vehicles, and related parts manufacturing	33644	D	D	D	D	1,899	2,431	2,366	2,434 i	339	1,480 i	4,265	2,774	5,309	2,767



TABLE 64  
Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Railroad rolling stock manufacturing	33651	894	875	1,980	1,666	2,455	1,764	3,557 i	3,253	3,760	5,164	5,507	5,415 i	7,433	3,630 i
Ship and boat building	33660	1,581	D	D	D	1,188 i	1,919 i	6,971 i	1,858	0 - 100,602 i	1,677	1,979	2,069	1,866	2,150
Motorcycle, bicycle, and parts manufacturing	33691	345	395	565	1,526	762	926	1,365	1,381	3,231 i	3,684	4,254	4,031	4,158	6,676
Military armored vehicle, tank, and tank components manufacturing	33692	249	462	D	484	224	164	2,608	D	78	1,644 i	2,678	1,557	1,367	1,793 i
All other transportation equipment manufacturing	33699	2,382	895	1,929	2,349	2,212	13,125	D	3,093	2,495	3,104	3,294	1,539	1,880	2,124
Furniture and related products manufacturing	33700	7,183	4,342	4,610	6,151	6,272	5,960	6,085	5,506	5,625	3,866	4,438	5,317	7,203	7,392
Medical equipment and supplies manufacturing	33910	58,419	57,025	73,646	79,038	80,885	77,466	78,288	81,056	78,407	85,432	0 - 242,771	101,069	112,337	120,995
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	41,981	29,242	30,526	D	37,781	47,716	43,898	D	45,531 i	38,962	65,941 i	29,707	0 - 563,442	48,004
Merchant wholesalers, durable goods	42300	174,168	116,754	127,763	42,957	25,213	25,149 i	18,514	27,926	26,876	22,686	22,567	16,769	25,347	26,461
Merchant wholesalers, nondurable goods	42400	66,765	33,733	33,672	229,921	237,186	208,777	240,437	160,432	152,996	156,369	178,950	155,095	131,942	196,801
Wholesale electronic markets and agents and brokers (business to business)	42500	119	D	16	1,714 i	50,376 i	20,233	20,653	20,376	544	312	436	251	732	285

TABLE 64  
Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Retail trade (except electronic shopping and electronic auctions)	44000	NA	D	27,253	34,498	42,738	28,360	42,336	13,516	17,264	16,756	55,879	80,367	77,183	47,540
Electronic shopping and electronic auctions	45411	NA	NA	D	D	34,500	37,403	D	D	0 - 163,991	0 - 198,757	0 - 242,771 i	0 - 585,012 i	0 - 563,442 i	0 - 274,489
Transportation	48000	NA	D	86,945	25,930	32,403	8,708	5,691	D	163,991	54,889	58,580	88,742	41,227	56,197
Couriers, messengers, and express delivery services	49200	D	D	11,199	D	0	30,192	47,478	D	45,916	33,435	22,049	20	0 - 563,442	0 - 274,489
Warehousing and storage	49300	2,512	240	474	975	826	1,295	614	D	1,294	5,837	0 - 242,771	7,536	5,701	0 - 274,489
Newspaper, periodical, book, and directory publishers (except Internet)	51110	4,670	8,159	7,754	8,343	7,008 i	2,953 i	2,040	1,265	1,441	1,628	0 - 242,771	1,562	1,491	1,690
Software publishers (except Internet) <sup>e</sup>	51120	89,158	77,832	84,710	97,929	100,697	112,350	115,101	113,255	101,226	97,898	96,171	94,590	89,112	98,450
Motion picture and sound recording (except Internet)	51200	6,721	6,341	6,635	5,141	2,185	7,140	D	1,939	2,490	2,583	4,452	3,265	2,081	1,138
Broadcasting (except Internet)	51500	NA	5,624	7,533	4,466	7,504 i	8,215	D	10,083	14,710	16,825	25,106	39,683	36,550	35,746
Wired telecommunications carriers	51710	D	D	1,214	6,862	7,093	865	2,852	2,667	2,665	2,349	2,328	2,226	3,923 i	3,919 i
Wireless telecommunications carriers (except satellite)	51720	1,085	745	6	171	154 i	D	45	D	59	84	3 i	5	1,645 i	688 i
Satellite telecommunications	51740	5,325	5,919 i	176	353 i	234	D	63	587	305	296	90	70	192	1,208
Other telecommunications (not listed elsewhere)	51790	1,230	1,015	515	2,875	3,193 i	2,179	534	893	840	1,898	0 - 242,771	0 - 585,012	0 - 563,442	767

TABLE 64  
Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Data processing, hosting, and related services <sup>e</sup>	51800	NA	6,292	7,107	9,443	12,874	9,301	13,891	14,101	16,853	20,676	26,815	28,779	33,130	47,460
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	7,987 i	D	7,138	13,012	20,668	35,853	49,309	96,722	94,328
Other information services, including Internet publishing, broadcasting, and Web search portals <sup>e</sup>	51910	NA	13,753	29,921	11,126	16,969	28,521	44,849 i	40,718	37,792	60,390	77,032	93,598	0 - 563,442	152,477
Finance: banking and credit intermediation	52200	NA	45,027	76,052 i	29,501	41,335	41,144	47,077	64,668	58,050	72,381	56,472	52,099	63,767	65,351
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	NA	D	34,345	35,268	16,671	23,114	19,687	15,087 i	17,046	18,774	20,890	30,062	35,216	32,489
Insurance carriers and related activities	52400	NA	11,594	16,234	14,985	8,907	34,172 i	32,407 i	21,780 i	19,060 i	18,456 i	0 - 242,771 i	37,830 i	30,746 i	17,764
Real estate	53100	D	D	D	D	D	D	D	88	57	0 - 10,116	583	223	1	1
Rental and leasing services	53200	NA	D	8,580 i	5,232 i	7,232	8,873	6,656	5,390	0 - 14,237	8,019	3,608	4,473	3,186	9,680
Lessors of nonfinancial intangible assets, including patent licensing	53300	D	352	225	359	764	640	517	168	82	729	0 - 80,926 i	56	0 - 563,442	1,838
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	NA	864 i	1,623	D	2,222	2,614	3,816 i	3,720	2,818	2,755	2,902	3,148	2,323	2,697

TABLE 64  
Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Architectural, engineering, and related services	54130	4,931	14,969	33,706	36,917	19,373	45,064	49,007	49,180	26,789	19,248	18,151	16,522	14,317	15,915
Specialized design services	54140	D	D	454	228	345	900	678	D	68	2,229 i	18,371	8,921	0 - 563,442	55
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	70,600	96,552	86,379	0 - 225,490	79,654
Management, scientific, and technical consulting services	54160	18,909	23,315	14,838	24,421	27,236	22,327	8,247	16,452	7,535	6,959	19,754	7,997 i	5,267	6,226
Research and development services in the social sciences and humanities	54172	NA	2	2	7	D	4	22	D	7	5	7	89	13	1
Research and development services in biotechnology <sup>c,f</sup>	54173	NA	3,663 i	1,299	1,269	1,547	1,701	1,671	1,581	2,478 i	2,864	3,773	4,160	4,095	6,140
Research and development services in the physical, engineering, and life sciences (except biotechnology)	54174	NA	3,817	2,994	4,352	5,625	4,814	5,253	5,194	7,260	9,736	10,193 i	10,902 i	13,029 i	15,390 i
Research and development services in nanotechnology	54175	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	2
Advertising and related services	54180	D	D	1,656	D	25,263	D	D	D	0 - 163,991	54,756	67,297	0 - 585,012	0 - 563,442	0 - 274,489
Professional, scientific, and technical services (not listed elsewhere)	54190	3,456	2,025	2,186	4,901	9,285	8,417	8,004	2,749	0 - 163,991	2,049	4,823	3,988 i	2,695	3,112

TABLE 64  
Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Management of companies and enterprises	55100	76	23	266	5,428	1,304	887	716	D	622	1,592	1,726	40	206 i	104 i
Administrative and support services	56100	NA	6,821	19,476	10,588	11,810	17,023	29,314	26,456	28,098	22,603	28,430	27,044	8,212	9,353
Waste management and remediation services	56200	NA	D	201	959	484	595	614	1,827	1,910	1,402	4,360	281	0 - 563,442	629
Offices of physicians	62110	0	* i	0	0	0	0	0	0	0	1	0	0	0	0
Medical and diagnostic laboratories	62150	1,037	857	1,662	1,269	1,383	887	895	1,488 i	1,925 i	1,275	4,320 i	4,132 i	4,245 i	5,641 i
Other ambulatory health care services (ambulance, dental, home health care)	62199	NA	D	154	D	27	0	0	0	0	455	177	193	3,636	6,143
Hospitals and nursing care facilities	62200	NA	0	D	D	D	D	0	131	287	0	1 i	0	0	0
Social assistance services	62400	D	D	0	0	0	29	2	0	0	0	0	0	0	0
Arts, entertainment, and recreation	71000	NA	3,074	3,169	3,297	3,096	D	D	2,540	0 - 163,991	5,595	8,134	5,730	0 - 563,442	1,880
Accommodation and food services	72000	NA	9,891	32,256	11,945	34,612	49,347	14,564	32,394	34,445	4,924	20,830	28,004	17,863	23,058
Other services (not listed elsewhere)	81000	NA	5,946	7,784	10,816	12,789	21,571	17,416	19,528	64,593	0 - 408,784	0 - 242,771	18,846 i	20,963	72,687
Less: intersegment eliminations	–	161,647	127,244	101,536	164,044	172,709	165,075	156,556	113,257	97,136	64,324	102,225	65,462	62,651	95,441
Undistributed <sup>g</sup>	–	335,723	452,404	103,862	147,756 i	58,997 i	D	2,657	D	0	0	0	0	0	0

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

<sup>a</sup> Data are tabulated independent of the industry classification of the company. Companies were asked to report their sales and R&D activity in one or more business activity codes.  
<sup>b</sup> Business codes and descriptions are based on 2017 North American Industry Classification System (NAICS) industry definitions.  
<sup>c</sup> Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2013 and beyond: 32543, Biotechnology-based pharmaceutical and biological products (except diagnostic substances).  
<sup>d</sup> Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2014 and beyond: 33333, Digital cameras manufacturing.

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

<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 2020 and beyond: 54175, Research and development services in nanotechnology.

<sup>g</sup> Includes data reported that were not allocated to a business activity.

**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 \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. For survey years 2014–19, industry classification was based on the 2012 NAICS. For survey years beginning in 2020, classification was based on the 2017 NAICS. Most statistics for years prior to 2021 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

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

TABLE 65  
Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
All business activities	21100–81000	290,240	302,759	323,107	340,539	355,671	378,590	396,979	443,633	491,434	538,870	602,499
Oil and gas extraction	21100	D	D	D	1,108	D	867	0 - 11,355 i	0 - 16,964	712	681	813
Mining	21200	83	88	80	54	68	58	121	92	121	104	89 i
Support activities for mining, including oil and gas	21300	D	1,860	1,871	2,349	2,076	1,544	1,599 i	836 i	1,364	722	651 i
Utilities	22100	298	434	343	343	485	349	323 i	272	274	275	34 - 1,538
Construction	23000	752	756	244 i	204 i	521	258 i	507	686	868	1,071	783
Food manufacturing	31100	3,769	3,565	5,156	4,934 i	4,388 i	4,966	4,809	4,678	4,756	5,098	5,235
Beverage manufacturing	31210	D	D	628	D	664	0 - 28,354 i	734	702	654	663	740
Tobacco manufacturing	31220	D	140	163	D	153	153	175	196	189	217	233
Textile, apparel, and leather products manufacturing	31990	623	688	687	662 i	794	1,244 i	904	934	831	768	775
Wood products manufacturing	32100	202	278	234	322 i	227	238	236	261	232	234	476
Paper manufacturing	32200	755	982	1,166	1,028	D	1,165	1,411	1,302	1,472	1,244	1,534
Printing and related support activities	32300	244	305 i	389	363	287	304	265	321	439	352	307 - 1,044
Petroleum refineries	32401	D	596	438	D	443	441	396	491	0 - 17,119	0 - 25,158	392
Asphalt paving, roofing, and saturated materials manufacturing	32402	38	41	117 i	66	52 i	75	124	107	110	197	138
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	285	218	312 i	279 i	268	202	223	133	106 - 2,076	120	91
Basic chemicals manufacturing	32510	3,099	3,228	2,925	3,144	3,071	2,946	2,897	2,897	2,638	3,039	3,048
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	815	1,093	999	1,054	1,213	930	825	1,262	1,293	1,338	1,284 - 2,021
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	D	1,951	2,114 i	2,057 i	D	1,900 i	1,977	2,384 i	2,094	1,512	1,266 - 2,003
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing <sup>c</sup>	32541	42,381	43,672	42,456	43,748	40,540	43,964	45,846	48,489	55,243	56,811	58,651
In vitro diagnostic substances manufacturing <sup>c</sup>	32542	1,110	1,044 i	831	729	801	987	1,308	1,151	1,380	1,596	1,622
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	NA	NA	7,118	10,337	14,071	16,440	18,629	23,591	29,477	32,452	38,166
Soap, cleaning compound, and toilet preparations manufacturing	32591	2,344	2,261	2,286	2,365	2,451	2,550	2,492	2,534	0 - 17,119	2,404	2,238 - 2,975
Paint, adhesive, and other chemical manufacturing	32592	1,552	1,630	1,489	1,562 i	D	0 - 28,354	1,636	1,361	1,423	1,472	1,325 - 2,062
Plastics and rubber products manufacturing	32600	2,669	3,277	3,010	3,072 i	2,910	3,396	3,264	3,128	2,997	2,921	3,226
Clay and glass products manufacturing	32710	801 i	987 i	973 i	1,003 i	948	987	1,199	1,333	1,326 i	1,376 i	1,376

TABLE 65  
Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	303	367	458 i	564 i	393 i	374	378	331	437	374	418
Primary metal manufacturing	33100	552	750	644	703	596 i	0 - 28,354	608	708	742	915	1,023
Fabricated metal products manufacturing	33200	D	2,236	2,535 i	2,280	2,541	2,321	2,650	2,764	3,278	3,895	4,861
Agricultural machinery and equipment manufacturing	33311	989	1,175	1,193	1,230	1,172	1,194	1,224	1,529	1,549	0 - 25,158	1,475 - 2,212
Construction machinery manufacturing	33312	655	675	1,340	1,309	1,210	1,209	1,203	1,316 i	1,276	1,254	1,384
Mining, oil, and gas field machinery and equipment manufacturing	33319	1,735	1,999	1,436 i	1,142	1,431	1,107	1,272	1,324	1,104	1,028	1,223
Semiconductor machinery manufacturing	33321	2,207	1,308 i	3,146	2,979	3,218	3,374	3,707	4,131	4,396	4,752	5,308
Industrial machinery manufacturing (except semiconductor machinery)	33322	945	850	878	1,158	1,143	900	1,049	971	1,386	1,042	1,411
Photographic and photocopying equipment manufacturing	33331	656	23 i	458	79	133	92	61	59 i	162	0 - 25,158	70
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	D	1,182	1,367	1,446	1,380	0 - 28,354	1,780	1,667	1,712	1,440	1,907
Digital cameras manufacturing	33333	NA	NA	NA	25	491 i	421 i	475	230	409	313 i	398 - 1,135
Engine, turbine, and power transmission equipment manufacturing	33360	3,257	3,603	2,373	1,847	2,304	2,365	2,543	2,273	2,550	2,466	2,050
Metalworking and other general purpose machinery manufacturing	33390	1,832	1,607	1,780	2,089	2,292	2,139	2,039	2,468	2,394	2,881	2,532
Computers and peripheral equipment manufacturing and magnetic and optical media <sup>d</sup>	33412	10,311	10,893	11,162	9,651	10,997	18,321	20,751	21,765	19,060 i	22,842	24,633
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	7,006	5,101	5,534	7,734	9,529	8,182	7,789	8,550	8,495	7,562	7,853 - 8,590
Radio, television, and wireless communication equipment manufacturing	33422	4,182	5,851	7,664	6,325 i	3,387 i	4,108 i	3,942 i	0 - 16,964 i	2,589 i	2,286	3,313
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	871	1,937	1,729	1,687	1,695 i	1,798	1,536	0 - 16,964	1,686	1,641	681
Audio and video equipment manufacturing	33430	798	865	876	1,018	1,071 i	972	1,058	1,084	1,270	1,285	1,517
Semiconductor and other electronic components manufacturing	33440	24,580	28,983	30,792	31,986	30,805	31,428	30,858	31,240	35,725	44,110	46,882
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	2,787	2,868 i	3,178 i	3,670	3,409	3,417 i	3,094	4,079	3,973	3,902	4,358
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	5,666	6,403	6,550	6,234	6,503	8,275	6,538	7,819	7,870	8,840 i	3,918
Measuring and control instruments manufacturing (not listed elsewhere)	33459	3,191	3,465	3,901	4,045	4,201	4,222	3,885	3,888	3,911	4,376	4,273
Electrical equipment, appliances, and components manufacturing	33500	3,007	3,391	4,208	4,461	4,378	4,805	4,512	4,362	5,230	5,295	5,420
Motor vehicles manufacturing	33610	9,320	11,314	11,696	12,134	12,502	15,095	16,308	17,447	15,241	15,574	18,365
Motor vehicle body and trailer manufacturing	33620	69	91 i	98 i	96	156 i	113	44	93	155	82	137



TABLE 65  
Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Motor vehicle parts manufacturing	33630	3,010	D	4,554	6,022	6,158	6,401	6,946	7,800	8,146 i	7,780	7,728
Aircraft manufacturing	33641	5,853	15,380 i	16,607 i	15,632 i	14,757 i	28,354 i	9,704 i	14,488 i	10,720 i	15,641	9,707 i
Aircraft engine and engine parts manufacturing	33642	1,636	1,296	1,758	2,294 i	1,580	1,738	1,850	2,226	2,104	2,038	8,246 i
Other aircraft parts and auxiliary equipment manufacturing	33643	1,896	2,655	3,446	4,443	4,919	3,817	4,453	1,887	1,434	1,740	1,491
Guided missiles, space vehicles, and related parts manufacturing	33644	3,526	2,850	2,703	2,826 i	3,011	3,063 i	3,269	3,405	3,496	3,357	2,426
Railroad rolling stock manufacturing	33651	136	177	183	295	240	187	0 - 11,355	148	0 - 17,119 i	239	212 i
Ship and boat building	33660	D	D	1,106	1,568 i	D	0 - 28,354 i	1,289	0 - 16,964	0 - 17,119	964	858
Motorcycle, bicycle, and parts manufacturing	33691	212 i	176 i	214 i	251	282	286	0 - 11,355	372	368	417	447
Military armored vehicle, tank, and tank components manufacturing	33692	D	122	215	358	335	392	653 i	664 i	541	468	731
All other transportation equipment manufacturing	33699	415	D	362	428	D	368	564	465	465	552	559
Furniture and related products manufacturing	33700	300	382	383	389	458	364	438	428	458	462	456
Medical equipment and supplies manufacturing	33910	10,141	10,703	11,797	10,987	11,336	12,024	13,299	13,211	14,801	14,638	16,924
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	2,593	D	2,544	2,387	2,455 i	2,597 i	2,575	2,861	2,499	3,032	3,193
Merchant wholesalers, durable goods	42300	505	1,461 i	449 i	414 i	1,507 i	551 i	364	730 i	750	855	1,301 i
Merchant wholesalers, nondurable goods	42400	429	651 i	272 i	D	546 i	153 i	207	273 i	0 - 17,119	384	660 i
Wholesale electronic markets and agents and brokers (business to business)	42500	54	182 i	D	139	D	23	41 i	94 i	37 i	36 i	50
Retail trade (except electronic shopping and electronic auctions)	44000	52	101 i	96 i	58 i	87	149	69	190	280	216	362
Electronic shopping and electronic auctions	45411	940 i	1,239	993	1,051	1,543 i	0 - 28,354 i	0 - 11,355	0 - 16,964 i	0 - 17,119 i	0 - 25,158 i	11,931 - 12,668 i
Transportation	48000	123	D	D	388	205 i	100	691	2,045 i	9,398 i	25,158 i	5,929 i
Couriers, messengers, and express delivery services	49200	D	D	D	344	D	394	421	446	290	923	1,115
Warehousing and storage	49300	15	15	15	3	3	0	90	76	128 i	33	0 - 2,201
Newspaper, periodical, book, and directory publishers (except Internet)	51110	345 i	229 i	316 i	89 i	99 i	80 i	83	151	84	0 - 25,158	127 i
Software publishers (except Internet) <sup>e</sup>	51120	22,635	23,803	26,661	31,392	29,887 i	26,685	24,362	25,742	24,798	23,520	27,969
Motion picture and sound recording (except Internet)	51200	61	73 i	86	71 i	10	16	27 i	148	72	81	0 - 1,503
Broadcasting (except Internet)	51500	94	36	53	70 i	101 i	0 - 28,354 i	0 - 11,355	186	0 - 2,469	0 - 25,158 i	0 - 2,201 i
Wired telecommunications carriers	51710	867	1,482 i	951 i	945 i	1,229 i	1,067 i	924	469	424	505	599

TABLE 65  
Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Wireless telecommunications carriers (except satellite)	51720	391	i 739	i 1,768	i 2,481	i 1,176	i 1,477	i 1,920	2,147	2,306	2,022	2,492
Satellite telecommunications	51740	D	195	106	107	681	i 699	i 593	451	475	0 - 25,158	510
Other telecommunications (not listed elsewhere)	51790	495	383	322	255	459	448	413	691	0 - 17,119	427	304
Data processing, hosting, and related services <sup>e</sup>	51800	4,922	3,997	4,009	4,754	5,839	6,295	6,217	6,809	8,885	11,223	13,122
Cloud computing applications and Internet-based software services	51801	NA	NA	3,727	i 5,718	5,783	9,981	16,812	20,600	28,631	39,147	43,204
Other information services, including Internet publishing, broadcasting, and Web search portals <sup>e</sup>	51910	D	11,397	13,485	15,306	21,534	23,962	28,445	37,435	46,171	53,228	63,299
Finance: banking and credit intermediation	52200	1,365	1,601	1,834	2,451	2,708	4,474	4,819	4,309	4,924	7,917	12,777
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	1,148	893	1,153	937	1,352	1,516	1,587	1,248	1,445	1,815	4,427
Insurance carriers and related activities	52400	D	1,141	1,573	887	1,364	1,216	1,127	1,673	2,190	2,542	3,661
Real estate	53100	13	26	i 100	193	280	438	251	377	0 - 17,119	368	0 - 2,201
Rental and leasing services	53200	27	D	69	59	D	97	i 536	i 639	945	2,766	1,423
Lessors of nonfinancial intangible assets, including patent licensing	53300	319	369	74	78	79	40	58	23	59	0 - 25,158	0 - 831
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	578	i 417	i 514	i 826	i 1,283	892	875	1,148	1,901	2,492	2,674
Architectural, engineering, and related services	54130	2,028	4,206	i 3,398	3,392	4,143	i 3,259	2,664	4,293	4,421	4,347	4,900
Specialized design services	54140	271	207	i 101	97	83	77	198	i 16,964	163	212	170
Computer systems design and related services <sup>e</sup>	54150	11,129	12,390	i 11,472	i 13,216	i 13,647	14,159	12,607	16,346	19,604	16,755	18,843
Management, scientific, and technical consulting services	54160	1,745	2,280	2,030	1,958	1,761	2,137	i 1,903	2,796	2,561	2,671	3,761
Research and development services in the social sciences and humanities	54172	D	601	792	745	756	0 - 28,354	1,124	674	764	0 - 25,158	562
Research and development services in biotechnology <sup>c,f</sup>	54173	6,030	7,146	4,145	3,083	i 5,178	i 3,911	i 3,610	5,398	5,564	5,482	8,686
Research and development services in the physical, engineering, and life sciences (except biotechnology)	54174	7,196	9,427	9,139	9,068	10,907	10,621	11,842	14,904	15,130	i 19,362	i 24,511
Research and development services in nanotechnology	54175	NA	NA	NA	NA	NA	NA	NA	NA	NA	0 - 25,158	231
Advertising and related services	54180	80	377	i 450	i 435	424	344	381	1,032	i 1,107	i 1,284	i 2,096
Professional, scientific, and technical services (not listed elsewhere)	54190	1,316	2,463	i 1,786	1,020	1,228	874	1,113	1,246	1,649	1,883	1,714
Management of companies and enterprises	55100	20	40	68	25	i D	28	70	0 - 16,964	0 - 17,119	0 - 25,158	0 - 1,503
Administrative and support services	56100	338	436	556	i 401	i 202	i 418	1,405	2,302	3,285	3,521	3,293

TABLE 65  
Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–21  
(Millions of U.S. dollars)

Business activity <sup>a</sup>	Business code <sup>b</sup>	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Waste management and remediation services	56200	19 i	D	39 i	31	24 i	25	20	20	20	0 - 25,158	530 r
Offices of physicians	62110	24	73 i	74 i	88 i	79 i	106 i	190	155	508	235	298
Medical and diagnostic laboratories	62150	764	1,027	959	965	1,204	0 - 28,354 i	1,210	2,049	2,467	2,065	2,721
Other ambulatory health care services (ambulance, dental, home health care)	62199	11	41 i	51 i	35 i	42 i	24 i	65	46	148	93	300
Hospitals and nursing care facilities	62200	2	2 i	2	7 i	7	9	0 - 11,355	0 - 10,879	0 - 11,355	0 - 25,158	0 - 1,503
Social assistance services	62400	7	36	38	16	2	2	0 - 11,355	0 - 16,964	0 - 17,119	0 - 25,158	0 - 1,503
Arts, entertainment, and recreation	71000	105	108	31	91 i	D	44	48	44	415	0 - 25,158	64 r
Accommodation and food services	72000	74	131 i	123 i	57	87	61	49	120	80	122	103
Other services (not listed elsewhere)	81000	366	553	366	576	682	0 - 28,354	0 - 11,355	0 - 16,964	654	0 - 25,158	6,736 i
Undistributed <sup>g</sup>	–	28,583 i	1,689 i	336 i	63	0	0	0	0	0	0	0

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

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

<sup>b</sup> Business codes and descriptions are based on 2017 North American Industry Classification System (NAICS) industry definitions.

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

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

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

<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 2020 and beyond: 54175, Research and development services in nanotechnology.

<sup>g</sup> Includes data reported that were not allocated to a business activity.

**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 \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. For survey years 2009–13, industry classification was based on the 2007 NAICS. For survey years 2014–19, industry classification was based on the 2012 NAICS. For survey years beginning in 2020, classification was based on the 2017 NAICS. Most statistics for years prior to 2021 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

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

TABLE 66

**Domestic R&D paid for by the company and others and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2021**

(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for by the company and others	Depreciation	Capital expenditures related to R&D	Adjusted domestic R&D paid for by the company and others	Change	
						Amount	Percent
All industries	21–23, 31–33, 42–81	602,499	21,180	52,844	634,163 i	31,664 i	5.3
Manufacturing industries	31–33	326,060	13,686	28,450	340,825	14,764	4.5
Food	311	5,266	250	946	5,962 i	696	13.2
Beverage and tobacco products	312	1,247	68	297 i	1,476	229 i	18.4
Textile, apparel, and leather products	313–16	829	15	69	883 i	54 i	6.5
Wood products	321	444	2	15	456	13	2.8
Paper	322	1,139	7	511	1,643 i	504 i	44.2
Printing and related support activities	323	204 i	11 i	39	233 i	29 i	14.0
Petroleum and coal products	324	957	43	171 i	1,084	127 i	13.3
Chemicals	325	109,490	4,349	8,291	113,432	3,942	3.6
Basic chemicals	3251	2,713	178	317	2,852	140	5.1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,389 i	99	62	1,352 i	-37 i	-2.7
Pesticide, fertilizer, and other agricultural chemicals	3253	1,157	79 i	170 i	1,248 i	91 i	7.9
Pharmaceuticals and medicines	3254	100,220	3,825	7,504	103,899	3,679	3.7
Soap, cleaning compound, and toilet preparations	3256	2,740	121	174	2,793	53	1.9
Paint, coating, adhesive, and other chemicals	3255, 3259	1,271	48	64	1,287	16	1.3
Plastics and rubber products	326	3,144	117	353 i	3,380	235 i	7.5
Nonmetallic mineral products	327	1,533	89	193	1,637 i	104	6.8
Primary metals	331	912	21	172	1,063 i	151	16.6
Fabricated metal products	332	4,291	92	397	4,595	305	7.1
Machinery	333	17,730	714	1,295	18,311	582	3.3
Agricultural implement	33311	1,867	59	216	2,024	157	8.4
Semiconductor machinery	333242	5,349	390	314	5,273 i	-77 i	-1.4
Engine, turbine, and power transmission equipment	3336	1,374	46	115	1,443	69	5.0
Other machinery	other 333	9,140	219	651	9,572	432	4.7
Computer and electronic products	334	101,063	5,582	9,468	104,948	3,885	3.8
Communications equipment	3342	12,557	502	731	12,787	229 i	1.8
Semiconductor and other electronic components	3344	47,396	2,477	5,014 i	49,934 i	2,537 i	5.4
Navigational, measuring, electromedical, and control instruments	3345	13,644	467	952	14,130 i	486	3.6
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	3,087	67	78 i	3,098 i	11	0.4
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	5,301	224	357	5,435 i	134 i	2.5
Other measuring and controlling devices	other 3345	5,256	176	517	5,597	341	6.5
Other computer and electronic products	other 334	27,465	2,137	2,770	28,098	633	2.3
Electrical equipment, appliances, and components	335	5,494	134	389	5,749	255	4.6
Transportation equipment	336	50,760	1,534	3,652	52,878 i	2,118 i	4.2
Motor vehicles, bodies, trailers, and parts	3361–63	26,391	1,085	2,813 i	28,119 i	1,728 i	6.5

TABLE 66

**Domestic R&D paid for by the company and others and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2021**

(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for by the company and others	Depreciation	Capital expenditures related to R&D	Adjusted domestic R&D paid for by the company and others	Change	
						Amount	Percent
Aerospace products and parts	3364	21,468 i	385 i	704	21,787 i	318 i	1.5
Aircraft, aircraft engine, and aircraft parts	336411-13	19,845 i	380 i	603	20,069 i	224 i	1.1
Guided missile, space vehicle, and related parts	336414-15, 336419	1,623	6	101	1,718	95	5.8
Military armored vehicle, tank, and tank components	336992	21 - 25	2 r	0 - 3	19 - 26 i	-2 - 1	D
Other transportation	other 336	2,875 - 2,880	61 i	133 - 137	2,947 - 2,956 i	72 - 76 i	D
Furniture and related products	337	426	10	29	445	19	4.4
Miscellaneous	339	21,133	647	2,164	22,650	1,517	7.2
Medical equipment and supplies	3391	18,438	599	1,936	19,775	1,337	7.3
Other miscellaneous manufacturing	3399	2,695	48	228	2,876	180	6.7
Nonmanufacturing industries	21-23, 42-81	276,439	7,494 i	24,394 i	293,338 i	16,900 i	6.1
Mining, quarrying, oil and gas extraction, and support activities	21	1,260 - 1,334	20 i	263 - 344	1,503 - 1,658 i	243 - 324	D
Utilities	22	168 - 17,997	9	1,003 i	1,161 - 18,991 i	994 i	D
Wholesale trade	42	1,745 - 1,855 i	33	693 - 816 i	2,405 - 2,638 i	660 - 783 i	D
Electronic shopping and electronic auctions	454111-12	5,936 - 24,040 i	1,224 i	1,087 i	5,799 - 23,904 i	-137 i	D
Transportation and warehousing	48-49	7,208	223	261	7,247	38	0.5
Information	51	147,855	2,924	10,768	155,699 i	7,844 i	5.3
Publishing	511	39,152	486	2,887	41,553	2,401	6.1
Newspaper, periodical, book, and directory publishers	5111	103	*	11 i	114 i	10 i	9.9
Software publishers	5112	39,049	486	2,877	41,439	2,391	6.1
Telecommunications	517	3,835	9	239 i	4,065 i	231 i	6.0
Data processing, hosting, and related services	518	45,192	551	3,821	48,462	3,270	7.2
Other information	other 51	59,676	1,878 i	3,820 i	61,618 i	1,942 i	3.3
Finance and insurance	52	20,947	643	3,491	23,796 i	2,849	13.6
Real estate and rental and leasing	53	2,096	20	243	2,319	223	10.6
Lessors of nonfinancial intangible assets (except copyrighted works)	533	5 - 8	0	4 - 11	10 - 19	4 - 11	D
Other real estate and rental and leasing	other 53	2,088 - 2,091	20	231 - 239	2,300 - 2,310	211 - 219	D
Professional, scientific, and technical services	54	66,496	2,349 i	5,028	69,175	2,680 i	4.0
Architectural, engineering, and related services	5413	4,560	14	249	4,795	235	5.2
Computer systems design and related services	5415	20,409	660	2,367	22,115	1,706 i	8.4
Scientific research and development services	5417	34,142 i	1,388 i	1,467	34,222 i	79 i	0.2
Research and development in nanotechnology	541713	228	6	18	240 i	12	5.2

TABLE 66

**Domestic R&D paid for by the company and others and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2021**

(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for by the company and others		Depreciation		Capital expenditures related to R&D		Adjusted domestic R&D paid for by the company and others	Change	
									Amount	Percent
Research and development in biotechnology (except nanobiotechnology)	541714	9,039		236		535		9,337	299	3.3
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	24,312	i	1,141	i	904		24,076	-237	-1.0
Research and development in the social sciences and humanities	541720	563		5		10		569	6	1.0
Other professional, scientific, and technical services	other 54	7,385		286		945	i	8,043	659	8.9
Health care services	621-23	2,060 - 2,138		40		345 - 436	i	2,365 - 2,534	305 - 396	D
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	2,564 - 3,199		10		914 - 1,215		3,468 - 4,404	904 - 1,205	D
All companies (number of domestic employees)	-	602,499		21,180		52,844		634,163	31,664	5.3
Small companies										
10-19 <sup>a</sup>	-	5,477		99		474		5,852	375	6.9
20-49	-	15,061		255		1,719		16,525	1,464	9.7
Medium companies										
50-99	-	14,540		295		1,733		15,978	1,438	9.9
100-249	-	24,023		530		3,102		26,595	2,572	10.7
Large companies										
250-499	-	23,932		512		2,835		26,255	2,323	9.7
500-999	-	27,432		903		3,012		29,541	2,109	7.7
1,000-4,999	-	94,615		2,911		8,427		100,131	5,516	5.8
5,000-9,999	-	62,817		2,629		5,864		66,053	3,236	5.2
10,000-24,999	-	104,607		4,680		7,891		107,818	3,211	3.1
25,000 or more	-	229,995		8,367		17,787	i	239,414	9,419	4.1

\* = 0 < amount < \$500,000; D = data withheld to avoid disclosing operations of individual companies; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies. To enable comparisons between U.S. BERD statistics and those of other nations, in this table an internationally comparable adjusted domestic R&D estimate is calculated by subtracting depreciation relating to R&D operations, which is included in U.S. BERD domestic R&D, and adding capital expenditures relating to R&D operations, which is excluded from U.S. BERD domestic R&D.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 67  
Domestic R&D paid for and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2021  
(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for and performed by the company	Depreciation	Capital expenditures related to R&D	Adjusted domestic R&D paid for by the company and others	Change	
						Amount	Percent
All industries	21–23, 31–33, 42–81	527,804	18,433	52,844	562,215	34,411	6.5
Manufacturing industries	31–33	287,666	12,251	28,450	303,865	16,199	5.6
Food	311	4,963 - 4,968	224 - 236	946	5,673 - 5,690 i	710 - 722	D
Beverage and tobacco products	312	1,228	67	297 i	1,458	230 i	18.7
Textile, apparel, and leather products	313–16	818	15	69	872 i	54 i	6.6
Wood products	321	433 - 442	2	15	446 - 454	13	D
Paper	322	1,139	7	511	1,643 i	504 i	44.2
Printing and related support activities	323	196 - 205 i	11 i	39	225 - 234 i	29 i	D
Petroleum and coal products	324	952	43	171 i	1,079	127 i	13.4
Chemicals	325	97,097	3,679	8,291	101,709	4,612	4.8
Basic chemicals	3251	2,559	165	317	2,711	152	5.9
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,291 - 1,320 i	73 - 100	62	1,253 - 1,309 i	-38 - -11 i	D
Pesticide, fertilizer, and other agricultural chemicals	3253	915 - 946	53 - 80 i	170 i	1,005 - 1,063 i	90 - 117 i	D
Pharmaceuticals and medicines	3254	88,524	3,204	7,504	92,823	4,299	4.9
Soap, cleaning compound, and toilet preparations	3256	2,531	107	174	2,598	67	2.7
Paint, coating, adhesive, and other chemicals	3255, 3259	1,242 - 1,252	22 - 49	64	1,257 - 1,294	15 - 42	D
Plastics and rubber products	326	2,961	111	353 i	3,203	242 i	8.2
Nonmetallic mineral products	327	1,503	88	193	1,607 i	105	7.0
Primary metals	331	887 - 890	15 - 22	172	1,037 - 1,047 i	150 - 157	D
Fabricated metal products	332	3,879	79	397	4,197	318	8.2
Machinery	333	16,726	681	1,295	17,341	614	3.7
Agricultural implement	33311	1,799 - 1,807	41 - 60	216	1,955 - 1,982	156 - 175	D
Semiconductor machinery	333242	5,182	373	314	5,122 i	-60 i	-1.2
Engine, turbine, and power transmission equipment	3336	1,239 - 1,246	35 - 47	115	1,307 - 1,326	68 - 80	D
Other machinery	other 333	8,499	201 - 220	651	8,930 - 8,949	431 - 450	D
Computer and electronic products	334	94,211	5,272	9,468	98,407	4,196	4.5
Communications equipment	3342	11,339	480	731	11,591	252 i	2.2
Semiconductor and other electronic components	3344	45,516	2,360	5,014 i	48,170 i	2,654 i	5.8
Navigational, measuring, electromedical, and control instruments	3345	10,014	299	952	10,666 i	653	6.5
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	2,837	64	78 i	2,850 i	14 i	0.5
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	2,109	65	357	2,401	292 i	13.9
Other measuring and controlling devices	other 3345	5,068	170	517	5,415	347	6.8
Other computer and electronic products	other 334	27,342	2,133	2,770	27,980	638	2.3



TABLE 67  
Domestic R&D paid for and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2021  
(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for and performed by the company	Depreciation	Capital expenditures related to R&D	Adjusted domestic R&D paid for by the company and others	Change	
						Amount	Percent
Electrical equipment, appliances, and components	335	5,007	113	389	5,283	276	5.5
Transportation equipment	336	34,405	1,181	3,652	36,875 i	2,471 i	7.2
Motor vehicles, bodies, trailers, and parts	3361-63	22,754	969	2,813 i	24,598 i	1,844 i	8.1
Aerospace products and parts	3364	9,900	177	704	10,428 i	527	5.3
Aircraft, aircraft engine, and aircraft parts	336411-13	9,293	171	603	9,725 i	433	4.7
Guided missile, space vehicle, and related parts	336414-15, 336419	608	6	101	702	95	15.6
Military armored vehicle, tank, and tank components	336992	20 - 24	2 r	0 - 3	18 - 25 i	-2 - 1	D
Other transportation	other 336	1,726 - 1,731	33	133 - 137	1,826 - 1,835 i	100 - 104 i	D
Furniture and related products	337	423	10	29	441	19	4.4
Miscellaneous	339	20,822	644	2,164	22,343	1,521	7.3
Medical equipment and supplies	3391	18,204	597	1,936	19,543	1,339	7.4
Other miscellaneous manufacturing	3399	2,618	46	228	2,800	182	6.9
Nonmanufacturing industries	21-23, 42-81	240,138	6,182 i	24,394 i	258,350 i	18,212 i	7.6
Mining, quarrying, oil and gas extraction, and support activities	21	1,077 - 1,151	14	263 - 344	1,326 - 1,481	249 - 330	D
Utilities	22	133 - 17,961	9	1,003 i	1,127 - 18,955 i	994 i	D
Wholesale trade	42	1,661 - 1,770 i	30	693 - 816 i	2,324 - 2,556 i	663 - 786 i	D
Electronic shopping and electronic auctions	454111-12	5,931 - 24,034 i	1,222 i	1,087 i	5,796 - 23,900 i	-135 i	D
Transportation and warehousing	48-49	7,198 - 7,200	221 - 224	261	7,235 - 7,240	38 - 40	D
Information	51	146,488	2,893	10,768	154,364 i	7,876 i	5.4
Publishing	511	38,521	461	2,887	40,948	2,427	6.3
Newspaper, periodical, book, and directory publishers	5111	81	*	11 i	91 i	10 i	12.7
Software publishers	5112	38,441	460	2,877	40,857	2,417	6.3
Telecommunications	517	3,736 - 3,805	3 - 10	239 i	3,965 - 4,041 i	229 - 236 i	D
Data processing, hosting, and related services	518	44,585	549	3,821	47,857	3,272	7.3
Other information	other 51	59,577 - 59,647	1,872 - 1,879 i	3,820 i	61,518 - 61,595 i	1,941 - 1,948 i	D
Finance and insurance	52	20,902	643	3,491	23,751 i	2,849	13.6
Real estate and rental and leasing	53	2,095 - 2,097	20	243	2,317 - 2,320	223	D
Lessors of nonfinancial intangible assets (except copyrighted works)	533	5 - 8	0	4 - 11	9 - 19	4 - 11	D
Other real estate and rental and leasing	other 53	2,087 - 2,091	20	231 - 239	2,298 - 2,310	211 - 219	D



TABLE 67  
Domestic R&D paid for and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2021  
(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for and performed by the company	Depreciation	Capital expenditures related to R&D	Adjusted domestic R&D paid for by the company and others	Change	
						Amount	Percent
Professional, scientific, and technical services	54	32,083	1,081	5,028	36,030	3,948 i	12.3
Architectural, engineering, and related services	5413	2,553	9	249	2,793 i	240	9.4
Computer systems design and related services	5415	17,188	612	2,367	18,943	1,755 i	10.2
Scientific research and development services	5417	6,123	188	1,467	7,402	1,279	20.9
Research and development in nanotechnology	541713	154	6	18	166 i	12	7.8
Research and development in biotechnology (except nanobiotechnology)	541714	1,664	53	535	2,146	482	28.9
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	4,266	128	904	5,042	776 i	18.2
Research and development in the social sciences and humanities	541720	38	1	10	48	10	25.3
Other professional, scientific, and technical services	other 54	6,218	272	945 i	6,891	673 i	10.8
Health care services	621-23	1,965 - 2,043	39	345 - 436 i	2,271 - 2,440	306 - 397 i	D
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	2,501 - 3,136	5 - 11	914 - 1,215	3,404 - 4,346	903 - 1,210	D
All companies (number of domestic employees)	-	527,804	18,433	52,844	562,215	34,411	6.5
Small companies							
10-19 <sup>a</sup>	-	4,258	83	474	4,649 i	391 i	9.2
20-49	-	12,626	226	1,719	14,119	1,493 i	11.8
Medium companies							
50-99	-	12,488	250	1,733	13,970	1,483	11.9
100-249	-	20,030	461	3,102	22,672	2,641	13.2
Large companies							
250-499	-	20,574	439	2,835	22,970	2,396	11.6
500-999	-	23,655	737	3,012	25,931	2,275	9.6
1,000-4,999	-	83,609	2,369	8,427	89,667	6,058	7.2
5,000-9,999	-	53,873	2,150	5,864	57,587	3,714	6.9
10,000-24,999	-	84,057	3,847	7,891	88,102 i	4,045	4.8
25,000 or more	-	212,634	7,872	17,787 i	222,548 i	9,914 i	4.7

\* = amount is between \$0 and \$500,000; D = data withheld to avoid disclosing operations of individual companies; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = 2017 North American Industry Classification System.

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

**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies. To enable comparisons between U.S. BERD statistics and those of other nations, in this table an internationally comparable adjusted domestic R&D estimate is calculated by subtracting depreciation relating to R&D operations, which is included in U.S. BERD domestic R&D, and adding capital expenditures relating to R&D operations, which is excluded from U.S. BERD domestic R&D.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE 68

**Domestic R&D paid for by others and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2021**

(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for by others and performed by the company	Depreciation		Capital expenditures related to R&D <sup>a</sup>		Adjusted domestic R&D paid for by the company and others	Change	
								Amount	Percent
All industries	21-23, 31-33, 42-81	74,695	2,747		0		71,948	-2,747	-3.7
Manufacturing industries	31-33	38,394	1,435		0		36,959	-1,435	-3.7
Food	311	297 - 302	14 - 26		0		271 - 288	-26 - -14	D
Beverage and tobacco products	312	19	1		0		18	-1	-5.0
Textile, apparel, and leather products	313-16	11	0		0		11	0	0.0
Wood products	321	2 - 10	*		0		2 - 10	0	D
Paper	322	0	0		0		0	0	NA
Printing and related support activities	323	0 - 7	0		0		0 - 7	0	0.0
Petroleum and coal products	324	5	0		0		5	0	0.0
Chemicals	325	12,393	670		0		11,723	-670	-5.4
Basic chemicals	3251	154	12		0		141	-12	-8.1
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	69 - 98	0 - 25	i	0		44 - 98	-25 - 0	i D
Pesticide, fertilizer, and other agricultural chemicals	3253	211 - 241	0 - 25	i	0		186 - 241	-25 - 0	i D
Pharmaceuticals and medicines	3254	11,697	620		0		11,076	-620	-5.3
Soap, cleaning compound, and toilet preparations	3256	209	14		0		195	-14	-6.8
Paint, coating, adhesive, and other chemicals	3255, 3259	19 - 28	0 - 25		0		0 - 28	-25 - 0	D
Plastics and rubber products	326	183	6		0		177	-6	-3.5
Nonmetallic mineral products	327	31	1		0		30	-1	-3.3
Primary metals	331	22 - 26	0 - 6	i	0		16 - 26	-6 - 0	D
Fabricated metal products	332	412	13		0		399	-13	-3.3
Machinery	333	1,003	33		0		970	-33	-3.3
Agricultural implement	33311	60 - 68	0 - 17		0		43 - 68	-17 - 0	D
Semiconductor machinery	333242	167	17		0		151	-17	-10.0
Engine, turbine, and power transmission equipment	3336	128 - 134	0 - 11		0		117 - 134	-11 - 0	D
Other machinery	other 333	641	0 - 17		0		625 - 642	-17 - 0	D
Computer and electronic products	334	6,852	311		0		6,541	-311	-4.5
Communications equipment	3342	1,218	22	i	0		1,196	-22	i -1.8
Semiconductor and other electronic components	3344	1,880	116		0		1,764	-116	-6.2
Navigational, measuring, electromedical, and control instruments	3345	3,630	167		0		3,463	-167	-4.6
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	250	3		0		248	-3	-1.0
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments	334511	3,193	159		0		3,034	-159	-5.0
Other measuring and controlling devices	other 3345	187	6		0		182	-6	-3.1
Other computer and electronic products	other 334	123	5		0		118	-5	-3.9
Electrical equipment, appliances, and components	335	486	20		0		466	-20	-4.2
Transportation equipment	336	16,356	353	i	0		16,003	-353	i -2.2

TABLE 68

**Domestic R&D paid for by others and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2021**

(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for by others and performed by the company	Depreciation	Capital expenditures related to R&D <sup>a</sup>	Adjusted domestic R&D paid for by the company and others	Change	
						Amount	Percent
Motor vehicles, bodies, trailers, and parts	3361-63	3,637	116	0	3,521	-116	-3.2
Aerospace products and parts	3364	11,568 i	209 i	0	11,359 i	-209 i	-1.8
Aircraft, aircraft engine, and aircraft parts	336411-13	10,552 i	209 i	0	10,343 i	-209 i	-2.0
Guided missile, space vehicle, and related parts	336414-15, 336419	1,016	*	0	1,015	*	0.0
Military armored vehicle, tank, and tank components	336992	1	0	0	1	0	0.0
Other transportation	other 336	1,149	28 i	0	1,121 i	-28 i	-2.4
Furniture and related products	337	3	*	0	3	*	-3.5
Miscellaneous	339	311	4	0	308	-4	-1.1
Medical equipment and supplies	3391	233	2	0	232	-2	-0.8
Other miscellaneous manufacturing	3399	78	2	0	76	-2	-2.2
Nonmanufacturing industries	21-23, 42-81	36,300 i	1,312 i	0	34,988 i	-1,312 i	-3.6
Mining, quarrying, oil and gas extraction, and support activities	21	183 i	6 i	0	177 i	-6 i	-3.1
Utilities	22	35 i	0	0	35 i	0	0.0
Wholesale trade	42	84	2 r	0	82	-2	-2.9
Electronic shopping and electronic auctions	454111-12	4 - 8	2 r	0	2 - 6	-2	D
Transportation and warehousing	48-49	8 - 10	0 - 2	0	6 - 10	-2 - 0	D
Information	51	1,366	32	0	1,335	-32	-2.3
Publishing	511	631	26	0	605	-26	-4.1
Newspaper, periodical, book, and directory publishers	5111	23 r	0	0	23 r	0	0.0
Software publishers	5112	608	26	0	582	-26	-4.2
Telecommunications	517	30 - 98	0 - 5	0	25 - 98	-5 - 0	D
Data processing, hosting, and related services	518	607	2	0	605	-2	-0.3
Other information	other 51	29 - 99	0 - 5	0	25 - 99	-5 - 0	D
Finance and insurance	52	45	0	0	45	0	0.0
Real estate and rental and leasing	53	0 - 1	0	0	0 - 1	0	0.0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0	0	0	NA
Other real estate and rental and leasing	other 53	0 - 1	0	0	0 - 1	0	0.0
Professional, scientific, and technical services	54	34,413 i	1,268 i	0	33,145 i	-1,268 i	-3.7
Architectural, engineering, and related services	5413	2,007	5	0	2,002	-5	-0.2
Computer systems design and related services	5415	3,221	49	0	3,172	-49	-1.5
Scientific research and development services	5417	28,019 i	1,200 i	0	26,819 i	-1,200 i	-4.3
Research and development in nanotechnology	541713	73 i	*	0	73 i	*	-0.4
Research and development in biotechnology (except nanobiotechnology)	541714	7,374	183	0	7,191	-183	-2.5
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	20,046 i	1,013 i	0	19,034 i	-1,013 i	-5.1
Research and development in the social sciences and humanities	541720	525	4	0	521	-4	-0.8

TABLE 68

**Domestic R&D paid for by others and performed by the company, depreciation, capital expenditures, and adjusted domestic R&D, by industry and company size: 2021**

(Millions of U.S. dollars and percent change)

Industry and company size	NAICS code	Domestic R&D paid for by others and performed by the company	Depreciation	Capital expenditures related to R&D <sup>a</sup>	Adjusted domestic R&D paid for by the company and others	Change	
						Amount	Percent
Other professional, scientific, and technical services	other 54	1,166	14	0	1,152	-14	-1.2
Health care services	621-23	95	1	0	94	-1	-0.8
Other nonmanufacturing	23, 44-45 (excluding 454111-12), 55-56, 624, 71-72, 81	62 - 66	0 - 4	0	58 - 66	-4 - 0	D
All companies (number of domestic employees)	-	74,695	2,747	0	71,948	-2,747	-3.7
Small companies							
10-19 <sup>b</sup>	-	1,219	16	0	1,203	-16	-1.3
20-49	-	2,434	29	0	2,406	-29	-1.2
Medium companies							
50-99	-	2,052	45	0	2,008	-45	-2.2
100-249	-	3,993	69	0	3,924	-69	-1.7
Large companies							
250-499	-	3,358	73	0	3,285	-73	-2.2
500-999	-	3,777	167	0	3,610	-167	-4.4
1,000-4,999	-	11,006	542	0	10,464	-542	-4.9
5,000-9,999	-	8,944	478	0	8,466	-478	-5.3
10,000-24,999	-	20,549	833	0	19,716	-833	-4.1
25,000 or more	-	17,361	495	0	16,866	-495	-2.9

\* = amount is between -\$500,000 and \$500,000; D = data withheld to avoid disclosing operations of individual companies; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%; NA = not available.

NAICS = 2017 North American Industry Classification System.

<sup>a</sup> Capital expenditures related to R&D are assumed to be \$0 for domestic R&D paid for by others and performed by the company.

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

**Note(s):**

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies. To enable comparisons between U.S. BERD statistics and those of other nations, in this table an internationally comparable adjusted domestic R&D estimate is calculated by subtracting depreciation relating to R&D operations, which is included in U.S. BERD domestic R&D, and adding capital expenditures relating to R&D operations, which is excluded from U.S. BERD domestic R&D.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

## Technical Notes

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### Survey Overview (2021 Survey Cycle)

*Purpose.* The Business Enterprise Research and Development (BERD) Survey, successor to the Business Research and Development Survey (BRDS) (2017–18), 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 (R&D) expenditures and R&D employees of for-profit, publicly or privately held, nonfarm businesses with 10 or more employees in the United States that performed or funded R&D either domestically (in the 50 states and the District of Columbia) or abroad.

*Data collection authority.* The information collected by the BERD Survey is solicited under the authority of the National Science Foundation (NSF) Act of 1950, as amended, and the America COMPETES Reauthorization Act of 2010. Response to this annual survey is mandatory and confidential; the Census Bureau collects the data under the authority of Title 13, Section 8, of the U.S. Code. The Office of Management and Budget (OMB) control number is 0607-0912.

*Survey sponsors.* The BERD Survey is cosponsored by the National Center for Science and Engineering Statistics (NCSES) within NSF and the Census Bureau.

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

### Key Survey Information

*Frequency.* Annual.

*Initial survey year.* BERD Survey data collection began in 2019. BRDS collected data for 2017–18, BRDIS collected data for 2008–16, and SIRD collected data for 1953–2007.

*Reference period.* Calendar year 2021.

*Response unit.* Company.

*Sample or census.* Sample.

*Population size.* 1,137,000 companies.

*Sample size.* 47,500 companies; the actual number of companies that remained within the scope of the survey between sample selection and tabulation was 44,000.

### Survey Design

The survey is administered both to companies known to have performed R&D and to companies with no known history of R&D activity. The BERD Survey has been designed to provide detailed statistics on global and domestic R&D expenditures of companies located in the United States and on these companies' R&D employees.

The survey is sent to a single coordinator within each company, but it is organized into sections that help the coordinator collect specific types of information from different experts in the company (human resources, accounting, R&D managers, etc.). Foreign-owned companies are instructed to report only for company operations owned by the U.S. subsidiary and, for purposes of the survey, to treat the U.S. subsidiary's foreign owners as if they were unrelated third parties.

## Target Population

The target population for the BERD Survey consists of all for-profit companies that have 10 or more paid employees in the United States, that have at least one establishment located in the United States that is in business during the survey year, and that are classified in certain industries based on the 2017 North American Industry Classification System (NAICS), with a particular focus on those companies that perform R&D in the United States.

The Business Register, a Census Bureau compilation that contains information on more than 7.3 million establishments with paid employees, serves as the primary input to the sampling frame from which the BERD Survey sample is selected. For a given company with more than one establishment, the prior year's annual payroll and employment data for its active establishments are summed to the company level.

## Sampling Frame

The scope of the 2021 BERD Survey is limited to companies that (1) are in business primarily to make a profit; (2) are classified within a specific set of NAICS industries; (3) have 10 or more paid employees in the United States, based on employment on 12 March 2020; (4) have at least one establishment that is physically located in the United States and is in business at the end of calendar year 2021 (the time at which the Census Bureau finished the 2020 Business Register Processing); and (5) are not federally funded R&D centers.

Single-unit company records were extracted from the 2020 Business Register if the company had at least 10 paid employees in 2020 or, when employment information was unavailable, if the company's 2020 payroll was greater than or equal to \$500,000. Companies were removed from the sampling frame if their NAICS codes were designated as agriculture, forestry, fishing, and hunting (NAICS 11); postal service (NAICS 491); educational services (NAICS 61); private households (NAICS 814); or public administration (NAICS 92); or if they were no longer in business or were nonprofits. Companies were also removed from the sampling frame if they were not located in the 50 U.S. states or the District of Columbia.

Records for active establishments from multiunit companies were extracted from the 2020 Business Register if the given establishment's 2020 payroll was greater than zero or if the establishment employed at least one person in 2020. Prior to creating records for multiunit companies from these establishments, establishments classified as postal service (NAICS 491), private households (NAICS 814), or public administration (NAICS 92) were removed, as were those that were not physically located in the 50 U.S. states or the District of Columbia. Unlike single-unit companies, establishments classified as agriculture, forestry, fishing, and hunting (NAICS 11) or educational services (NAICS 61) were not initially removed during the construction of multiunit company records. Establishments classified in NAICS 11 or NAICS 61 contributed to the classification of the multiunit companies, and their payroll could have been included in determining the company's measure of size. From the resulting set of multiunit companies, companies were removed from the sampling frame if they had fewer than 10 paid employees or if the payroll associated with their nonprofit establishments was greater than the payroll of their for-profit establishments.

For each company on the sampling frame, a measure of size was assigned. The measure of size for a given company was based on R&D, if R&D data from the last 5 years were available from (1) the BERD Survey, (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 2020 from the Business Register.



## Industry Classification for Sampling

Each company was assigned to 1 of 60 industry sampling strata based on the reported business segment in which the company performed the largest amount of total domestic R&D, as reported within the previous 5 years (2016 BRDIS, 2017–18 BRDS, and 2019–20 BERD Survey), if available. If these business segment data were not reported for a given company, assignment was based on the NAICS codes of its establishments in the Business Register using the following method, with some adjustments made to account for vertical integration of related business activities within the company. The company was first assigned to the economic sector, defined by a two-digit NAICS code that accounted for the highest percentage of its aggregated annual payroll. Then the company was assigned to a subsector, defined by a three-digit NAICS code that accounted for the highest percentage of its annual payroll within the economic sector. Next, the company was assigned a four-digit NAICS code within the subsector, again based on the highest percentage of its aggregated annual payroll within the subsector. Finally, the company was assigned a six-digit NAICS code within the four-digit NAICS code, based on the highest percentage of its aggregated annual payroll within the four-digit NAICS code. Companies with an assigned six-digit NAICS code beginning with 11 or 61 were removed from the sampling frame at this point, and their R&D and associated data are not included in the tabulations. The industry used for sampling purposes was not necessarily the same code used for publication; see section “[Postsampling Industry Classification](#).”

## Stratification of the Sampling Frame

Each company in an industry sampling stratum was further assigned to one of two 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*), or (2) companies with unknown R&D activity (*unknown R&D group*). For the 2021 BERD Survey, there were 31,500 companies in the first group and 1,106,000 companies in the second group, for a total of 1,137,500 companies (table A-1).

## Sample Selection

In the known positive R&D group, Pareto probability-proportional-to-size (PPS) sampling was used within each noncertainty industry stratum, where the probability of selection was proportional to the company’s measure of size. In the unknown R&D group, Pareto PPS sampling was used within most industry strata; simple random sampling (SRS) was used instead of Pareto PPS for industries in which the number of companies in the sampling frame was high and the likelihood of R&D was low. For both the known positive and unknown groups, a separate stratum was created for companies with fewer than 25 employees, regardless of industry. Pareto PPS sampling was used within these strata. Each sampling stratum had a certainty and noncertainty portion (table A-2). Across both groups (known positive and unknown), companies in select industries and companies that exhibited characteristics of having large R&D amounts, including those with the largest annual payroll, were selected for the sample with certainty (i.e., the probability of selection was equal to 1). The probability of selection for other companies in the known positive R&D and unknown R&D groups depended on their size, the number of companies selected, and the total size or number of companies in their strata. The number of companies selected was based on a coefficient of variation constraint on the estimated sample total for the stratum and was adjusted, if necessary, to ensure that the minimum probability of selection is 0.05 for the known positive R&D group and one of six values for the unknown R&D group: 0.004, 0.01, or 0.02 for nonmanufacturing industries (NAICS other than 31–33) and incomplete manufacturers (incomplete NAICS beginning with 3), depending on the population size and likelihood of R&D; 0.04 for printing and related support activities manufacturing (NAICS 323), furniture and related product manufacturing (NAICS 337), and computer systems design and related services (NAICS 5415); 0.02 for the remaining manufacturing (NAICS 31–33) industries; and 0.05 for the companies with fewer than 25 employees. Within the unknown R&D group, a total of 33,500 companies had a known zero value for the measure of size based on R&D from prior survey response. The probability of selection for those companies was set to zero.



Once selected, each company was assigned a sampling weight equal to the reciprocal of its probability of selection for the sample. Companies that were selected for the sample with certainty were assigned sampling weights equal to 1, and companies that were selected using SRS or Pareto PPS sampling were assigned weights ranging from 1 to 250. A complete and detailed description of the sample design and estimation methodology is given in the annual BERD Survey methodology report available from the NCSES Survey Manager.

## Sample Size

Using the sample design parameters detailed above, a total of 47,500 companies were selected, of which 21,000 companies were in the known positive R&D group, and 26,500 companies were in the unknown R&D group (table A-3 and table A-4).

During the survey's annual contact update procedures, 150 large R&D performers from the 2020 sample were found that were not included on the 2021 sampling frame. The primary reasons for this were 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 2020 BERD Survey file. To follow up with these companies, they were added to the 2021 sample with certainty, and 150 companies were mailed a survey letter. Because it was expected that many of these records would not contribute to 2021 BERD Survey tabulations due to changes in company structure, these companies are not included in sampling frame counts or sample sizes (table A-5). A complete and detailed description of the selection of additional sampling units is given in the annual BERD Survey methodology report available from the NCSES Survey Manager.

## Data Collection and Processing Methods

Starting in the 2017 cycle, an initial letter was mailed to all companies instructing them to report via the Census Bureau's Centurion data collection instrument. Paper questionnaires were mailed by respondent request only and during a later nonresponse follow-up for delinquent companies. For paper versus electronic response rates, see section "[Response by Mode](#)."

## Questionnaires

Beginning in the 2017 cycle, all companies completed the same questionnaire, BRD-1, which combined the standard form BRDI-1 and the abbreviated form BRDI-1(S) used in prior cycles (table A-6). Companies that reported less than \$1 million in R&D paid for by the company or less than \$1 million in R&D funded by others completed abbreviated worksheets in lieu of more detailed questions asked of companies with \$1 million or more in R&D. As was the case in previous cycles, some companies with decentralized records requested a special reporting arrangement with the Census Bureau. Under this arrangement, the survey form was mailed to multiple operating units within the same company, and each Alternate Reporting Unit (ARU) completed the survey individually. The data for these ARUs were also tabulated separately in published estimates and were not consolidated at the company level (table A-7).

Because of the potential compartmentalization of organizational knowledge within companies (particularly in larger companies), the BERD Survey questionnaire was organized into sections based on the subject matter of the questions. These sections included the following:

**Section 1. Company information.** Includes basic questions about company ownership, lines of business, sales, and employee data.

**Section 2. R&D paid for by your company.** Includes geographic location and accounting questions about the company's R&D expenses.

**Section 3. Costs paid for by others.** Includes accounting questions about R&D paid for by others, such as the company's customers or grant-giving organizations.

**Section 4. Assets.** Includes questions on total assets, total capital expenditures, and capital expenditures for R&D operations.

**Section 5. Management and strategy of R&D.** Includes questions related to the characteristics and focus of the company's R&D. This section was targeted toward company employees responsible for managing R&D departments or programs.

**Section 6. Human resources.** Includes questions related to the human resources involved in the company's R&D activities.

**Section 7. Tax topics.** Includes questions on filing federal and state tax credits for research activities.

For specific differences among the BERD Survey questionnaires, see section [“Data Comparability \(Changes\).”](#)

## Response Rates

### *Unit Response Rates*

Of the companies surveyed for the 2021 survey, 30% did not submit any response, and an additional 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 NCSES and the Census Bureau to measure unit response to the BERD Survey were check-in rates, unit response rates (URRs), and coverage rates.

**Check-in rate.** The check-in rate is defined as the unweighted number of surveys that were either submitted online or mailed in by in-scope companies, divided by the unweighted total number of all in-scope companies in the sample. Response to individual questions did not factor into this metric.

**Coverage rate.** BERD Survey Managers track a coverage rate that is a weighted measure of survey response based on the measure of size at the time of sample selection. The coverage rate measures how much of the weighted measure of size for in-scope companies in the sample is accounted for by respondents to the survey.

**Unit response rate (URR).** The URR is the unweighted number of responding companies with positive data for at least one of the survey's key items (i.e., worldwide R&D expenses or R&D costs funded by others, worldwide or domestic sales, or worldwide or domestic employees), divided by the unweighted total number of in-scope companies in the sample.

For the 2021 BERD Survey, the check-in rate was 70% and the URR was 69%. The coverage rate for the 2021 BERD Survey was 92% for the known positive R&D group and 69% for the unknown R&D group (table A-8 and table A-9).

### *Item Response Rates*

The BERD Survey collects data for over 500 variables, and the distribution of values reported by sample companies is highly skewed. Thus, rather than report unweighted item response rates, total quantity response rates are calculated, which are based on weighted data.

**Total quantity response rate (TQRR).** For a given published estimate other than count or ratio estimates, TQRR is the percentage of the weighted estimate based on data that were reported by units in the sample or on data that were obtained from other sources and were determined to be equivalent in quality to reported data. The TQRR for total R&D performed in the United States in 2021 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 the BERD Survey, except for cells that contain count or ratio estimates. TQNR measures the combined effect of the procedures used to handle unit and item nonresponse on the weighted BERD Survey estimate. TQNR tables giving imputation rates corresponding to each data table are available from the NCSES Survey Manager. Also see section [“Item Nonresponse.”](#)

## Response by Mode

Overall, more than 99% of checked-in cases responded to the BERD Survey by using the online version of the survey and less than 1% responded by mailing in the paper form. Lastly, more than 97% of checked-in companies with account managers—that is, the top R&D companies (based on prior year reported or imputed data) that were assigned an analyst to act as a single point of contact for all communications—responded using the online version of the survey.

## Data Editing

Given the size and complexity of the BERD Survey, many survey responses included errors that required correction or had unusual patterns that required validation. Several hundred automated edit checks were programmed to improve the efficiency of analyst data review and correction (table A-10).

Approximately two-thirds of these edit checks were designed to catch arithmetic errors and logically inconsistent responses (*balance edits*). The remaining edit checks were designed to flag outliers for further analyst review (*analytical edits*). Descriptions of the data edits and edit failure rates are in annual methodology reports that are available from the NCSES Survey Manager.

During the editing and review process, several cases were identified where companies reported zero R&D or a relatively small amount of R&D, even though subject-matter experts expected large amounts of R&D to be reported. Some of these companies were contract research organizations or federal contractors that did not account for the costs they incurred while conducting customer-sponsored research as R&D; instead, they accounted for these as the cost of sales. The largest of these companies were contacted by analysts and asked to resubmit their surveys. In rare cases, if no response could be elicited from a company and public information was available related to costs for customer-sponsored R&D, those data were used to impute an R&D estimate for that company.

## Techniques for Handling Unit and Item Nonresponse

For various reasons, many firms chose to return the survey questionnaire with one or more blank items. For some firms, internal accounting systems and procedures may not have allowed quantification of specific expenditures. Others may have refused to answer any questions as a matter of company policy. Weighted estimates produced from the BERD Survey include adjustments to account for companies that did not respond to the survey (*unit nonresponse*) and for companies that did respond but left some questions blank (*item nonresponse*).

### Unit Nonresponse

The BERD Survey accounts for unit nonresponse by multiplying each company's sampling weight by a nonresponse adjustment factor. To calculate the adjustment factors, each company in the sample that is eligible for tabulation is assigned to one (and only one) adjustment cell. The adjustment cells are based on the two R&D groups, which are subdivided according to R&D size and certainty status and also on the industry sampling strata described in the section "[Stratification of the Sampling Frame](#)" that are updated using information on industry classification reported in the BERD Survey. For a given adjustment cell, the nonresponse adjustment factor is the ratio of the sum of the weighted measure of size for all companies in the cell to the sum of the weighted measure of size for all companies in the cell with reported or imputed data. The measure of size used to select the sample for the 2021 BERD Survey (see section "[Sampling Frame](#)") was also used to adjust for unit nonresponse. For companies in the known positive R&D stratum, the measure of size was based on R&D in the United States. For companies in the unknown R&D stratum, the measure of size was based on total annual payroll in the United States. Beginning in survey year 2018, this unit nonresponse adjustment was also applied to counts, patents, patent licensing agreements, and intellectual property protection. In previous survey years, no such adjustment was applied to those items.

R&D estimates for geographic areas outside the largest countries, states, and core-based statistical areas (CBSAs) that are dominated by a relatively small number of companies are particularly sensitive to changes in survey response because these areas may not be similarly represented by companies in the same adjustment cell.

### ***Item Nonresponse***

Item nonresponse for a given company is handled by item imputation. For account manager companies, large companies, and special cases, analysts impute these data using direct substitution of available company data (e.g., data from the company's website, annual Form 10-K report, or administrative sources) or other methods determined appropriate by NCSES's and the Census Bureau's subject-matter experts. For other cases, including cases where analysts were unable to provide a superior estimate, data are imputed by programmed item imputation procedures. Depending on the particular item being imputed for a company, these procedures are based on a combination of (1) direct substitution of available company data, (2) ratio imputation using the company's survey data for both the current and prior year, and (3) ratio imputation using survey data from both the company and other similar companies, which reported both the survey item being imputed for the company and the other survey item used in the ratio. Tables of imputation rates corresponding to each data table are available from the NCSES Survey Manager.

### **Estimation**

The general methodology used to produce estimates from the BERD Survey involves sums of weighted data (reported or imputed) in which the weights are the product of the sampling weight and the nonresponse adjustment factor. However, there are some exceptions, which are described below.

### ***Weighting***

Estimates published for the BERD Survey are computed as sums of weighted data for sample companies that reported to the survey or for sample companies for which data could be reliably imputed based on prior reports or other information. Two types of weights are used for estimates of R&D: sampling weights and nonresponse adjustment factors. The *sampling weight* for a given company is calculated as the reciprocal of the company's probability of inclusion in the sample. *Nonresponse adjustment factors* are used to represent companies in the sample that did not provide sufficient response data to be directly tabulated and whose data could not be imputed. For information on the calculation of the nonresponse adjustment factors, see section "[Unit Nonresponse](#)."

Each value that contributes to a given BERD Survey estimate is multiplied by both its sampling weight and its nonresponse adjustment factor, and these weighted values are then summed to create the estimate. Beginning in survey year 2018, the nonresponse adjustment factor was also applied to estimates of counts, patents, and patent licensing agreements. In prior survey years, the adjustment was not applied to those items.

### ***Postsampling Industry Classification***

As mentioned in the section "[Industry Classification for Sampling](#)," the industry classification assigned to companies for sampling was based on either reported BERD Survey business segment data from prior years or annual payroll. To produce more accurate estimates for the current survey year, a company's reported business code, if available for the current survey year, was used to assign an updated industry code for tabulations. The company's response to the domestic R&D performance questions from the current survey year was used to classify each company into the business code that accounted for the largest amount of total domestic R&D performance. The business codes reported by companies with large amounts of R&D were validated, and in some cases corrected, by survey staff. If no business code data were available for a company's domestic R&D performance, the industry code used for sampling was also used for tabulations.

## ***R&D, by Core-Based Statistical Area (CBSA) or State***

CBSA-level estimates of business R&D are modeled using BERD Survey data reported by companies on the address of each of their largest R&D locations and administrative data from the Census Business Register on the payroll for each business establishment in the United States. The weighted amount of company R&D is apportioned to CBSAs within states using the same hybrid estimator method used for state estimates (below). Current BERD Survey methodology cannot attribute all R&D to a specific location. For example, R&D reported by companies that did not respond to geographic questions and for whom no method was available to impute locations is not assigned to a location. This R&D was performed in one of the 50 U.S. states or the District of Columbia, but the specific location is not estimated and is reported as “undistributed” in BERD Survey tables.

The estimation methodology for state estimates takes the form of a hybrid estimator, combining the unweighted reported amount, by state, with a weighted amount apportioned (or raked) across states with relevant industrial activity. The hybrid estimator smooths the estimate over states with R&D activity, by industry, and accounts for real observed change within a state.

R&D estimates for CBSAs and states that are dominated by a relatively small number of companies are particularly sensitive to changes in both unit and item response. Because companies rarely publish detailed information about the geographic location of their R&D operations, it is difficult to identify and correct erroneous responses to these questions. And, as noted earlier, the method used to correct for unit nonresponse relies on data from companies in the same industry or size category. These peer companies may report relatively less (or no) R&D in the geographic areas where a nonresponsive company performs R&D.

## ***R&D, by Business Segment Code***

To provide increased granularity on R&D activities, the BERD Survey includes questions asking companies to report data for business units below the company level. To support subcompany reporting, a list of business codes based on NAICS was provided in the BERD Survey for companies to use to categorize their business operations. The list of business codes for the 2021 cycle of the BERD Survey was based on the 2017 NAICS. To assist companies in selecting appropriate business codes, likely business codes were provided to respondents by prepopulating them on the online version of the survey and by printing them on the forms mailed to companies. For companies that reported to the 2017 BRDIS or 2018 BRDS, the most recent business codes reported by the company were used to provide the business codes. For companies that did not report to the 2017 BRDIS or 2018 BRDS, establishment payroll data from the Business Register were used to provide the business codes.

## ***Company Counts***

The BERD Survey is designed primarily to produce valid, useful estimates of *money amounts* related to the performance and funding of R&D. Because this is the survey’s focus, estimation of meaningful *company counts* is difficult. Consequently, throughout the history of the survey there have been various efforts to calculate frequencies more precisely. Following is a summary of the results of recent efforts.

Beginning in survey year 2019, company count estimates reflect a change in rounding methodology. Beginning in survey year 2018, a weight adjustment to account for unit nonresponse was implemented for company counts; as a result, company count estimates are not comparable with survey years prior to 2018.

The company count estimates for 2017 are not comparable with those for 2016 for two reasons. First, the target population for 2017 was restricted to companies with 10 or more domestic employees, whereas the 2016 survey population included companies with 5 or more employees. Second, no adjustment is applied to count estimates to correct for unit nonresponse, and overall response to the survey declined from 2016 to 2017.

The company count estimates for 2014 and onward are not comparable with estimates published for previous years. BRDIS review and correction procedures were amended beginning in survey year 2014 to include a more systematic analysis of companies reporting small amounts of R&D (less than \$10,000) and no R&D employees. Many of these responses were determined to be reporting errors (false-positive R&D), and their R&D was set to zero. These corrections had a negligible impact on BRDIS R&D estimates compared to earlier years. But because these companies tended to have high sample weights, these corrections had a large impact on the estimate of R&D-active companies compared to prior years (when many fewer such corrections were made).

### ***Revision of Capital Expenditure Estimates***

Review of BERD Survey capital expenditures data in calendar year 2021 uncovered cases where reported or imputed R&D capital expenditures (CAPEX) were unrealistically high, resulting in inflated overall survey estimates. In addition to an overall escalation in the priority placed on the review of these data by survey staff, the following specific procedures were implemented to improve the quality of BERD Survey estimates of CAPEX and total capital expenditures (TCPEX):

1. Use of total domestic capital expenditures data from the Census Bureau's Annual Capital Expenditures Survey (ACES) when companies report TCPEX amounts significantly smaller than estimated in ACES.
2. Imputing values of CAPEX for respondents that report the same value for CAPEX as they do for either domestic R&D expenditures (DOEXP) or domestic R&D performance.
3. Flagging cases where reported CAPEX exceeds DOEXP for additional subject-matter expert review. Erroneous CAPEX values will be replaced with imputed values.
4. Excluding influential outliers from the imputation bases for CAPEX. Imputation for CAPEX relies on industry ratios of reported CAPEX to reported TCPEX. These ratios can be highly influenced by outliers.

### ***Tabulation Eligibility***

Beginning in survey year 2018, companies that performed or funded less than \$50,000 of R&D were excluded from tabulation. In prior years, companies that performed or funded any amount of R&D were tabulated. This change has affected the comparability of these estimates to those published for years prior to 2018. These companies in aggregate represented a very small share of total R&D expenditures in prior years, but they accounted for a larger share of count estimates. Had the companies under this threshold been included in the 2021 estimates, they would have contributed approximately \$110 million to overall R&D expenditures and would have added approximately 7,800 companies to the estimated count of U.S. companies with R&D expenditures.

## **Survey Quality Measures**

### **Sampling and Nonsampling Errors**

The estimates produced from the BERD Survey are subject to both sampling and nonsampling errors. Sampling error is the difference between estimates obtained from the sample and results theoretically obtainable from a comparable complete enumeration of the sampling frame. This error results because only a subset of the sampling frame is measured in a sample survey. For published estimates from the BERD Survey, standard errors are produced for estimated percentages, while relative standard errors (RSEs) are produced for all other estimates. Tables of the estimated measures of sampling variability corresponding to each data table are available from the NCSES Survey Manager.

Beginning in survey year 2021, a data flag denoted by "r" was added to the data tables to denote any data estimates that had RSEs greater than 50%. If estimates required both an "r" and "i" flag (where an "i" flag indicates that more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse), the estimate "r" flag was assigned. This is because the "r" flag indicates the data is of lower quality than the "i" flag.



Standard errors may be used to define confidence intervals about the corresponding estimates with a desired level of confidence. If a confidence interval was constructed for each possible sample that could be selected using the same sample design, then it would be expected that the percentage of confidence intervals containing the result of a complete enumeration of the sampling frame would equal the percentage of the level of confidence. For example, the interval defined by a margin of error of 2 standard errors yields a confidence interval of approximately 95%.

Because relatively few companies perform R&D in the United States, and because the amount of R&D they perform is quite variable, it is difficult to achieve control over the sampling error of survey estimates produced from the BERD Survey. This depends on the correlation between the measure of size on the sampling frame that was used to assign the selection probabilities and the actual data that are collected in the BERD Survey, which cannot be predicted accurately for all companies when the sample is designed. However, the companies known to perform the greatest amounts of R&D are included in the sample with certainty so that these companies will not contribute to the sampling error of the resulting estimates produced from the BERD Survey.

The sample size is sufficiently large so 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 0.18% in 2021.

Potential nonsampling errors include coverage error and various response and operational errors, such as errors during data collection, reporting errors, transcription errors, and bias due to nonresponse. These are errors that could also occur if a complete enumeration of the sampling frame had been conducted under the same conditions as the sample survey. Most of the important operational errors were detected and corrected during the course of reviewing the data for reasonableness and consistency. Although nonsampling error is not measured directly, quality control procedures were employed throughout the survey process to minimize this type of error.

## Measurement Error

Variations in respondent interpretations of the definitions of R&D activities and variations in accounting procedures are of particular concern—specifically, the characterization and reporting of R&D activities by large defense contractors funded by the U.S. federal government, the reporting of R&D activities by companies classified in the scientific R&D services industry (NAICS 5417), and the method used by companies, in general, to count and report numbers of employees in various categories, such as the number of employees who work full time versus part time on R&D. The sophistication and comprehensiveness of a company's accounting and personnel tracking systems often depend on its size and activities and on its willingness to accommodate government-sponsored surveys. Although no metric of measurement error is produced, ongoing efforts to minimize measurement error include questionnaire pretesting, improvement of questionnaire wording and format, inclusion of more cues and examples in the questionnaire instructions, in-person and telephone interviews and consultations with respondents, and post-survey evaluations.

## Data Comparability (Changes)

The statistics resulting from this survey are intended primarily as *indicators* of absolute levels of R&D spending and personnel. Nevertheless, the statistics are often taken to be a continuous time series prepared using the same collection, processing, and tabulation methods. Although estimating the business portion of the nation's R&D enterprise accurately has always been the goal, such strict uniformity has not been the case. Since the survey was first fielded, improvements have been made to increase the reliability of the statistics and to make the survey results more useful. To that end, past practices have been changed and new procedures instituted. Preservation of the comparability of the statistics has, however, been an important consideration in making these improvements. Nonetheless, changes to survey coverage and

definitions, the industry classification system, estimation methods, and the procedure used to assign industry codes to multi-establishment companies, which are documented in the annual reports, may have affected the comparability of the statistics. Among the most demonstrable changes are those made to the questionnaires, and those changes are summarized below.

### Differences between the 2020 and 2021 BERD Survey Questionnaires

The following changes were made to the 2021 BERD Survey from the 2020 BERD Survey:

- Question on details of R&D performed by others was rotated back on.
- Question on activities with academia was rotated back on.
- Question on business code or codes in which the company performed R&D and was paid for by others was rotated back on.
- Question on federal R&D by government agency was rotated back on.
- Question on federal R&D by types of agreements was rotated back on.
- Questions on assets were added to section 4. The capital expenditures questions were expanded, and the section was also renamed from “Capital Expenditures” to “Assets.”
- Questions on R&D application areas were rotated back on.
- Questions on patents, intellectual property, and technology transfer were cycled off.

### Differences between the 2019 and 2020 BERD Survey Questionnaires

The following changes were made to the 2020 BERD Survey from the 2019 BERD Survey:

- Questions on the contact information of the person primarily responsible for completing each section were added to the end of each section.
- A follow-up question was added to the ownership question asking whether the new owner of the sampled company is a holding company or a private equity firm.
- Question on details of R&D performed by others was cycled off.
- Question on activities with academia was cycled off.
- Question on business code or codes in which the company performed R&D and was paid for by others was cycled off.
- Question on federal R&D by government agency was cycled off.
- Question on federal R&D by types of agreements was cycled off.
- Question on source of funds for domestic R&D funded by others was added to the section 3 worksheet.
- Questions on R&D application areas were cycled off.
- Questions on patents, intellectual property, and technology transfer were rotated back on.

### Differences between the 2018 BRDS and 2019 BERD Survey Questionnaires

The following changes were made to the 2019 BERD Survey from the 2018 BRDS:

- Questions on patents, intellectual property, and technology transfer were cycled off.
- A question on filing for state tax credit for research activities in 2019 was added.



## Differences between the 2017 and 2018 BRDS Questionnaires

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

- A question on land acquisition capital expenditures for R&D operations was added.
- Questions related to R&D on artificial intelligence (AI) were added.
- Questions asking for country and state location of employees and R&D employees were added.
- A question asking for counts of temporary and leased employees working on R&D was added.

## Differences between the 2016 BRDIS and 2017 BRDS Questionnaires

The following changes were made to the 2017 BRDS from the 2016 BRDIS:

- Questions on product and process innovation were removed.
- 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.

## Differences between the 2014 and 2015 BRDIS Questionnaires

The following changes were made to the 2015 BRDIS from the 2014 BRDIS:

- A question on phase IV clinical trials was added to Form BRDI-1.
- A question on R&D performed by others that was paid for by U.S. federal government agencies or laboratories was added to Form BRDI-1.
- Questions on the type of foreign R&D paid for and performed by the company were added to Form BRDI-1.
- Questions on the type of foreign R&D performed by the company but paid for by others were added to Form BRDI-1.
- A question on nonprovisional utility patents was added to Form BRDI-1.
- Questions related to R&D in photonics and optics application areas were removed from Form BRDI-1.

## Differences between the 2013 and 2014 BRDIS Questionnaires

The following changes were made to the 2014 BRDIS from the 2013 BRDIS:

- A question on monetary gifts to universities or colleges restricted to supporting R&D was added to Form BRDI-1.
- A question on revenue received from patent licensing was added to Form BRDI-1.
- A question on purchasing patents from others was added to Form BRDI-1.
- A question on licensing patents from others was added to Form BRDI-1.
- One business code was added to the list of business codes collected on the survey: 33333, digital cameras manufacturing. In prior years, this line of business was included in the business code 33412, computers and peripheral equipment manufacturing and magnetic and optical media.
- Questions related to patenting were removed from Form BRDI-1(S).
- Questions related to innovation were added to Form BRDI-1(S).

## Differences between the 2012 and 2013 BRDIS Questionnaires

The following changes were made to the 2013 BRDIS from the 2012 BRDIS:

- The list of countries for which foreign R&D performance data were collected was expanded by three: Hungary, Luxembourg, and Norway.
- A question was restored asking the amount of R&D that the company plans to recoup through indirect charges on U.S. federal government contracts (independent R&D). This question was last asked on the 2010 BRDIS.
- Questions on R&D for software products and R&D for embedded software were combined.
- A question on R&D for software products and embedded software paid for by the federal government was added.
- A question related to the educational attainment of scientists and engineers was restored. This question was last asked on the 2010 BRDIS.
- Two business codes were added to the list of business codes collected on the survey: 32542, biotechnology-based pharmaceutical and biological products (except diagnostics), and 51801, cloud computing applications and Internet-based software services.
- Delinquent companies in the known positive R&D stratum for the past two survey cycles were sent Form BRD-1(S) to see if they would report at least the high-level numbers.

## Differences between the 2011 and 2012 BRDIS Questionnaires

For 2012, a much shorter (8-page) version of the short form, BRD-1(S), was implemented. The form included 19 high-level-detail items on worldwide sales; domestic sales; R&D expenses funded both by the company and by others; employment both worldwide and domestic, including R&D employment; and patents applied for and issued. Companies that reported \$1 million or more of domestic R&D performance were then sent the long form (BRDI-1) for additional details. The BRD-1(S) form was sent to companies in the unknown and known zero R&D strata. In section 2, the questionnaire collected the additional detail categories for capital expenditures. In section 3, four agencies were added to the type of agency question so as to reduce the amount reported in the “all other” category. In section 4, the percentage of R&D that was directed toward business areas or product lines new to the respondent’s company and also the percentages that pertain to defense applications, health or medical applications, or agricultural applications were added for R&D funded by the company and R&D funded by others.

## Differences between the 2010 and 2011 BRDIS Questionnaires

For the 2011 data collection, the innovation questions and instructions in section 1 were changed based on the results of the 2010 experiment. Cycling continued for data items that were not needed every year. The survey was expanded in several ways to address data gaps: the list of countries in which companies could report foreign R&D performance was expanded, a question was added to collect intracompany R&D transactions, and questions were added about companies’ second-largest R&D location. In addition, questions pertaining to full-time equivalent (FTE) R&D scientists and engineers were revised to improve respondent understanding of survey concepts.

## Differences between the 2009 and 2010 BRDIS Questionnaires

For the 2010 data collection, the most notable changes made to the questionnaire were the inclusion of a one-time section (section 7) on R&D time frame and R&D product life, the inclusion of an experiment testing the impact of different innovation questions and instructions, and the addition of a survey supplement to collect detailed information from companies reporting R&D paid for by others. In addition, questions and instructions about company ownership were expanded to clarify, especially for foreign-owned companies, the information that should be reported on the survey. Cycling began for data items that were not needed every year from every company. These items will be returned to the questionnaire cyclically, depending on the demand for and quality of the collected data. Finally, data items that were poorly reported during the first two cycles of BRDIS were deleted.

The section titled “R&D Time Frame and R&D Product Life” was added 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.

An 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. 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 asking 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.
- Instructions in the question about R&D paid for by others were replaced with a series of targeted questions.
- Data for R&D performed by others were derived rather than collected directly. For the 2009 cycle of BRDIS, R&D performed by others was the sum of two R&D costs known to be tracked by companies: payments to business partners for collaborative R&D and purchased R&D services.
- The order of the “Management and Strategy of R&D” and the “Financial Schedule B” (R&D paid for by others) sections was switched.

## Definitions

**Capital expenditure.** Capital expenditures are payments by a business for assets that usually have a useful life of more than 1 year, like buildings, equipment, or software. The value of assets acquired or improved through capital expenditures is recorded on a company’s balance sheet. Expenditures for long-lived assets used in a company’s R&D operations are not included in its R&D expense, but any depreciation recorded for those assets would be included in its R&D expense. Data are collected in the BERD Survey for capital expenditures for R&D operations for land acquisition, structures, equipment, capitalized software, and other items.

**Core-based statistical area (CBSA).** A CBSA is a U.S. geographic area that consists of one or more counties (or equivalents) anchored by an urban center of at least 10,000 people plus adjacent counties that are socioeconomically tied to the urban center by commuting. CBSAs are defined by OMB in the Executive Office of the President.

**Employment, total and R&D.** Involves the number of people employed by R&D-performing or R&D-funding companies in all locations, both foreign and domestic, during the pay period that included 12 March of the survey year. (The date 12 March is what most employers use when paying first-quarter employment taxes to IRS.) R&D employees are those who provide direct support to R&D, such as researchers, R&D managers, technicians, clerical staff, and others assigned to R&D groups. Those not included are employees who provide indirect support to R&D, such as corporate personnel, security guards, and cafeteria workers. In addition to providing head counts of total and R&D employees, the BERD Survey also produces estimates of FTE domestic R&D employment. This is the number of persons employed who were assigned full time to R&D, plus a prorated number of employees who worked on R&D only part of the time.

**Employment, leased and temporary.** The number of people who work for R&D-performing or R&D-funding companies, but who are not considered employees of the reporting company. These workers perform tasks similar to the reporting companies’ own employees but are technically employed by another company (such as a temp or staffing agency or a consulting firm) or are independent on-site consultants.

**Expense and R&D expense.** Involves money spent or costs incurred in an organization’s efforts to generate revenue, representing the cost of doing business. Expenses may be in the form of actual cash payments (such as wages and salaries), a computed expired portion of an asset (depreciation), or an amount taken out of earnings (such as bad debts). Expenses are summarized and charged in the income statement as deductions from the income before assessing income tax. Whereas all expenses are costs, not all costs are expenses (e.g., costs incurred in acquisition of income-generating assets—see the definition of *capital expenditure* above). R&D expense is the cost of R&D funded by the company itself and performed within the respondent company’s facilities, both foreign and domestic, or performed by others outside of the company under contract, subcontract, grant, or other funding arrangement.

**R&D and business R&D.** R&D is planned, creative work aimed at discovering new knowledge or devising new applications of available knowledge. This includes (1) activities aimed at acquiring new knowledge or understanding without specific immediate commercial applications or uses (*basic research*), (2) activities aimed at solving a specific problem or meeting a specific commercial objective (*applied research*), and (3) systematic use of research and practical experience and resulting in additional knowledge, which is directed to producing new or improved goods, services, or processes (*development*). R&D includes both *direct costs*, such as salaries of researchers, and *administrative and overhead costs* clearly associated with the company's R&D. However, R&D does not include expenditures for routine product testing, quality control, and technical services unless they are an integral part of an R&D project. R&D also does not include market research; efficiency surveys or management studies; literary, artistic, or historical projects, such as films, music, or books and other publications; and prospecting or exploration for natural resources.

**R&D, artificial intelligence (AI).** AI is a branch of computer science and engineering devoted to making machines intelligent. Intelligence is that quality that enables an entity to perceive, analyze, determine response, and act appropriately in its environment.

Systems with AI perform functions including, but not limited to, speech recognition, machine vision, or machine learning:

- Speech recognition transforms human speech into a format useful for computer applications (e.g., a digital assistant).
- Machine vision uses sensors and software that allow images to be used as an input for computer applications (e.g., systems that sort or inspect objects or support navigation in mobile equipment).
- Machine learning uses statistical software and data to “learn” and make better predictions without reprogramming (e.g., recommender systems for websites, or sales and demand forecasting).

AI technologies also include virtual agents, deep learning platforms, decision management systems, biometrics, text analytics, and natural language generation and processing.

**R&D, biotechnology.** Biotechnology is the application of science and technology (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, bioleaching, biodesulfurization, bioremediation, biosensing, biofiltration and phytoremediation, and molecular aquaculture
- Gene and RNA vectors: gene therapy and viral vectors
- Bioinformatics: construction of databases on genomes, protein sequences, and modeling complex biological processes, including systems biology
- Nanobiotechnology: application of the tools and processes of nano- or microfabrication to build devices for studying biosystems and applications in, for example, drug delivery or diagnostics

**R&D, domestic.** R&D performed in the 50 U.S. states and the District of Columbia. *Adjusted* domestic R&D is calculated in tables designed to enable comparisons between U.S. BERD Survey statistics and those of other nations. There are three types of tables corresponding to the three principal measures of domestic R&D in the BERD Survey—that is, R&D paid for by the respondent company and others outside of the company and performed by the respondent company, R&D paid for and performed by the respondent company, and R&D paid for by others and performed by the company. In each table, an internationally comparable adjusted domestic R&D estimate is calculated by subtracting depreciation relating to R&D operations, which is *included* in U.S. BERD Survey domestic R&D, and adding capital expenditures relating to R&D operations, which is *excluded* from U.S. BERD Survey domestic R&D. Also shown in each table are the differences between the U.S. BERD Survey estimates in this report and the adjusted internationally comparable estimates for domestic R&D.

**R&D intensity, or R&D-to-sales ratio.** R&D intensity is a ratio, expressed as a percentage, calculated by dividing the cost of R&D by sales. The ratio serves as an indicator of the relative incidence of R&D among groups of companies, primarily among industries and company size classifications. In this report, R&D intensity ratios are calculated in various ways, depending on the measure of R&D (R&D paid for by the respondent company, paid for by others outside of the company, or both) and whether the respondent company performs and funds or only performs R&D.

**R&D, nanotechnology.** The understanding of processes and phenomena and the application of 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.** The cost of R&D funded by the company or by others outside of the company and performed within the respondent company's facilities, both foreign and domestic, or performed by others outside of the company under contract, subcontract, grant, or other funding arrangement.

**R&D performed by the company, worldwide and domestic.** The cost of R&D performed within the respondent company's facilities, both foreign and domestic, funded by the company itself or by others outside of the company.

**R&D performed by the company and others, worldwide and domestic.** The cost of R&D performed within the respondent company's facilities, both foreign and domestic, or performed by others outside of the company under contract, subcontract, grant, or other funding arrangement.

**R&D performed by others, worldwide and domestic.** The cost of R&D funded by the company or by others outside of the company and performed by others outside of the company under contract, subcontract, grant, or other funding arrangement.

**R&D, software and Internet.** R&D activity in software and Internet applications refers only to activities that have an element of uncertainty and that are intended to close knowledge gaps and meet scientific and technological needs. This item is reported in this survey regardless of the eventual user (internal or external). R&D activity in software includes software development or improvement activities that expand scientific or technological knowledge and construction of new theories and algorithms in the field of computer science. R&D activity in software excludes software development that does not depend on a scientific or technological advance, such as supporting or adapting existing systems, adding functionality to existing application programs, routine debugging of existing systems and software, creating new software based on known methods and applications, converting or translating existing software and software languages, and adapting a product to a specific client, unless knowledge that significantly improved the base program was added in that process.

**Sales, worldwide and domestic.** Dollar values for goods sold or services rendered by R&D-performing or R&D-funding companies located in the 50 U.S. states and the District of Columbia to customers outside the company, including the U.S. federal government, foreign customers, and the company's foreign subsidiaries. Included are revenues from a company's foreign operations and subsidiaries and from discontinued operations. If a respondent company is owned by a foreign parent company, sales to the parent company and to affiliates not owned by the respondent companies are included. Excluded are intracompany transfers, returns, allowances, and freight charges, as well as excise, sales, and other revenue-based taxes.

## Data Availability

### Publications

The data from the BERD Survey can be found online at <https://nces.nsf.gov/surveys/business-enterprise-research-development/>. Detailed historical statistics from the predecessor survey, SIRD, can be obtained from NCSES's Industrial Research and Development Information System at <https://www.nsf.gov/statistics/iris/>. Information from the BERD Survey is also included in *Science and Engineering Indicators* and in *National Patterns of R&D Resources*.

## Electronic Access

The BERD Survey contains confidential data that are protected under Title 13 and Title 26 of the U.S. Code. Restricted microdata can be accessed at the secure Federal Statistical Research Data Centers (FSRDCs) administered by the Census Bureau. FSRDCs are partnerships between federal statistical agencies and leading research institutions. FSRDCs provide secure environments supporting qualified researchers using restricted-access data while protecting respondent confidentiality. Researchers interested in using the microdata can submit a proposal to the Census Bureau, which evaluates proposals based on their benefit to Census, scientific merit, feasibility, and risk of disclosure. To learn more about the FSRDCs and how to apply, please visit <https://www.census.gov/about/adrm/fsrdc.html>.

## Disclosure Avoidance

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

The BERD Survey uses cell suppression and rounding to avoid disclosing information about a particular company. *Cell suppression* is a disclosure avoidance technique that protects the confidentiality of individual survey units by withholding cell values from release and replacing the cell value with a data code, usually a "D" or an estimate range. If the suppressed cell value were known, it would allow one to estimate an individual survey unit's value too closely.

The cells that must be protected are called *primary suppressions*. To make sure the cell values of the primary suppressions cannot be closely estimated by using other published cell values, additional cells may also be suppressed. These additional suppressed cells are called *complementary suppressions*. The process of suppression does not usually change the higher-level totals. Values for cells that are not suppressed remain unchanged. Before the Census Bureau releases data, computer programs and analysts ensure that primary and complementary suppressions have been correctly applied.

The Census Bureau has reviewed this data product to ensure appropriate access, use, and disclosure avoidance protection of the confidential source data (Project No. P-7504682, Disclosure Review Board approval number: CBDRB-FY23-0161).



# Technical Tables

Table	Title
A-1	Target population counts, by frame partition: 2008–21
A-2	Companies in the target population and selected for the sample, by industry and company size: 2021
A-3	Sample size, by frame partition: 2008–21
A-4	Companies sampled, by sampling stratum: 2021
A-5	Companies included in the survey that were not in the original sampling frame: 2008–21
A-6	Survey letters mailed, by sampling stratum: 2021
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A-8	Response measures: 2008–21
A-9	Unit response rates, by industry and company size: 2021
A-10	Companies that required an analyst action, by sampling stratum: 2021

TABLE A-1

**Target population counts, by frame partition: 2008–21**

(Number of companies)

Year	Total <sup>a</sup>	Known positive R&D	Known zero R&D	Unknown R&D
2008	1,926,012	16,059	75,923	1,834,030
2009	2,090,181	22,181	79,031	1,988,969
2010	2,013,399	24,723	67,281	1,921,395
2011	1,964,757	27,049	73,930	1,863,778
2012	1,971,731	29,512	73,004	1,869,215
2013	1,971,959	34,482	70,032	1,867,445
2014	1,998,858	35,532	79,343	1,883,983
2015	2,029,436	35,839	71,386	1,922,211
2016	1,485,151	34,958	11,355	1,438,838
2017	1,097,510	32,206	27,679	1,037,625
2018	1,115,834	33,215	34,158	1,048,461
2019	1,124,000	32,000	37,500	1,055,000
2020	1,139,000	31,500	36,500	1,071,000
2021	1,137,000	31,500	na	1,106,000

na = not applicable.

<sup>a</sup> For each year, the estimate of the number of companies in the total target population is based on the original sampling frame that was created to select the sample. The target population estimates in this table do not include R&D performers from the previous year's sample, which were not on the original sampling frame but were found during the survey's annual contact update procedures. See table A-5 for the counts of companies that were added to each year's sample.

**Note(s):**

Beginning in survey year 2021, companies in the known zero R&D group were combined with the unknown R&D group. See "[Technical Notes](#)." Beginning in survey year 2019, counts reflect a change in rounding methodology. Detail may not add to total because of rounding. Companies were said to be known to conduct R&D (*known positive R&D*) if they reported positive R&D in any of the previous 5 survey years. For survey years 2008–15, companies were said to have *known zero R&D* if they reported zero R&D in at least 1 of the previous 5 survey years and no positive R&D in any of the 5 years. Beginning in survey year 2016, companies were said to have *known zero R&D* if they reported zero R&D in at least 1 of the previous 3 survey years and no positive R&D in any of the previous 5 survey years. Companies were said to have *unknown R&D* if no R&D information was available. For survey year 2016, the target population did not include companies in the Other nonmanufacturing industry with fewer than 10 domestic employees. Starting in survey year 2017, the target population no longer includes companies with fewer than 10 domestic employees.

**Source(s):**

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

TABLE A-2  
Companies in the target population and selected for the sample, by industry and company size: 2021  
(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	1,137,000	47,500	24,000	23,500
Manufacturing industries	31–33	95,500	19,500	9,700	9,600
Food	311	9,400	1,200	700	500
Beverage and tobacco products	312	3,800	450	300	150
Textile, apparel, and leather products	313–16	3,500	550	350	200
Wood products	321	4,800	650	500	150
Paper	322	1,400	400	200	150
Printing and related support activities	323	5,600	950	600	350
Petroleum and coal products <sup>b</sup>	324	350	150	30	150
Chemicals	325	5,300	2,300	600	1,700
Basic chemicals	3251	700	300	90	200
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	550	200	80	150
Pesticide, fertilizer, and other agricultural chemicals	3253	300	150	D	150
Pharmaceuticals and medicines	3254	1,700	1,000	150	900
Soap, cleaning compound, and toilet preparation	3256	800	250	100	100
Paint, coating, adhesive, and other chemicals	3255, 3259	1,200	400	150	200
Plastics and rubber products	326	4,700	1,000	550	500
Nonmetallic mineral products	327	3,900	600	400	200
Primary metals	331	1,600	450	250	250
Fabricated metal products	332	20,000	2,400	1,600	850
Machinery	333	9,200	2,100	1,000	1,100
Agricultural implement	33311	550	200	40	150
Semiconductor machinery	333242	80	70	0	70
Engine, turbine, and power transmission equipment	3336	350	150	30	150
Other machinery	other 333	8,200	1,700	950	750
Computer and electronic products	334	4,700	1,800	550	1,200
Communications equipment	3342	550	250	30	200
Semiconductor and other electronic components	3344	1,700	500	200	300
Navigational, measuring, electromedical, and control instruments	3345	1,800	850	300	550
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	350	200	50	150
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	200	150	D	150
Other measuring and controlling devices	other 3345	1,300	500	200	250
Other computer and electronic products	other 334	550	200	60	150
Electrical equipment, appliances, and components	335	2,200	600	300	300
Transportation equipment	336	4,700	1,300	550	800

TABLE A-2  
Companies in the target population and selected for the sample, by industry and company size: 2021  
(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
Motor vehicles, bodies, trailers, and parts	3361–63	2,900	750	300	450
Aerospace products and parts	3364	850	300	90	200
Aircraft, aircraft engine, and aircraft parts	336411–13	800	250	90	150
Guided missile, space vehicle, and related parts	336414, 336415, 336419	50	50	0	50
Military armored vehicle, tank, and tank component	336992	30	20	0	20
Other transportation equipment	other 336	900	250	150	100
Furniture and related products	337	4,300	850	500	350
Miscellaneous manufacturing	339	6,300	1,400	750	650
Medical equipment and supplies	3391	2,300	650	250	350
Other miscellaneous	3399	4,000	800	500	300
Unclassified	–	90	60	D	60
Nonmanufacturing industries	21–23, 42–81	1,039,000	25,500	14,000	11,500
Mining, extraction, and support activities	21	4,800	550	350	250
Utilities	22	750	200	40	150
Wholesale trade	42	65,500	5,400	3,800	1,600
Electronic shopping and electronic auctions	454111–12	5,300	500	350	100
Transportation and warehousing	48–49	36,500	600	150	450
Information	51	16,500	3,600	1,400	2,200
Publishing	511	5,400	1,300	550	750
Newspaper, periodical, book, and directory publishers	5111	2,300	350	200	150
Software publishers	5112	3,100	950	350	600
Telecommunications	517	2,600	500	300	250
Data processing, hosting, and related services	518	3,600	1,200	250	950
Other information	other 51	4,700	600	350	250
Finance and insurance	52	25,500	1,100	150	900
Real estate and rental and leasing	53	25,000	450	100	350
Lessors of nonfinancial intangible assets (except copyrighted works)	533	450	80	D	80
Other real estate and rental and leasing	other 53	25,000	400	100	250
Professional, scientific, and technical services	54	101,000	7,400	4,100	3,200
Architectural, engineering, and related services	5413	18,000	2,700	1,600	1,100
Computer systems design and related services	5415	16,500	3,000	1,900	1,100
Scientific research and development services	5417	2,600	2,600	0	2,600
Research and development in nanotechnology	541713	100	100	0	100
Research and development in biotechnology (except nanobiotechnology)	541714	650	650	0	650

TABLE A-2  
Companies in the target population and selected for the sample, by industry and company size: 2021  
(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
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	1,600	1,600	0	1,600
Research and development in the social sciences and humanities	541720	150	150	0	150
Other professional, scientific, and technical services <sup>c</sup>	other 54	66,500	1,700	700	1,000
Health care services	621–23	114,000	1,800	500	1,200
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	644,000	3,900	3,100	800
Unclassified	–	450	150	30	100
Company size (number of domestic employees)					
All companies	–	1,137,000	47,500	24,000	23,500
< 10 <sup>d</sup>	–	6,900	400	200	200
10–19	–	560,000	10,500	8,000	2,300
20–49	–	366,000	10,500	7,400	3,200
50–99	–	111,000	6,900	4,100	2,800
100–249	–	59,500	7,800	3,200	4,600
250–499	–	17,500	3,900	850	3,100
500–999	–	8,100	3,400	80	3,300
1,000–4,999	–	6,600	3,000	60	3,000
5,000–9,999	–	900	450	D	450
10,000–24,999	–	600	350	D	350
25,000 or more	–	350	200	D	200

D = suppressed to ensure confidentiality of individual companies.

NAICS = 2017 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 2021 Business Enterprise Research and Development (BERD) Survey sample. These estimates do not include 150 R&D performers from the previous year's sample, which were not on the original sampling frame but were found during the survey's annual contact update procedures. These companies were added to the 2021 sample with certainty but are not reflected in the number of certainties selected for the sample.

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

<sup>c</sup> Contains companies classified in scientific research and development services (NAICS 5417) that, as of sampling, were not fully classified to the level of detail in research and development in nanotechnology (NAICS 541713), research and development in biotechnology (except nanobiotechnology) (NAICS 541714), research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology) (NAICS 541715), or research and development in the social sciences and humanities (NAICS 541720).

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

**Note(s):**  
Beginning in survey year 2019, counts reflect a change in rounding methodology. Detail may not add to total because of rounding. Certainties are companies whose probability of selection is 1 based on prior year R&D expenditures equal to or greater than \$3 million as well as others included in the sample for analytical purposes (analytical certainties). Noncertainties are companies whose probability of selection is less than 1. Companies that were missing or had an incomplete NAICS code at the time of sampling were assigned to an Unclassified industry category temporarily. If an unclassified company reported R&D expenditures, its primary industrial activity was investigated, and a NAICS code was assigned during statistical processing.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE A-3

**Sample size, by frame partition: 2008–21**

(Number of companies)

Year	Total	Known positive R&D	Known zero R&D	Unknown R&D
2008	39,553	11,103	3,156	25,294
2009	43,002	14,343	3,443	25,216
2010	42,965	14,399	3,150	25,416
2011	43,108	14,941	3,385	24,782
2012	43,655	16,188	3,527	23,940
2013	45,089	17,690	3,531	23,868
2014	44,162	16,959	3,861	23,342
2015	44,824	17,602	3,484	23,738
2016	44,861	18,184	1,058	25,619
2017	44,978	17,737	2,112	25,129
2018	45,690	20,115	2,265	23,310
2019	45,500	20,000	2,300	23,500
2020	47,500	20,500	2,200	24,500
2021	47,500	21,000	na	26,500

na = not applicable

**Note(s):**

Beginning in survey year 2021, companies in the known zero R&D group were combined with the unknown R&D group. See "[Technical Notes](#)." Beginning in survey year 2019, counts reflect a change in rounding methodology. Detail may not add to total because of rounding. Companies were said to be known to conduct R&D (*known positive R&D*) if they reported positive R&D in any of the previous 5 survey years. For survey years 2008–15, companies were said to have *known zero R&D* if they reported zero R&D in at least 1 of the previous 5 survey years and no positive R&D in any of the 5 years. Beginning in survey year 2016, companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 3 survey years and no positive R&D in any of the previous 5 survey years. Companies were said to have *unknown R&D* if no R&D information was available.

**Source(s):**

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

TABLE A-4

**Companies sampled, by sampling stratum: 2021**

(Number of companies)

Stratum	Total
Total	47,500
Known positive R&D	21,000
Certainties	16,000
Noncertainties	4,700
Known zero R&D	na
Certainties	na
Noncertainties	na
Unknown R&D	26,500
Certainties	7,400
Noncertainties	19,000

na = not applicable.

**Note(s):**

Beginning in survey year 2021, companies in the known zero R&D group were combined with the unknown R&D group. See "[Technical Notes](#)." Beginning in survey year 2019, counts reflect a change in rounding methodology. Detail may not add to total because of rounding. Companies were said to be known to conduct R&D (*known positive R&D*) if they reported positive R&D in any of the previous 5 survey years. Companies were said to have *known zero R&D* if they reported zero R&D in at least 1 of the previous 3 survey years and no positive R&D in any of the previous 5 survey years. Companies were said to have *unknown R&D* if no R&D information was available.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.



TABLE A-5

**Companies included in the survey that were not in the original sampling frame: 2008–21**

(Number of companies)

Year	Known positive R&D
2008	336
2009	18
2010	49
2011	42
2012	54
2013	44
2014	37
2015	52
2016	90
2017	93
2018	111
2019	150
2020	150
2021	150

**Note(s):**

Beginning in survey year 2019, counts reflect a change in rounding methodology. This table shows the counts of companies that were found during the update procedures, were added to each year's sample, and were mailed a survey letter. These company counts are not in table A-2.

**Source(s):**

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

TABLE A-6

**Survey letters mailed, by sampling stratum: 2021**

(Number)

Stratum	Total
Total	47,000
Known positive R&D	21,000
Certainties	16,000
Noncertainties	4,700
Known zero R&D	na
Certainties	na
Noncertainties	na
Unknown R&D	26,000
Certainties	7,100
Noncertainties	19,000
Cases not in the frame	150

na = not applicable.

**Note(s):**

Beginning in survey year 2021, companies in the known zero R&D group were combined with the unknown R&D group. See "[Technical Notes](#)." Beginning in survey year 2019, counts reflect a change in rounding methodology. Detail may not add to total because of rounding. Beginning in survey year 2017, an initial letter was mailed to all companies that instructed them to report online using the unique authentication code printed on the letter. Companies were said to be known to conduct R&D (*known positive R&D*) if they reported positive R&D in any of the previous 5 survey years. Companies were said to have *known zero R&D* if they reported zero R&D in at least 1 of the previous 3 survey years and no positive R&D in any of the previous 5 survey years. Companies were said to have *unknown R&D* if no R&D information was available.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE A-7

**Survey letters mailed for companies with subcompany reporting units, by sampling stratum: 2021**

(Number of companies)

Stratum	Sent one form	Sent multiple forms <sup>a</sup>
Total	47,000	150
Known positive R&D	20,500	150
Certainties	16,000	150
Noncertainties	4,700	0
Known zero R&D	na	na
Certainties	na	na
Noncertainties	na	na
Unknown R&D	26,000	0
Certainties	7,100	0
Noncertainties	19,000	0
Cases not in the frame	150	0

na = not applicable.

<sup>a</sup> Under special arrangement with the Census Bureau, and to facilitate reporting, the Business Enterprise Research and Development Survey used multiple survey forms to separately survey portions of some companies. This special arrangement extends to holding companies to facilitate reporting among the operating units. The number of companies does not include companies that made special reporting arrangements with the Census Bureau after the initial mailout.

**Note(s):**

Beginning in survey year 2021, companies in the known zero R&D group were combined with the unknown R&D group. See "[Technical Notes](#)." Beginning in survey year 2019, counts reflect a change in rounding methodology. Detail may not add to total because of rounding. Beginning in survey year 2017, an initial letter was mailed to all companies that instructed them to report online using the unique authentication code printed on the letter. Companies were said to be known to conduct R&D (*known positive R&D*) if they reported positive R&D in any of the previous 5 survey years. Companies were said to have *known zero R&D* if they reported zero R&D in at least 1 of the previous 3 survey years and no positive R&D in any of the previous 5 survey years. Companies were said to have *unknown R&D* if no R&D information was available.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

TABLE A-8  
Response measures: 2008–21  
(Percent)

Measure	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Check-in rate <sup>a</sup>	79.5	74.9	75.1	73.7	78.6	74.3	73.3	80.1	80.5	75.6	74.0	72	69	70
Response rate (unweighted) <sup>b</sup>	74.2	73.1	71.4	71.1	77.1	73.6	72.5	79.6	80.2	74.5	72.8	69	67	69
Coverage rate for known positive sampling strata (using weighted R&D) <sup>c</sup>	91.4	91.5	87.7	86.0	91.4	90.4	91.0	93.0	92.6	92.4	90.5	92	92	92
Coverage rate for unknown sampling strata (using weighted payroll) <sup>c</sup>	79.9	75.0	76.2	76.7	84.2	77.7	78.1	84.3	73.4	73.6	71.6	68	65	69
Coverage rate for known zero sampling strata (using unweighted counts) <sup>c</sup>	77.2	78.7	74.5	76.0	82.7	80.7	80.4	83.4	88.0	80.0	80.3	79	78	na

na = not applicable.

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

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

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

**Note(s):**  
Beginning in survey year 2021, companies in the known zero R&D group were combined with the unknown R&D group. See "[Technical Notes](#)." Beginning in survey year 2019, these percentages reflect a change in rounding methodology.

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

TABLE A-9  
Unit response rates, by industry and company size: 2021  
(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	44,000	30,500	69	7,800	18
Manufacturing industries	31–33	18,500	13,000	70	4,200	23
Food	311	1,200	800	67	200	17
Beverage and tobacco products	312	400	300	75	40	10
Textile, apparel, and leather products	313–16	550	350	64	60	11
Wood products	321	650	450	69	30	5
Paper	322	400	250	63	40	10
Printing and related support activities	323	900	600	67	20	2
Petroleum and coal products	324	150	100	67	30	20
Chemicals	325	2,300	1,700	74	1,000	43
Basic chemicals	3251	300	200	67	100	33
Resin, synthetic rubber, and artificial synthetic fibers and filaments	3252	200	150	75	60	30
Pesticide, fertilizer, and other agricultural chemicals	3253	150	100	67	30	20
Pharmaceuticals and medicines	3254	1,100	850	77	700	64
Soap, cleaning compound, and toilet preparation	3256	250	150	60	50	20
Paint, coating, adhesive, and other chemicals	3255, 3259	350	250	71	90	26
Plastics and rubber products	326	1,000	700	70	200	20
Nonmetallic mineral products	327	550	400	73	50	9
Primary metals	331	450	300	67	60	13
Fabricated metal products	332	2,300	1,700	74	300	13
Machinery	333	2,000	1,400	70	550	28
Agricultural implement	33311	200	150	75	50	25
Semiconductor machinery	333242	60	50	83	30	50
Engine, turbine, and power transmission equipment	3336	150	100	67	40	27
Other machinery	other 333	1,600	1,200	75	400	25
Computer and electronic products	334	1,700	1,200	71	650	38
Communications equipment	3342	200	150	75	80	40
Semiconductor and other electronic components	3344	500	350	70	200	40

TABLE A-9  
Unit response rates, by industry and company size: 2021  
(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
Navigational, measuring, electromedical, and control instruments	3345	800	550	69	300	38
Electromedical, electrotherapeutic, and irradiation apparatus	334510, 334517	200	100	50	70	35
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	150	100	67	40	27
Other measuring and controlling devices	other 3345	450	350	78	150	33
Other computer and electronic products	other 334	200	100	50	80	40
Electrical equipment, appliances, and components	335	600	400	67	150	25
Transportation equipment	336	1,300	900	69	350	27
Motor vehicles, bodies, trailers, and parts	3361–63	700	500	71	200	29
Aerospace products and parts	3364	300	200	67	100	33
Aircraft, aircraft engine, and aircraft parts	336411–13	250	200	80	100	40
Guided missile, space vehicle, and related parts	336414–15, 336419	40	30	75	20	50
Military armored vehicle, tank, and tank component	336992	20	D	D	D	D
Other transportation equipment	other 336	250	150	60	40	16
Furniture and related products	337	800	550	69	40	5
Miscellaneous manufacturing	339	1,300	1,000	77	400	31
Medical equipment and supplies	3391	600	450	75	250	42
Other miscellaneous	3399	750	550	73	150	20
Nonmanufacturing industries	21–23, 42–81	25,500	17,000	67	3,600	14
Mining, extraction, and support activities	21	500	350	70	40	8
Utilities	22	150	150	100	30	20
Wholesale trade	42	5,000	3,400	68	150	3
Electronic shopping and electronic auctions	454111–12	450	250	56	20	4
Transportation and warehousing	48–49	600	350	58	40	7
Information	51	3,500	2,400	69	1,200	34
Publishing	511	1,200	750	63	300	25
Newspaper, periodical, book, and directory publishers	5111	300	200	67	D	D
Software publishers	5112	900	550	61	300	33
Telecommunications	517	450	300	67	60	13

TABLE A-9  
Unit response rates, by industry and company size: 2021  
(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
Data processing, hosting, and related services	518	1,300	1,000	77	750	58
Other information	other 51	500	350	70	90	18
Finance and insurance	52	1,000	750	75	150	15
Real estate and rental and leasing	53	450	250	56	20	4
Lessors of nonfinancial intangible assets (except copyrighted works)	533	70	40	57	D	D
Other real estate and rental and leasing	other 53	350	200	57	D	D
Professional, scientific, and technical services	54	8,900	5,900	66	1,700	19
Architectural, engineering, and related services	5413	2,600	1,900	73	350	13
Computer systems design and related services	5415	2,600	1,600	62	450	17
Scientific research and development services	5417	2,100	1,300	62	650	31
Research and development in nanotechnology	541713	150	70	47	30	20
Research and development in biotechnology (except nanobiotechnology)	541714	500	250	50	150	30
Research and development in the physical, engineering, and life sciences (except nanotechnology and biotechnology)	541715	1,300	850	65	450	35
Research and development in the social sciences and humanities	541720	150	100	67	D	D
Other professional, scientific, and technical services	other 54	1,600	1,100	69	250	16
Health care services	621–23	1,700	1,000	59	70	4
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	3,500	2,400	69	200	6
All companies (number of domestic employees)	–	44,000	30,500	69	7,800	18
Small companies						
10–19 <sup>c</sup>	–	8,200	5,800	71	600	7
20–49	–	10,500	7,600	72	1,300	12
Medium companies						
50–99	–	6,900	4,800	70	1,100	16
100–249	–	7,500	5,100	68	1,600	21
Large companies						
250–499	–	4,000	2,600	65	1,000	25
500–999	–	3,000	1,900	63	750	25

TABLE A-9  
Unit response rates, by industry and company size: 2021  
(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
1,000–4,999	–	2,800	1,800	64	950	34
5,000–9,999	–	500	350	70	200	40
10,000–24,999	–	350	250	71	150	43
25,000 or more	–	200	150	75	100	50

D = suppressed to ensure confidentiality of individual companies.

NAICS = 2017 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 detail may not add to total for number of companies.

<sup>b</sup> Reporting units were considered to have fulfilled the response criteria if they reported that they performed or funded R&D. If not, a reporting unit fulfilled the response criteria if it reported a value for worldwide sales or domestic sales, or if it reported a positive value for paid worldwide employees or paid domestic employees.

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

**Note(s):**  
Beginning in survey year 2019, these counts and percentages reflect a change in rounding methodology. Detail may not add to total because of rounding.

**Source(s):**  
National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.



TABLE A-10

**Companies that required an analyst action, by sampling stratum: 2021**

(Number)

Stratum	Total	Companies deleted <sup>a</sup>	Companies requiring action due to merger or acquisition <sup>b</sup>	Companies requiring action due to analyst review <sup>c</sup>
Total	3,100	3,000	100	D
Known positive R&D	800	750	50	D
Certainties	600	550	50	D
Noncertainties	200	200	D	0
Known zero R&D	na	na	na	na
Certainties	na	na	na	na
Noncertainties	na	na	na	na
Unknown R&D	2,200	2,200	40	D
Certainties	400	400	D	D
Noncertainties	1,800	1,800	30	D
Cases not in the frame	D	D	D	0

D = suppressed to ensure confidentiality of individual companies; na = not applicable.

<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 contact 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 Enterprise Research and Development Survey and public information available on the companies' R&D expenses.**Note(s):**

Beginning in survey year 2021, companies in the known zero R&D group were combined with the unknown R&D group. See "[Technical Notes](#)." Beginning in survey year 2019, counts reflect a change in rounding methodology. Detail may not add to total because of rounding. Companies were said to be known to conduct R&D (*known positive R&D*) if they reported positive R&D in any of the previous 5 survey years. Companies were said to have *known zero R&D* if they reported zero R&D in at least 1 of the previous 3 survey years and no positive R&D in any of the previous 5 survey years. Companies were said to have *unknown R&D* if no R&D information was available.

**Source(s):**

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021.

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