Business Research and Development and Innovation: 2016

Detailed Statistical Tables | NSF 19-318 | May 13, 2019

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General Notes

The Business R&D and Innovation Survey (BRDIS) is the primary source of information on domestic and global research and development expenditures and the R&D workforce for companies operating in the 50 U.S. states and the District of Columbia. The survey is conducted annually by the U.S. Census Bureau in accordance with an interagency agreement with the National Center for Science and Engineering Statistics (NCSES) within the National Science Foundation (NSF). The BRDIS **questionnaires**, **reports**, and **data** can be found at **https://www.nsf.gov/statistics/industry/**.

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

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

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

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

The U.S. Census Bureau's Business Register contains information on more than 3 million establishments with paid employees. It serves as the primary input to the sample 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 BRDIS or have fewer than five employees, based on their prior year aggregated annual payroll and employment data.

In addition to single-year tables for 2016, this report includes tables containing statistics for multiple years. In these tables, most prior year statistics have been revised since originally published. Revised statistics include adjustments based on information obtained after the original statistics were prepared. For any given year, after the tables are published, the statistical file used to produce the tables stays open for about 1 year before it is permanently closed. During that year, respondents may provide updated data; also, information from other U.S. Census Bureau surveys or publicly available sources may become available. The new data and information are evaluated and tested; if appropriate, revisions are made to the statistical file. The multiyear tables in this report (table 70 through table 77) were prepared using the 2016 statistical file and revised statistical files for 2008–15.

Terms used in business accounting and incorporated throughout the tables are defined in the section Technical Notes.

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

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

Table	Title
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Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D

Table	Title
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9	Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2016

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

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

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

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

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

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Employment and R&D employment, by industry and company size

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

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

Table	Title
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77	Domestic R&D paid for by the company and others and performed by the company, by business activity: 2008–16

TABLE 1

Business R&D and Innovation Survey aggregate estimates, by questionnaire reference: 2016

(Financial information, employees, and patents)

Question	Survey item	Aggregate amount	
Company and financial information (US$millions)			
1.8	Worldwide net sales and operating revenues	12,285,760	
1.9	Net sales and operating revenues from domestic operations	9,191,871	
-	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	463,568	
2.3	Worldwide R&D paid for by the company (expense) adjustments	28,165	
2.4	Worldwide R&D paid for by the company and performed by the company and others	435,403	
2.8a	Domestic R&D paid for by the company and performed by the company and others	355,230	
2.8b	Foreign R&D paid for by the company and performed by the company and others	80,173	
2.6	Indirect R&D charges to be recouped from the U.S. federal government (IR&D or independent R&D)	5,795	
2.11m(1)	Domestic R&D paid for by the company and performed by the company and others	355,230	
2.11a(1)	Salaries, wages, and fringe benefits	180,885	
2.11b(1)	Stock-based compensation	21,068	
2.11c(1)	Leased or temporary staffing, including on-site contractors	14,836	
2.11d(1)	Expensed equipment	5,160	
2.11e(1)	Materials and supplies	21,595	
2.11f(1)	Leased facilities and equipment rental payments	5,107	
2.11g(1)	Depreciation and amortization of R&D property and equipment	12,520	
2.11h(1)	Royalties and licensing fees	1,872	
2.11i(1)	Payments to business partners for collaborative R&D	8,278	
2.11j(1)	Purchased R&D services	29,221	
2.11k(1)	All other purchased services except R&D	7,285	
2.11l(1)	All other costs	47,402	
2.12(3)	Worldwide R&D paid for by the company and performed by others	47,346	
2.12(1)	Domestic R&D paid for by the company and performed by others	37,499	
2.12(2)	Foreign R&D paid for by the company and performed by others	9,847	
2.13(3)	Worldwide R&D paid for and performed by the company	388,057	
2.13(1)	Domestic R&D paid for and performed by the company	317,731	
2.13(2)	Foreign R&D paid for and performed by the company	70,326	
2.13(3) + 3.9(3)	Worldwide R&D paid for by the company and others and performed by the company	451,831	
2.12(1) + 2.13(1) + 3.8(1) + 3.9(1)	Domestic R&D paid for by the company and others and performed by the company and others	421,539	
2.13(1) + 3.9 (1)	Domestic R&D paid for by the company and others and performed by the company	374,685	
-	Domestic R&D paid for and performed by the company		
2.19	Performed at largest domestic location	180,657	
2.21	Performed at second-largest domestic location	30,967	
2.23	Domestic R&D paid for by foreign operations or subsidiaries and performed by the company	11,120	
2.24	Foreign R&D paid for by domestic operations or subsidiaries and performed by the company	13,030	
2.26i	Domestic R&D paid for by the company and performed by others	37,499	
2.26a	Companies in the United States	31,239	
2.26b	Your company's foreign parent or owner	843	
2.26c	Companies outside the United States	3,322	i
2.26d	U.S. federal government agencies or laboratories	116	i
2.26e	U.S. state and local government agencies or laboratories	5	
2.26f	U.S. universities, colleges, and academic researchers	275	
2.26g	All other organizations in the United States	346	
2.26h	All other organizations outside the United States	163	
2.26	Undistributed (BRDI-1(S))	1,190	i
2.28	Monetary gifts made by the company to U.S. universities and colleges	72	
-	Projected worldwide R&D expense paid for and performed by the company in 2017		
2.29(3)	Worldwide R&D to be paid for and performed by the company	455,995	

TABLE 1

Business R&D and Innovation Survey aggregate estimates, by questionnaire reference: 2016

(Financial information, employees, and patents)

Question	Survey item	Aggregate amount	
2.29(1)	Domestic R&D to be paid for and performed by the company	372,897	
2.29(2)	Foreign R&D to be paid for and performed by the company	83,098	
2.30	Projected R&D services and projected payments for collaborative R&D	34,846	
2.31	Total domestic capital expenditures	560,900	
2.32	Domestic capital expenditures for R&D	25,248	
2.33a	Land and structures	3,072	
2.33b	Equipment	11,839	
2.33c	Capitalized software	6,793	
2.33d	All other capital expenditures for R&D	3,543	
3.1j, 3.4c	Worldwide R&D paid for by others and performed by the company and others	74,224	
3.1a	R&D reimbursed by the company's foreign parent or owner	17,447	
3.1b	Collaborative R&D reimbursed by business partners	7,939	
3.1c	R&D paid for by government or private foundation grants	12,564	
3.1d	Defense RDT&E goods or services provided to the federal government or government contractors	13,646	
3.1f	Medical nonclinical R&D services provided to others not owned by the company	3,354	i
3.1e	Medical clinical trial Phase I–III services provided to others not owned by the company	11,544	
3.1g	Nondefense custom software development or computer systems designed for others not owned by the company	277	
3.1h	Prototype development, production, and testing for customer's products	1,496	
3.1i	All other R&D services not included in 3.1a–3.1h provided to the federal government or to others not owned by the company	5,957	i
3.4c, 3.1j	Worldwide R&D paid for by others and performed by the company and others	74,224	
3.4a	Domestic R&D paid for by others and performed by the company and others	66,309	
3.4b	Foreign R&D paid for by others and performed by the company and others	7,915	
3.7m(1)	Domestic R&D paid for by others and performed by the company and others	66,309	
3.7a(1)	Salaries, wages, and fringe benefits	34,074	
3.7b(1)	Stock-based compensation	576	
3.7c(1)	Leased or temporary staffing, including on-site contractors	1,868	
3.7d(1)	Expensed equipment	424	
3.7e(1)	Materials and supplies	5,101	
3.7f(1)	Leased facilities and equipment rental payments	993	
3.7g(1)	Depreciation and amortization of R&D property and equipment	1,154	
3.7h(1)	Royalties and licensing fees	56	
3.7i(1)	Payments to business partners for collaborative R&D	2,029	
3.7j(1)	Purchased R&D services	7,326	
3.7k(1)	All other purchased services except R&D	2,912	
3.7l(1)	All other costs	9,797	
3.8(3)	Worldwide R&D paid for and performed by others	10,450	
3.8(1)	Domestic R&D paid for and performed by others	9,355	
3.8(2)	Foreign R&D paid for and performed by others	1,095	
3.9(3)	Worldwide R&D paid for by others and performed by the company	63,774	
3.9(1), 3.14i	Domestic R&D paid for by others and performed by the company	56,954	
3.9(2)	Foreign R&D paid for by others and performed by the company	6,820	
3.14i, 3.9(1)	Domestic R&D paid for by others and performed by the company	56,954	
3.14a	Companies in the United States	14,239	
3.14b	Your company's foreign parent or owner	14,766	
3.14c	Companies outside the United States	2,926	
3.14d, 3.18j, 3.19c	U.S. federal government agencies or laboratories	23,772	
3.14e	U.S. state and local government agencies or laboratories	171	
3.14f	U.S. universities, colleges, and academic researchers	127	
3.14g	All other organizations in the United States	851	

TABLE 1

Business R&D and Innovation Survey aggregate estimates, by questionnaire reference: 2016

(Financial information, employees, and patents)

Question	Survey item	Aggregate amount	
3.14h	All other organizations outside the United States	100	
3.18j, 3.14d, 3.19c	Federally funded R&D performed by the company	23,772	
3.18a	Department of Defense	16,458	
3.18b	Department of Energy	1,011	i
3.18c	National Aeronautics and Space Administration	4,037	i
3.18d	National Institutes of Health	652	
3.18e	Department of Homeland Security	D	
3.18f	Department of Transportation	46	
3.18g	Environmental Protection Agency	2	
3.18h	National Science Foundation	23	
3.18i	Other U.S. federal agencies	D	
3.19c, 3.14d, 3.18j	Federally funded R&D performed by the company by type of agreement	23,772	
3.19a	Contracts	22,951	
3.19b	Grants and all other agreements	821	
-	Domestic R&D paid for by others and performed by the company		
3.23	Performed at largest domestic location	26,458	
3.25	Performed at second-largest domestic location	4,753	
3.26	Domestic R&D paid for and performed by others	9,355	
3.27	Domestic R&D paid for by U.S. federal government agencies or laboratories and performed by others	3,549	
-	Projected R&D to be paid for by others and performed by the company in 2017		
3.28	Worldwide R&D to be paid for by others and performed by the company	77,612	
3.29	Domestic R&D to be paid for by others and performed by the company	61,937	
3.30	Domestic R&D to be paid for by U.S. federal government and performed by the company	25,411	
-	Domestic R&D paid for and performed by the company		
4.3	R&D directed toward business areas or product lines new to company	52,234	
-	Type of R&D (character of work)		
4.6b	Basic research	19,143	
4.6a	Applied research	48,806	
4.5b	Development	249,782	
-	Application areas		
4.7	Energy applications	20,341	
4.8	Environmental protection applications	7,426	
4.9	Defense applications	10,369	
4.10	Health or medical applications	78,699	
4.11	Agricultural applications	5,705	i
-	Technology focus areas		
4.12	Software products and software embedded in other projects or products	111,933	i
4.13	Biotechnology	36,970	
4.14	Nanotechnology	23,823	i
-	Domestic R&D paid for by others and performed by the company		
-	Type of R&D (character of work)		
4.18b	Basic research	5,501	i
4.18a	Applied research	12,213	
4.17b	Development	39,239	
-	Application areas		
4.19	Energy applications	2,296	
4.20	Environmental protection applications	1,792	
4.21	Defense applications	17,680	
4.22	Health or medical applications	17,989	i
4.23	Agricultural applications	686	
-	Technology focus areas		

TABLE 1

Business R&D and Innovation Survey aggregate estimates, by questionnaire reference: 2016

(Financial information, employees, and patents)

Question	Survey item	Aggregate amount	
4.24	Software products and software embedded in other projects or products	8,890	
4.25	Biotechnology	7,823	
4.26	Nanotechnology	1,482	i
-	Federally funded R&D performed by the company		
-	Type of R&D (character of work)		
4.30b	Basic research	2,005	i
4.30a	Applied research	5,181	i
4.29b	Development	16,586	
-	Technology focus areas		
4.31	Software products and software embedded in other projects or products	4,481	i
-	Foreign R&D paid for and performed by the company		
-	Type of R&D (character of work)		
4.33a	Research	15,569	
4.33b	Development	54,757	
-	Foreign R&D paid for by others and performed by the company		
-	Type of R&D (character of work)		
4.35a	Research	1,861	i
4.35b	Development	4,959	i
Employees (thousands)			
-	Worldwide		
5.1, 5.2(3)	Total employees	30,667	
5.3b(3)	Non-R&D employees	28,472	
5.3a(3)	R&D employees	2,195	
5.5a(3)	Female	594	
5.5b(3)	Male	1,601	
5.6a(3)	Researchers	1,551	
5.6b(3)	Technicians	431	
5.6c(3)	Support staff	213	
-	Domestic		
5.2(1)	Total employees	19,293	
5.3b(1)	Non-R&D employees	17,772	
5.3a(1)	R&D employees	1,522	
5.5a(1)	Female	399	
5.5b(1)	Male	1,122	
5.6a(1)	Researchers	1,064	
5.6b(1)	Technicians	306	
5.6c(1)	Support staff	152	
-	Foreign		
5.2(2)	Total employees	11,374	
5.3b(2)	Non-R&D employees	10,701	
5.3a(2)	R&D employees	674	
5.5a(2)	Female	194	
5.5b(2)	Male	479	
5.6a(2)	Researchers	488	
5.6b(2)	Technicians	126	
5.6c(2)	Support staff	61	
-	Researchers with PhD		
5.7(3)	Worldwide	149	
5.7(1)	Domestic	120	
5.7(2)	Foreign	30	
-	Full-time equivalent		

TABLE 1

Business R&D and Innovation Survey aggregate estimates, by questionnaire reference: 2016

(Financial information, employees, and patents)

Question	Survey item	Aggregate amount	
5.8d	R&D employees	1,393	
5.8a	Full-time R&D employees	1,226	
5.8b	Full-time employees not solely working on R&D	152	
5.8c	Part-time employees working on R&D	15	
5.9d	Researchers	973	
5.9a	Full-time R&D employees	879	
5.9b	Full-time employees not solely working on R&D	85	i
5.9c	Part-time employees working on R&D	9	
5.10	Non-U.S. citizens employed as researchers under temporary visa	41	
U.S. patents (number)[a]			
6.1	Patents applied for, total	135,702	
6.2	Nonprovisional utility patents applied for	101,428	
6.3	Applications filed or planned in foreign jurisdictions	47,920	
6.4	Applications originated from organized R&D activities	75,310	
6.6	Utility patents issued	92,099	
U.S. patents (US$millions)[a]			
-	Revenue received from others		
6.7	From sale of utility patents	955	
6.8	From licensing utility patents	18,145	
-	Amount paid to others		
6.10	To purchase patents	163	
6.11	To license patents	8,380	

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

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

[a] These statistics do not include an adjustment to the weight to account for unit nonresponse.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

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: 2016

(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	451,831	388,057	63,774	374,685	317,731	56,954	77,146	70,326	6,820
Manufacturing industries	31–33	303,241	263,081	40,161	250,553	211,660	38,893	52,689	51,421	1,268
Food	311	5,821	5,601	220	4,828	4,611	217	994	991	3
Beverages and tobacco products	312	D	1,531	D	D	987	D	543	543	0
Textiles, apparel, and leather products	313–16	1,246 i	1,237 i	9	1,166 i	1,156 i	9	81	81	*
Wood products	321	203	196	7 i	188	181	7 i	15	15	0
Paper	322	929	929	*	851	851	*	78	78	0
Printing and related support activities	323	223 i	222 i	1 i	219 i	219 i	* i	4	4	*
Petroleum and coal products	324	425	411	14	381	367	14	44	44	0
Chemicals	325	85,888	76,311	9,577	73,575	64,165	9,410	12,313	12,146	167
Basic chemicals	3251	3,082	2,817	265	2,545	2,284	261	537	533	4
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,044	1,027	18	711	693	18	333	333	*
Pesticides, fertilizers, and other agricultural chemicals	3253	D	1,483 i	D	D	1,061 i	D	432 i	422 i	10
Pharmaceuticals and medicines	3254	74,542	65,751	8,791	64,628	55,983	8,644	9,914	9,768	146
Soaps, cleaning compounds, and toilet preparations	3256	3,590	3,447	142	2,800	2,660	141	789	788	1
Paints, coatings, adhesives, and other chemicals	3255, 3259	D	1,785	D	D	1,484	D	307	302	5
Plastics and rubber products	326	4,583	4,412	171	3,752	3,584	169	831	829	2
Nonmetallic mineral products	327	1,474	1,459	15	1,289	1,274	14	185	185	*
Primary metals	331	662	652	10	592	583	10	69	69	*
Fabricated metal products	332	2,484	2,370	114 i	2,239	2,127	112 i	245	243	1
Machinery	333	15,764	14,863	901	12,585	11,699	886	3,179	3,164	15
Agricultural implements	33311	2,189	2,175	14	1,565	1,552	12	625	623	1
Semiconductor machinery	333242	4,138	3,745	393	3,411	3,028	383	727	717	10
Engines, turbines, and power transmission equipment	3336	2,327	2,269	59 i	1,959	1,901	58 i	368	368	*
Other machinery	other 333	7,109	6,674	435	5,650	5,218	432	1,459	1,456	3
Computer and electronic products	334	98,175	89,045	9,130	77,385	68,515	8,869	20,791	20,530	261
Communications equipment	3342	16,075	14,249	1,826 i	13,112	11,293	1,818 i	2,963	2,955	8

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: 2016

(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
Semiconductors and other electronic components	3344	41,695	39,454	2,241	31,391	29,176	2,215	10,304	10,278	26
Navigational, measuring, electromedical, and control instruments	3345	18,111	13,135	4,976	14,885	10,131	4,753	3,227	3,004	223
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	3,553	3,386	167	2,632	2,466	165	922	919	2
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	8,373	3,757	4,616	7,533	3,121	4,412	840	636	204
Other measuring and controlling devices	other 3345	6,185	5,992	193	4,720	4,544	176	1,465	1,448	17
Other computer and electronic products	other 334	22,294	22,208	86	17,997	17,914	82	4,297	4,293	4
Electrical equipment, appliances, and components	335	6,207	5,738	469 i	4,771	4,302	469 i	1,436	1,436	1
Transportation equipment	336	60,326	41,157	19,168	51,275	32,905	18,371	9,050	8,253	798
Automobiles, bodies, trailers, and parts	3361–63	29,171	25,952	3,219	22,042	19,293	2,749	7,130	6,659	470 i
Aerospace products and parts	3364	28,462	13,761	14,701	26,645	12,272	14,373	1,817	1,490	327
Aircraft, aircraft engines, and aircraft parts	336411–13	27,034	13,418	13,616	25,221	11,930	13,291	1,813	1,488	326
Guided missiles, space vehicles, and related parts	336414–15, 336419	1,428 i	344	1,084 i	1,424 i	342	1,083 i	4	2	2
Military armored vehicles, tanks, and tank components	336992	D	3	D	D	3	D	0	0	0
Other transportation	other 336	D	1,440	D	D	1,337	D	104	103	*
Furniture and related products	337	406	406	*	366	366	*	40	40	0
Miscellaneous	339	D	16,541	D	D	13,768	D	2,792	2,773	20
Medical equipment and supplies	3391	14,143	13,930	213	11,668	11,474	194	2,475	2,455	20
Other miscellaneous manufacturing	3399	D	2,611 i	D	D	2,294 i	D	317 i	317 i	0
Nonmanufacturing industries	21–23, 42–81	148,589	124,976	23,613	124,132	106,071	18,061	24,457	18,905	5,552
Mining, extraction, and support activities	21	3,604	3,167	437	3,296	2,897	400	308	270	38
Utilities	22	353	327	26	351	325	26	1	1	*
Wholesale trade	42	465 i	455 i	10 i	452 i	442 i	10 i	12 i	12 i	0
Electronic shopping and electronic auctions	454111–12	D	D	0	1,569 i	1,569 i	0	D	D	0

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: 2016

(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
Transportation and warehousing	48–49	495	493	3 i	488	486	3	7	7	0
Information	51	84,133	83,430	703	70,748	70,075	674	13,384	13,355	29
Publishing	511	42,272	41,860	412	33,574	33,174	400	8,698	8,686	12
Newspaper, periodical, book, and directory publishers	5111	84 i	81 i	3 i	79 i	77 i	3 i	4	4	0
Software publishers	5112	42,188	41,779	409	33,495	33,098	397	8,693	8,682	12
Telecommunications	517	D	3,579	D	D	3,530 i	D	49	49	0
Data processing, hosting, and related services	518	13,666	13,511	155	11,914	11,776	138	1,752	1,735	17
Other information	other 51	D	24,480	D	D	21,594	D	2,886	2,886	0
Finance and insurance	52	8,468	8,373	94	7,331	7,237	94	1,136	1,136	0
Real estate and rental and leasing	53	477	477	0	475	475	0	2	2	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	27	27	0	27	27	0	*	*	0
Other real estate and rental and leasing	other 53	450	450	0	449	449	0	2	2	0
Professional, scientific, and technical services	54	46,771	24,535	22,236	37,595	20,845	16,750	9,176	3,690	5,486
Architectural, engineering, and related services	5413	3,475	1,839	1,636	3,412	1,816	1,596	64	23	41
Computer systems design and related services	5415	19,168	16,587	2,581 i	15,747	13,255	2,492 i	3,421	3,332	89
Scientific research and development services	5417	20,254	2,875	17,379	14,842	2,811	12,031	5,412	64	5,348
Biotechnology research and development	541711	6,079	753 i	5,326	4,464	750 i	3,714	1,615	3 i	1,612
Physical, engineering, and life sciences (except biotechnology) research and development	541712	13,452	2,090	11,362	9,659	2,029	7,630	3,793	61	3,732
Social sciences and humanities research and development	541720	723	32	691	719	32	687	4	0	4
Other professional, scientific, and technical services	other 54	3,874	3,234	640	3,595	2,962	632	279	272	7
Health care services	621–23	1,002	936	66	848	782	66	154	154	0
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	D	D	38	977 i	939 i	38	D	D	0

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: 2016

(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 companies (number of domestic employees)	–	451,831	388,057	63,774	374,685	317,731	56,954	77,146	70,326	6,820
Micro companies[a]										
5 – 9	–	1,726 i	1,188 i	537 i	1,581 i	1,044 i	536 i	145	144	1 i
Small companies										
10 – 19	–	5,059 i	3,964 i	1,095 i	4,958 i	3,887 i	1,071 i	101	77	24
20 – 49	–	10,000 i	7,799 i	2,201	9,662 i	7,473 i	2,189	338	326	12
Medium companies										
50 – 99	–	9,662	8,081	1,581	9,298	7,728	1,570	364	354	11
100 – 249	–	16,194	12,998	3,196	14,875	11,722	3,153	1,319	1,277	43 i
Large companies										
250 – 499	–	14,866	13,175	1,691	13,092	11,438	1,654	1,774	1,738	37
500 – 999	–	16,609	15,671	938	14,450	13,525	924	2,159	2,146	13
1,000 – 4,999	–	79,597	67,403	12,194	63,971	53,305	10,666	15,626	14,099	1,527
5,000 – 9,999	–	49,620	44,208	5,412	40,633	35,887	4,746	8,986	8,321	665 i
10,000 – 24,999	–	80,255	65,294	14,961	65,594	53,384	12,210	14,661	11,910	2,751
25,000 or more	–	168,243	148,274	19,968	136,571	118,339	18,232	31,672	29,935	1,736

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

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: 2016

(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	451,831		6,529	i	25,829		34,443		21,677		363,353	
Manufacturing industries	31–33	303,241		3,864	i	13,416		20,120		15,418		250,423	
Food	311	5,821		202	i	535		549		531		4,004	
Beverages and tobacco products	312	D		D		66		87		254		1,214	
Textiles, apparel, and leather products	313–16	1,246	i	78	i	400	i	344		424		0	
Wood products	321	203		28	i	77		98		0		0	
Paper	322	929		52	i	82		128		63		605	
Printing and related support activities	323	223	i	63	i	79		81	i	0		0	
Petroleum and coal products	324	425		21	i	152		58		194		0	
Chemicals	325	85,888		565	i	2,879		6,139		4,478		71,826	
Basic chemicals	3251	3,082		82	i	343		618		572		1,466	
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,044		53	i	151		158		161	i	522	
Pesticides, fertilizers, and other agricultural chemicals	3253	D		D		60		0		D		1,685	i
Pharmaceuticals and medicines	3254	74,542		143	i	1,851		5,040		3,151		64,357	
Soaps, cleaning compounds, and toilet preparations	3256	3,590		84	i	198	i	224		167		2,917	
Paints, coatings, adhesives, and other chemicals	3255, 3259	D		D		278		99		D		878	
Plastics and rubber products	326	4,583		305	i	605		587		700		2,386	
Nonmetallic mineral products	327	1,474		61	i	145		266		0		1,001	
Primary metals	331	662		79	i	191		255		0		136	i
Fabricated metal products	332	2,484		496	i	833		549		388		218	
Machinery	333	15,764		594	i	1,584		1,942		1,098		10,545	
Agricultural implements	33311	2,189		24	i	D		126		D		1,755	
Semiconductor machinery	333242	4,138		10	i	43		88		286		3,712	
Engines, turbines, and power transmission equipment	3336	2,327		D		D		205		0		D	
Other machinery	other 333	7,109		D		1,346		1,523		D		D	
Computer and electronic products	334	98,175		672	i	2,183		3,604		3,474		88,242	
Communications equipment	3342	16,075		160	i	258		679		726		14,252	
Semiconductors and other electronic components	3344	41,695		135	i	729		1,330		1,337		38,165	
Navigational, measuring, electromedical, and control instruments	3345	18,111		295	i	1,033		1,103		1,118		14,561	
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	3,553		49	i	300	i	327		676	i	2,202	
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	8,373		27	i	156		237		0		7,953	
Other measuring and controlling devices	other 3345	6,185		220	i	578		539		442		4,406	
Other computer and electronic products	other 334	22,294		82	i	163		492		293		21,264	
Electrical equipment, appliances, and components	335	6,207		122	i	619		1,070		723		3,672	
Transportation equipment	336	60,326		109	i	1,432		1,866		2,308		54,609	
Automobiles, bodies, trailers, and parts	3361–63	29,171		58	i	1,099		1,142		1,561		25,312	
Aerospace products and parts	3364	28,462		19	i	213		472		575		27,184	
Aircraft, aircraft engines, and aircraft parts	336411–13	27,034		17	i	197		415		468		25,937	
Guided missiles, space vehicles, and related parts	336414–15, 336419	1,428	i	2		16	i	56		107		1,247	i

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: 2016

(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	
Military armored vehicles, tanks, and tank components	336992	D		D		D		0		0		0	
Other transportation	other 336	D		D		D		253		173		2,114	i
Furniture and related products	337	406		64	i	95		180		66		0	
Miscellaneous manufacturing	339	D		D		1,458		2,316		715		11,963	
Medical equipment and supplies	3391	14,143		169	i	1,082		1,792		715		10,385	
Other miscellaneous manufacturing	3399	D		D		376		524		0		1,578	i
Nonmanufacturing industries	21–23, 42–81	148,589		2,665	i	12,413		14,323		6,259		112,930	
Mining, extraction, and support activities	21	3,604		13	i	98		83		102		3,308	
Utilities	22	353		6	i	D		76		D		D	
Wholesale trade	42	465	i	341	i	123	i	0		0		0	
Electronic shopping and electronic auctions	454111–12	D		30	i	D		D		0		D	
Transportation and warehousing	48–49	495		9	i	54		24		86		323	
Information	51	84,133		484	i	4,006		5,976		3,920		69,746	
Publishing	511	42,272		355	i	1,768	i	1,912		1,566		36,670	
Newspaper, periodical, book, and directory publishers	5111	84	i	25	i	24		34		0		0	
Software publishers	5112	42,188		330	i	1,744	i	1,878		1,566		36,670	
Telecommunications	517	D		D		277		188		342		2,803	
Data processing, hosting, and related services	518	13,666		107	i	1,794		3,625		1,787		6,353	
Other information	other 51	D		D		167		251		225		23,921	
Finance and insurance	52	8,468		14	i	73		524		82		7,775	
Real estate and rental and leasing	53	477		13	i	5	i	45		105		309	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	27		D		0		D		0		0	
Other real estate and rental and leasing	other 53	450		D		5	i	D		105		309	
Professional, scientific, and technical services	54	46,771		1,636	i	7,356		6,864		1,561		29,354	
Architectural, engineering, and related services	5413	3,475		331	i	1,146		1,041		255		702	
Computer systems design and related services	5415	19,168		558	i	2,077	i	2,214		837		13,482	
Scientific research and development services	5417	20,254		488	i	3,012		D		272		D	
Biotechnology research and development	541711	6,079		135	i	678		450		86		4,731	
Physical, engineering, and life sciences (except biotechnology) research and development	541712	13,452		344	i	2,282		2,144		186		8,495	
Social sciences and humanities research and development	541720	723		9	i	53		D		0		D	
Other professional, scientific, and technical services	other 54	3,874		260	i	1,121	i	D		197		D	
Health care services	621–23	1,002		45	i	201		412		167	i	177	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	D		73	i	427		D		D		220	
All companies (number of domestic employees)	–	451,831		6,529	i	25,829		34,443		21,677		363,353	
Micro companies[a]													
5 – 9	–	1,726	i	891	i	720		115	i	0		0	
Small companies													
10 – 19	–	5,059	i	1,455	i	D		677		D		0	
20 – 49	–	10,000	i	1,650	i	D		1,460		D		0	
Medium companies													

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: 2016

(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
50 – 99	–	9,662	1,082 i	4,453	3,585	542	0
100 – 249	–	16,194	931 i	4,742	6,886	2,040	1,595
Large companies							
250 – 499	–	14,866	309 i	2,606	5,959	2,824	3,169
500 – 999	–	16,609	133 i	1,650	5,044	4,539	5,243
1,000 – 4,999	–	79,597	66 i	1,443	7,875	7,696	62,517
5,000 – 9,999	–	49,620	6 i	343	1,507	2,568	45,196
10,000 – 24,999	–	80,255	5 i	118	840	756	78,538
25,000 or more	–	168,243	2 i	D	497	D	167,097

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

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: 2016

(Number of companies)

Industry and company size	NAICS code	Worldwide R&D performance			Domestic R&D performance			Foreign R&D performance		
		Total[a]	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	31,842	30,108	4,820	31,784	29,999	4,790	2,524	2,455	294
Manufacturing industries	31–33	19,527	18,690	2,566	19,522	18,634	2,545	1,477	1,450	179
Food	311	1,185	1,153	123	1,185	1,153	123	76	76	3
Chemicals	325	2,907	2,640	661	2,907	2,640	657	348	342	28
Pharmaceuticals and medicines	3254	1,089	960	365	1,089	960	363	175	171	19
Other chemicals	other 325	1,818	1,680	296	1,818	1,680	294	173	171	9
Plastics and rubber products	326	1,238	1,201	97	1,238	1,201	97	69	66	7
Nonmetallic mineral products	327	417	410	84	416	409	84	14	13	D
Fabricated metal products	332	2,406	2,229	270	2,406	2,229	269	47	47	D
Machinery	333	2,781	2,698	245	2,780	2,648	239	179	178	61
Computer and electronic products	334	3,090	2,980	544	3,090	2,980	540	325	320	30
Electrical equipment, appliances, and components	335	727	719	69	727	719	66	59	59	D
Transportation equipment	336	1,154	1,114	192	1,154	1,114	189	118	111	33
Miscellaneous manufacturing	339	D	1,605	D	D	1,603	D	172	171	8
Other manufacturing	312–16, 321–24, 331, 337	D	1,951	D	D	1,949	D	75	72	4
Nonmanufacturing industries	21–23, 42–81	12,316	11,419	2,255	12,263	11,366	2,246	1,048	1,005	115
Wholesale trade	42	1,654	1,644	30	1,652	1,642	30	67	67	0
Information	51	2,385	2,350	105	2,362	2,327	103	518	516	9
Telecommunications	517	D	121	D	D	121	D	20	20	0
Data processing, hosting, and related services	518	766	745	32	765	744	32	240	239	4
Other information	other 51	D	1,484	D	D	1,462	D	258	257	5
Professional, scientific, and technical services	54	7,205	6,409	2,023	7,181	6,385	2,017	399	359	102
Architectural, engineering, and related services	5413	1,544	1,354	465	1,544	1,354	464	65	56	10
Scientific research and development services	5417	1,940	1,480	982	1,940	1,480	982	84	61	29
Biotechnology research and development	541711	411	315	205	411	315	205	20	12	10
Other scientific research and development	other 5417	1,529	1,165	777	1,529	1,165	777	64	49	19
Other professional, scientific, and technical services	other 54	3,721	3,575	576	3,697	3,551	571	251	242	63
Other nonmanufacturing	21–23, 44–45, 48–49, 52–53, 55–56, 621–24, 71–72, 81	1,072	1,017	96	1,068	1,013	95	63	63	4

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: 2016

(Number of companies)

Industry and company size	NAICS code	Worldwide R&D performance			Domestic R&D performance			Foreign R&D performance		
		Total[a]	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 companies (number of domestic employees)	–	31,842	30,108	4,820	31,784	29,999	4,790	2,524	2,455	294
Micro companies[b]										
5 – 9	–	3,943	3,579	964	3,921	3,507	964	190	181	64
Small companies										
10 – 19	–	6,761	6,395	1,088	6,757	6,390	1,085	186	174	46
20 – 49	–	8,416	7,891	1,240	8,397	7,873	1,239	354	345	16
Medium companies										
50 – 99	–	4,716	4,523	442	4,712	4,519	439	212	207	26
100 – 249	–	4,065	3,912	508	4,062	3,909	505	438	429	18
Large companies										
250 – 499	–	1,624	1,569	187	1,623	1,567	184	263	256	15
500 – 999	–	868	840	101	868	840	100	206	204	12
1,000 – 4,999	–	960	927	155	959	926	144	406	397	44
5,000 – 9,999	–	236	227	45	235	226	42	113	111	15
10,000–24,999	–	153	146	54	153	146	54	90	86	19
25,000 or more	–	100	100	36	98	98	34	66	65	20

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

NAICS = 2012 North American Industry Classification System.

[a] Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not include an adjustment to the weight to account for unit nonresponse. A company having multiple reporting parts for data collection may contribute to the statistics for multiple industries, so the detail may not add to the total for the number of companies.

[b] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 5

Worldwide R&D paid for by the company and performed by the company and others, by industry and company size: 2016

(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	435,403		388,057		47,346	
Manufacturing industries	31–33	305,593		263,081		42,512	
Food	311	5,771		5,601		170	
Beverages and tobacco products	312	1,880		1,531		349	
Textiles, apparel, and leather products	313–16	1,252		1,237	i	15	i
Wood products	321	212		196		16	
Paper	322	932		929		3	
Printing and related support activities	323	225		222	i	2	i
Petroleum and coal products	324	D		411		D	
Chemicals	325	110,658		76,311		34,347	
Basic chemicals	3251	2,997		2,817		180	
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,065		1,027		38	
Pesticides, fertilizers, and other agricultural chemicals	3253	1,528	i	1,483	i	45	
Pharmaceuticals and medicines	3254	99,287		65,751		33,535	
Soaps, cleaning compounds, and toilet preparations	3256	3,954		3,447		506	
Paints, coatings, adhesives, and other chemicals	3255, 3259	1,828		1,785		43	
Plastics and rubber products	326	4,625		4,412		213	
Nonmetallic mineral products	327	1,770		1,459		311	
Primary metals	331	698		652		46	i
Fabricated metal products	332	2,456		2,370		86	
Machinery	333	15,445		14,863		582	
Agricultural implements	33311	2,426		2,175		251	
Semiconductor machinery	333242	3,745		3,745		*	
Engines, turbines, and power transmission equipment	3336	2,281		2,269		12	
Other machinery	other 333	6,993		6,674		319	
Computer and electronic products	334	90,948		89,045		1,902	
Communications equipment	3342	14,524		14,249		276	
Semiconductors and other electronic components	3344	40,148		39,454		694	
Navigational, measuring, electromedical, and control instruments	3345	13,632		13,135		497	
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	3,450		3,386		64	
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	D		3,757		D	
Other measuring and controlling devices	other 3345	D		5,992		D	
Other computer and electronic products	other 334	22,644		22,208		436	
Electrical equipment, appliances, and components	335	5,898		5,738		160	
Transportation equipment	336	44,294		41,157		3,136	
Automobiles, bodies, trailers, and parts	3361–63	28,214		25,952		2,261	
Aerospace products and parts	3364	14,590		13,761		828	
Aircraft, aircraft engines, and aircraft parts	336411–13	14,125		13,418		707	
Guided missiles, space vehicles, and related parts	336414–15, 336419	465		344		121	
Military armored vehicles, tanks, and tank components	336992	3		3		0	
Other transportation	other 336	1,487		1,440		47	
Furniture and related products	337	433		406		27	
Miscellaneous manufacturing	339	D		16,541		D	
Medical equipment and supplies	3391	14,861		13,930		931	
Other miscellaneous manufacturing	3399	D		2,611	i	D	
Nonmanufacturing industries	21–23, 42–81	129,811		124,976		4,834	
Mining, extraction, and support activities	21	3,505		3,167		338	
Utilities	22	D		327		D	
Wholesale trade	42	D		455	i	D	

TABLE 5

Worldwide R&D paid for by the company and performed by the company and others, by industry and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Performed by the company		Performed by others	
Electronic shopping and electronic auctions	454111–12	D		D		D	
Transportation and warehousing	48–49	508		493		16	
Information	51	85,972		83,430		2,542	
Publishing	511	43,576		41,860		1,716	
Newspaper, periodical, book, and directory publishers	5111	87		81	i	6	i
Software publishers	5112	43,490		41,779		1,711	
Telecommunications	517	3,780		3,579		200	
Data processing, hosting, and related services	518	13,875		13,511		364	
Other information	other 51	24,741		24,480		261	
Finance and insurance	52	8,506		8,373		133	
Real estate and rental and leasing	53	480		477		3	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	30		27		3	
Other real estate and rental and leasing	other 53	450		450		*	
Professional, scientific, and technical services	54	25,697		24,535		1,162	
Architectural, engineering, and related services	5413	1,940		1,839		101	
Computer systems design and related services	5415	16,781		16,587		194	
Scientific research and development services	5417	3,722		2,875		846	
Biotechnology research and development	541711	1,188		753	i	435	i
Physical, engineering, and life sciences (except biotechnology) research and development	541712	2,501		2,090		411	
Social sciences and humanities research and development	541720	33		32		*	
Other professional, scientific, and technical services	other 54	3,255		3,234		21	i
Health care services	621–23	959		936		23	i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	D		D		D	
All companies (number of domestic employees)	–	435,403		388,057		47,346	
Micro companies[a]							
5 – 9	–	1,457		1,188	i	269	
Small companies							
10 – 19	–	4,600		3,964	i	636	
20 – 49	–	9,293		7,799	i	1,494	
Medium companies							
50 – 99	–	9,790		8,081		1,708	
100 – 249	–	15,396		12,998		2,397	
Large companies							
250 – 499	–	14,421		13,175		1,246	
500 – 999	–	17,344		15,671		1,673	
1,000 – 4,999	–	76,497		67,403		9,094	
5,000 – 9,999	–	48,741		44,208		4,533	
10,000 – 24,999	–	78,776		65,294		13,482	
25,000 or more	–	159,088		148,274		10,814	

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 6

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2016

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	Amount	
All business activities	21100–81000	435,403	
Oil and gas extraction	21100	1,089	
Mining	21200	63	
Support activities for mining, including oil and gas	21300	1,380	
Utilities	22100	515	
Construction	23000	274	
Food manufacturing	31100	6,178	
Beverages manufacturing	31210	787	i
Tobacco manufacturing	31220	732	
Textiles, apparel, and leather products manufacturing	31990	1,332	
Wood products manufacturing	32100	288	
Paper manufacturing	32200	1,544	
Printing and related support activities	32300	340	
Petroleum refineries	32401	625	
Asphalt paving, roofing, and saturated materials manufacturing	32402	93	
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	452	
Basic chemicals manufacturing	32510	3,472	
Resins, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	1,402	
Pesticides, fertilizers, and other agricultural chemicals manufacturing	32530	2,336	i
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing	32541	70,246	
In vitro diagnostic substances manufacturing	32542	1,340	
Biotechnology-based pharmaceutical and biological products (except diagnostic substances) manufacturing	32543	24,603	
Soaps, cleaning compounds, and toilet preparations manufacturing	32591	3,361	
Paints, adhesives, and other chemicals manufacturing	32592	2,121	
Plastics and rubber products manufacturing	32600	3,935	
Clay and glass products manufacturing	32710	1,203	
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	664	
Primary metal manufacturing	33100	720	
Fabricated metal products manufacturing	33200	2,613	
Agricultural machinery and equipment manufacturing	33311	1,977	
Construction machinery manufacturing	33312	1,464	
Mining, oil, and gas field machinery and equipment manufacturing	33319	1,529	
Semiconductor machinery manufacturing	33321	3,688	
Industrial machinery manufacturing (except semiconductor machinery)	33322	894	
Photographic and photocopying equipment manufacturing	33331	59	
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	2,232	
Digital cameras manufacturing	33333	519	
Engine, turbine, and power transmission equipment manufacturing	33360	2,637	
Metalworking and other general purpose machinery manufacturing	33390	2,574	
Computers and peripheral equipment manufacturing and magnetic and optical media	33412	23,133	
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	10,717	
Radio, television, and wireless communication equipment manufacturing	33422	2,786	
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	1,660	
Audio and video equipment manufacturing	33430	1,535	
Semiconductor and other electronic components manufacturing	33440	40,595	
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	4,125	
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments manufacturing	33452	2,615	
Measuring and control instruments manufacturing (not listed elsewhere)	33459	5,663	
Electrical equipment, appliances, and components manufacturing	33500	5,920	
Motor vehicles manufacturing	33610	20,365	
Motor vehicle body and trailer manufacturing	33620	119	

TABLE 6

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2016

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	Amount	
Motor vehicle parts manufacturing	33630	7,394	
Aircraft manufacturing	33641	5,639	
Aircraft engine and engine parts manufacturing	33642	D	
Other aircraft parts and auxiliary equipment manufacturing	33643	3,048	
Guided missiles, space vehicles, and related parts manufacturing	33644	954	
Railroad rolling stock manufacturing	33651	224	
Ship and boat building	33660	618	
Motorcycle, bicycle, and parts manufacturing	33691	335	
Military armored vehicles, tanks, and tank components manufacturing	33692	130	
All other transportation equipment manufacturing	33699	478	
Furniture and related products manufacturing	33700	490	
Medical equipment and supplies manufacturing	33910	15,602	
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	3,124	
Merchant wholesalers, durable goods	42300	647	
Merchant wholesalers, nondurable goods	42400	219	
Wholesale electronic markets and agents and brokers (business to business)	42500	24	
Retail trade (except electronic shopping and electronic auctions)	44000	121	
Electronic shopping and electronic auctions	45411	D	
Transportation	48000	123	
Couriers, messengers, and express delivery services	49200	394	
Warehousing and storage	49300	0	
Newspaper, periodical, book, and directory publishers (except Internet)	51110	87	
Software publishers (except Internet)	51120	34,806	
Motion picture and sound recording (except Internet)	51200	20	
Broadcasting (except Internet)	51500	347	
Wired telecommunications carriers	51710	1,180	
Wireless telecommunications carriers (except satellite)	51720	1,458	i
Satellite telecommunications	51740	746	
Other telecommunications (not listed elsewhere)	51790	362	
Data processing, hosting, and related services	51800	6,865	
Cloud computing applications and Internet-based software services	51801	11,690	
Other information services, including Internet publishing, broadcasting, and Web search portals	51910	27,567	
Finance: banking and credit intermediation	52200	5,171	
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	1,683	
Insurance carriers and related activities	52400	1,444	
Real estate	53100	440	
Rental and leasing services	53200	31	
Lessors of nonfinancial intangible assets, including patent licensing	53300	45	
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	1,051	
Architectural, engineering, and related services	54130	1,968	
Specialized design services	54140	26	
Computer systems design and related services	54150	15,240	
Management, scientific, and technical consulting services	54160	1,668	
Research and development services in social sciences and humanities	54172	D	
Research and development services in biotechnology	54173	1,275	
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	2,839	
Advertising and related services	54180	372	
Professional, scientific, and technical services (not listed elsewhere)	54190	621	
Management of companies and enterprises	55100	21	
Administrative and support services	56100	588	
Waste management and remediation services	56200	8	

TABLE 6

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2016

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	Amount
Offices of physicians	62110	70
Medical and diagnostic laboratories	62150	904
Other ambulatory health care services (ambulance, dental, home health care)	62199	23
Hospitals and nursing care facilities	62200	6
Social assistance services	62400	2
Arts, entertainment, and recreation	71000	45
Accommodation and food services	72000	76
Other services (not listed elsewhere)	81000	D
Undistributed	–	0

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

NAICS = 2012 North American Industry Classification System.

[a] Data are tabulated independent of the industry classification of the company. Companies were asked to report their sales and R&D activity in one or more business activity codes.
[b] Business codes and descriptions are based on 2012 NAICS industry definitions.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 7

Worldwide R&D paid for by others and performed by the company and others, by industry and company size: 2016

(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	74,224		63,774		10,450	
Manufacturing industries	31–33	48,428		40,161		8,268	
Food	311	221		220		1	
Beverages and tobacco products	312	D		D		*	
Textiles, apparel, and leather products	313–16	10		9		1	
Wood products	321	D		7	i	D	
Paper	322	*		*		*	i
Printing and related support activities	323	D		1	i	D	
Petroleum and coal products	324	D		14		D	
Chemicals	325	14,490		9,577		4,913	
Basic chemicals	3251	268		265		3	
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	18		18		*	
Pesticides, fertilizers, and other agricultural chemicals	3253	D		D		D	
Pharmaceuticals and medicines	3254	13,665		8,791		4,875	
Soaps, cleaning compounds, and toilet preparations	3256	173		142		31	
Paints, coatings, adhesives, and other chemicals	3255, 3259	D		D		D	
Plastics and rubber products	326	175		171		4	i
Nonmetallic mineral products	327	16		15		1	
Primary metals	331	D		10		D	
Fabricated metal products	332	145		114	i	31	i
Machinery	333	941		901		40	
Agricultural implements	33311	14		14		*	
Semiconductor machinery	333242	415		393		22	
Engines, turbines, and power transmission equipment	3336	60		59	i	2	
Other machinery	other 333	452		435		17	
Computer and electronic products	334	9,396		9,130		266	
Communications equipment	3342	1,871	i	1,826	i	45	i
Semiconductors and other electronic components	3344	2,287		2,241		46	
Navigational, measuring, electromedical, and control instruments	3345	5,149		4,976		173	
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	178		167		11	
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	4,773		4,616		157	
Other measuring and controlling devices	other 3345	197		193		4	
Other computer and electronic products	other 334	89		86		3	
Electrical equipment, appliances, and components	335	482	i	469	i	13	i
Transportation equipment	336	22,132		19,168		2,963	
Automobiles, bodies, trailers, and parts	3361–63	3,417		3,219		198	
Aerospace products and parts	3364	17,463		14,701		2,762	
Aircraft, aircraft engines, and aircraft parts	336411–13	16,378		13,616		2,762	
Guided missiles, space vehicles, and related parts	336414–15, 336419	1,085		1,084	i	1	
Military armored vehicles, tanks, and tank components	336992	D		D		0	
Other transportation	other 336	D		D		3	
Furniture and related products	337	*		*		0	
Miscellaneous	339	285		D		D	
Medical equipment and supplies	3391	240		213		26	
Other miscellaneous manufacturing	3399	45		D		D	
Nonmanufacturing industries	21–23, 42–81	25,795		23,613		2,182	
Mining, extraction, and support activities	21	437		437		0	
Utilities	22	40		26		14	
Wholesale trade	42	13		10	i	3	i

TABLE 7

Worldwide R&D paid for by others and performed by the company and others, by industry and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Performed by the company		Performed by others	
Electronic shopping and electronic auctions	454111–12	0		0		0	
Transportation and warehousing	48–49	3		3	i	0	
Information	51	776		703		74	
Publishing	511	480		412		68	
Newspaper, periodical, book, and directory publishers	5111	3		3	i	*	i
Software publishers	5112	477		409		68	
Telecommunications	517	D		D		0	
Data processing, hosting, and related services	518	160		155		5	
Other information	other 51	D		D		*	
Finance and insurance	52	100		94		6	
Real estate and rental and leasing	53	0		0		0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0		0		0	
Other real estate and rental and leasing	other 53	0		0		0	
Professional, scientific, and technical services	54	24,300		22,236		2,064	
Architectural, engineering, and related services	5413	2,000		1,636		363	
Computer systems design and related services	5415	2,678		2,581	i	97	
Scientific research and development services	5417	18,878		17,379		1,499	i
Biotechnology research and development	541711	D		5,326		D	
Physical, engineering, and life sciences (except biotechnology) research and development	541712	12,623		11,362		1,261	i
Social sciences and humanities research and development	541720	D		691		D	
Other professional, scientific, and technical services	other 54	744		640		104	
Health care services	621–23	68		66		2	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	59		38		21	
All companies (number of domestic employees)	–	74,224		63,774		10,450	
Micro companies[a]							
5 – 9	–	635		537	i	98	
Small companies							
10 – 19	–	1,265		1,095	i	170	i
20 – 49	–	2,541		2,201		340	
Medium companies							
50 – 99	–	1,993		1,581		412	
100 – 249	–	3,953		3,196		757	
Large companies							
250 – 499	–	1,998		1,691		307	
500 – 999	–	1,245		938		308	
1,000 – 4,999	–	14,569		12,194		2,375	
5,000 – 9,999	–	6,821		5,412		1,409	
10,000 – 24,999	–	16,290		14,961		1,329	
25,000 or more	–	22,914		19,968		2,945	

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

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: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Sales					
		R&D performers or funders[a]			Domestic R&D performers[b]		
		Worldwide	Domestic	Foreign	Worldwide	Domestic	Foreign
All industries	21–23, 31–33, 42–81	12,285,760	9,191,871	3,093,889	11,881,988	8,874,793	3,007,195
Manufacturing industries	31–33	7,483,867	5,396,816	2,087,051	7,376,945	5,325,493	2,051,452
Food	311	747,939	550,691	197,247	747,939	550,691	197,247
Beverages and tobacco products	312	230,927	146,434	84,493	200,618	146,434	54,183
Textiles, apparel, and leather products	313–16	116,524	96,812	19,712	116,524	96,812	19,712
Wood products	321	41,246	35,726	5,520	41,246	35,726	5,520
Paper	322	91,616	67,653	23,962	91,616	67,653	23,962
Printing and related support activities	323	28,619	25,059	3,560	28,619	25,059	3,560
Petroleum and coal products	324	198,336	163,381	34,955	198,336	163,381	34,955
Chemicals	325	1,446,440	1,039,760	406,681	1,443,961	1,037,281	406,681
Basic chemicals	3251	261,101	206,642	54,459	D	D	54,459
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	65,745	45,081	20,665	65,745	45,081	20,665
Pesticides, fertilizers, and other agricultural chemicals	3253	59,143	47,548	11,595 i	59,143	47,548	11,595 i
Pharmaceuticals and medicines	3254	767,140	579,390	187,750	D	D	187,750
Soaps, cleaning compounds, and toilet preparations	3256	190,498	94,911	95,587	190,498	94,911	95,587
Paints, coatings, adhesives, and other chemicals	3255, 3259	102,813	66,187	36,625	102,813	66,187	36,625
Plastics and rubber products	326	259,510	184,430	75,080	258,903	183,929	74,974
Nonmetallic mineral products	327	78,265	56,327	21,938	68,871	50,609	18,262
Primary metals	331	126,285	106,529	19,756	122,860	104,558	18,302
Fabricated metal products	332	137,763	113,185	24,579	137,566	113,038	24,528
Machinery	333	448,990	296,633	152,357	448,977	296,622	152,355
Agricultural implements	33311	65,132	40,657	24,475	65,132	40,657	24,475
Semiconductor machinery	333242	31,546	16,933	14,613	31,546	16,933	14,613
Engines, turbines, and power transmission equipment	3336	51,785	31,558	20,227	51,785	31,558	20,227
Other machinery	other 333	300,527	207,485	93,043	300,514	207,474	93,040
Computer and electronic products	334	1,267,382	786,351	481,031	1,267,382	786,351	481,031
Communications equipment	3342	145,430	104,330	41,099	145,430	104,330	41,099
Semiconductors and other electronic components	3344	410,372	273,929	136,444	410,372	273,929	136,444
Navigational, measuring, electromedical, and control instruments	3345	260,219	172,153	88,066	260,219	172,153	88,066
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	38,374	22,308	16,066	38,374	22,308	16,066
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	103,352	73,423	29,929	103,352	73,423	29,929
Other measuring and controlling devices	other 3345	118,493	76,421	42,072	118,493	76,421	42,072
Other computer and electronic products	other 334	451,362	235,940	215,422	451,362	235,940	215,422
Electrical equipment, appliances, and components	335	227,674	148,671	79,004	227,518	148,514	79,004
Transportation equipment	336	1,631,162	1,289,540	341,622	1,571,189	1,229,567	341,622

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: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Sales					
		R&D performers or funders[a]			Domestic R&D performers[b]		
		Worldwide	Domestic	Foreign	Worldwide	Domestic	Foreign
Automobiles, bodies, trailers, and parts	3361–63	1,134,364	886,881	247,483	1,074,391	826,908	247,483
Aerospace products and parts	3364	416,414	336,565	79,848	416,414	336,565	79,848
Aircraft, aircraft engines, and aircraft parts	336411–13	394,437	319,476	74,961	394,437	319,476	74,961
Guided missiles, space vehicles, and related parts	336414–15, 336419	21,976	17,089	4,887	21,976	17,089	4,887
Military armored vehicles, tanks, and tank components	336992	245	245	0	245	245	0
Other transportation	other 336	80,139	65,849	14,290	80,139	65,849	14,290
Furniture and related products	337	41,066	35,370	5,697	41,066	35,370	5,697
Miscellaneous manufacturing	339	364,122	254,265	109,857	363,755	253,899	109,857
Medical equipment and supplies	3391	254,570	178,892	75,678	254,570	178,892	75,678
Other miscellaneous manufacturing	3399	109,552	75,374	34,179 i	109,185	75,007	34,179 i
Nonmanufacturing industries	21–23, 42–81	4,801,893	3,795,055	1,006,838	4,505,042	3,549,300	955,743
Mining, extraction, and support activities	21	487,062	209,694	277,368	475,103	199,424	275,678
Utilities	22	317,418	313,058	4,361	216,109	211,748	4,361
Wholesale trade	42	177,270	161,921	15,348	175,609	161,190	14,419
Electronic shopping and electronic auctions	454111–12	D	109,664	D	D	109,619	D
Transportation and warehousing	48–49	243,502	199,681	43,821	243,502	199,681	43,821
Information	51	1,328,727	1,064,822	263,905	1,314,079	1,054,030	260,048
Publishing	511	549,084	399,746	149,339	548,783	399,678	149,104
Newspaper, periodical, book, and directory publishers	5111	3,954	3,637	317	3,954	3,637	317
Software publishers	5112	545,130	396,108	149,022	544,829	396,041	148,787
Telecommunications	517	468,117	455,430	12,687	468,091	455,414	12,677
Data processing, hosting, and related services	518	133,836	104,974	28,862	133,700	104,838	28,862
Other information	other 51	177,690	104,672	73,018	163,505	94,100	69,406
Finance and insurance	52	797,888	713,192	84,697	797,184	712,487	84,697
Real estate and rental and leasing	53	5,435	5,298	137	5,435	5,298	137
Lessors of nonfinancial intangible assets (except copyrighted works)	533	D	694	D	D	694	D
Other real estate and rental and leasing	other 53	D	4,604	D	D	4,604	D
Professional, scientific, and technical services	54	562,101	421,882	140,220	561,457	421,387	140,070
Architectural, engineering, and related services	5413	133,738	100,649	33,089	133,738	100,649	33,089
Computer systems design and related services	5415	263,361	175,787	87,574	262,859	175,434	87,425
Scientific research and development services	5417	78,259	66,620	11,639	78,117	66,478	11,639
Biotechnology research and development	541711	30,318	27,339	2,979	30,305	27,326	2,979
Physical, engineering, and life sciences (except biotechnology) research and development	541712	D	36,705	D	D	36,576	D
Social sciences and humanities research and development	541720	D	2,576	D	D	2,576	D

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: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Sales					
		R&D performers or funders[a]			Domestic R&D performers[b]		
		Worldwide	Domestic	Foreign	Worldwide	Domestic	Foreign
Other professional, scientific, and technical services	other 54	86,744	78,826	7,918	86,744	78,826	7,918
Health care services	621–23	80,599	79,471	1,128	79,346	78,218	1,128
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	D	516,373	D	D	396,216	D
All companies (number of domestic employees)	–	12,285,760	9,191,871	3,093,889	11,881,988	8,874,793	3,007,195
Micro companies[c]							
5 – 9	–	7,819	6,778	1,041	7,539	6,746	793
Small companies							
10 – 19	–	26,525	25,795	730	26,396	25,756	641
20 – 49	–	103,214	100,067	3,147	102,395	99,325	3,071
Medium companies							
50 – 99	–	119,232	113,696	5,536	118,447	113,199	5,249
100 – 249	–	323,326	271,388	51,938	292,833	271,205	21,628
Large companies							
250 – 499	–	316,526	276,513	40,014	315,031	275,766	39,265
500 – 999	–	397,279	326,260	71,019	386,701	315,732	70,968
1,000 – 4,999	–	1,662,808	1,238,059	424,749	1,635,116	1,215,008	420,108
5,000 – 9,999	–	1,336,675	994,329	342,346	1,312,926	970,580	342,346
10,000 – 24,999	–	2,329,719	1,677,581	652,138	2,267,216	1,618,690	648,526
25,000 or more	–	5,662,637	4,161,406	1,501,231	5,417,386	3,962,786	1,454,600

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

NAICS = 2012 North American Industry Classification System.

[a] Statistics are representative of companies located in the United States that performed or funded R&D and are comparable to previously published sales statistics from the Business R&D and Innovation Survey.

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

[c] Business R&D and Innovation Survey does not include companies with fewer than five 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 R&D.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 9

Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2016

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	Worldwide		Domestic		Foreign	
All business activities	21100–81000	12,285,760		9,191,871		3,093,889	
Oil and gas extraction	21100	117,732		58,244		59,489	
Mining	21200	28,755		18,634		10,121	
Support activities for mining, including oil and gas	21300	44,702		25,825		18,877	
Utilities	22100	306,761		302,288		4,473	
Construction	23000	52,281		45,590		6,691	
Food manufacturing	31100	707,781		523,397		184,384	
Beverages manufacturing	31210	155,463		111,433		44,030	
Tobacco manufacturing	31220	65,022		34,196		30,826	
Textiles, apparel, and leather products manufacturing	31990	113,516		93,256		20,260	
Wood products manufacturing	32100	40,764		35,117		5,647	
Paper manufacturing	32200	126,987		92,775		34,212	
Printing and related support activities	32300	31,309		26,808		4,501	
Petroleum refineries	32401	415,590		245,480		170,110	
Asphalt paving, roofing, and saturated materials manufacturing	32402	12,300		9,066		3,234	
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	15,672		10,569		5,103	
Basic chemicals manufacturing	32510	264,981		205,258		59,722	
Resins, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	91,427		58,372		33,055	
Pesticides, fertilizers, and other agricultural chemicals manufacturing	32530	59,610		42,103		17,507	
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing	32541	599,300		454,867		144,433	
In vitro diagnostic substances manufacturing	32542	16,288		7,753		8,536	i
Biotechnology-based pharmaceutical and biological products (except diagnostic substances) manufacturing	32543	90,940		77,531		13,408	
Soaps, cleaning compounds, and toilet preparations manufacturing	32591	164,824		83,100		81,724	
Paints, adhesives, and other chemicals manufacturing	32592	118,873		73,419		45,453	
Plastics and rubber products manufacturing	32600	240,149		175,735		64,414	
Clay and glass products manufacturing	32710	47,765		30,853		16,912	
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	34,781		28,328		6,453	
Primary metal manufacturing	33100	121,362		105,918		15,444	
Fabricated metal products manufacturing	33200	165,127		129,815		35,312	
Agricultural machinery and equipment manufacturing	33311	51,777		30,093		21,684	
Construction machinery manufacturing	33312	49,370		35,074		14,296	
Mining, oil, and gas field machinery and equipment manufacturing	33319	48,043		21,616		26,427	
Semiconductor machinery manufacturing	33321	30,749		15,676		15,074	
Industrial machinery manufacturing (except semiconductor machinery)	33322	37,747		25,375		12,372	
Photographic and photocopying equipment manufacturing	33331	7,670		6,774		896	
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	114,388		76,726		37,662	
Digital cameras manufacturing	33333	5,580	i	2,068	i	3,512	i
Engine, turbine, and power transmission equipment manufacturing	33360	89,194		52,344		36,850	
Metalworking and other general purpose machinery manufacturing	33390	116,040		77,458		38,582	
Computers and peripheral equipment manufacturing and magnetic and optical media	33412	414,723		212,338		202,386	
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	76,228		44,014		32,213	
Radio, television, and wireless communication equipment manufacturing	33422	49,323		40,293	i	9,030	
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	16,352		14,452		1,900	
Audio and video equipment manufacturing	33430	35,473		25,739	i	9,734	
Semiconductor and other electronic components manufacturing	33440	296,187		156,528		139,659	

TABLE 9

Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2016

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	Worldwide		Domestic		Foreign	
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	47,577		32,312		15,265	
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments manufacturing	33452	59,659		47,879		11,780	
Measuring and control instruments manufacturing (not listed elsewhere)	33459	102,293		62,706		39,587	
Electrical equipment, appliances, and components manufacturing	33500	213,569		140,087		73,482	
Motor vehicles manufacturing	33610	709,702		574,326		135,376	
Motor vehicle body and trailer manufacturing	33620	63,845		63,455		390	
Motor vehicle parts manufacturing	33630	245,224		152,650		92,573	
Aircraft manufacturing	33641	136,497		130,676		5,821	
Aircraft engine and engine parts manufacturing	33642	38,176		36,861		1,316	
Other aircraft parts and auxiliary equipment manufacturing	33643	85,120		68,070		17,050	
Guided missiles, space vehicles, and related parts manufacturing	33644	30,600		30,261		339	
Railroad rolling stock manufacturing	33651	14,871		11,110		3,761	
Ship and boat building	33660	D		33,497	i	D	
Motorcycle, bicycle, and parts manufacturing	33691	9,525		6,294	i	3,231	i
Military armored vehicles, tanks, and tank components manufacturing	33692	4,263		4,185		78	
All other transportation equipment manufacturing	33699	14,472		11,977		2,496	
Furniture and related products manufacturing	33700	45,372		38,473		6,898	
Medical equipment and supplies manufacturing	33910	239,051		162,044		77,007	
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	131,768		86,242		45,526	i
Merchant wholesalers, durable goods	42300	224,331		196,996		27,336	
Merchant wholesalers, nondurable goods	42400	513,889		360,816		153,073	
Wholesale electronic markets and agents and brokers (business to business)	42500	60,202		59,657		544	
Retail trade (except electronic shopping and electronic auctions)	44000	292,344		275,053		17,291	
Electronic shopping and electronic auctions	45411	D		110,618		D	
Transportation	48000	126,059		108,956		17,103	
Couriers, messengers, and express delivery services	49200	187,345		141,429		45,916	
Warehousing and storage	49300	4,652		3,359		1,294	
Newspaper, periodical, book, and directory publishers (except Internet)	51110	8,704		7,262		1,441	
Software publishers (except Internet)	51120	256,714		155,325		101,389	
Motion picture and sound recording (except Internet)	51200	9,353		6,863		2,490	
Broadcasting (except Internet)	51500	84,899		70,184		14,715	
Wired telecommunications carriers	51710	181,904		179,239		2,665	
Wireless telecommunications carriers (except satellite)	51720	172,416		172,357		59	
Satellite telecommunications	51740	61,927		61,622		305	
Other telecommunications (not listed elsewhere)	51790	8,524		7,685		840	
Data processing, hosting, and related services	51800	76,310		59,466		16,844	
Cloud computing applications and Internet-based software services	51801	56,784		44,095		12,689	
Other information services, including Internet publishing, broadcasting, and Web search portals	51910	112,825		75,034		37,791	
Finance: banking and credit intermediation	52200	401,295		343,070		58,225	
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	72,115		55,068		17,046	
Insurance carriers and related activities	52400	372,903		353,842		19,060	i
Real estate	53100	9,311		9,253		57	
Rental and leasing services	53200	19,067		12,368		6,699	
Lessors of nonfinancial intangible assets, including patent licensing	53300	1,468		1,386		82	
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	19,511		16,696		2,815	
Architectural, engineering, and related services	54130	105,993		79,090		26,903	

TABLE 9

Worldwide, domestic, and foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2016

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	Worldwide		Domestic		Foreign	
Specialized design services	54140	706		638		68	
Computer systems design and related services	54150	249,595		175,987		73,608	
Management, scientific, and technical consulting services	54160	63,141		55,607		7,534	
Research and development services in social sciences and humanities	54172	1,131		1,124		7	
Research and development services in biotechnology	54173	9,090		6,614		2,476	i
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	37,987		30,731		7,255	
Advertising and related services	54180	D		44,671		D	
Professional, scientific, and technical services (not listed elsewhere)	54190	13,888		12,355		1,533	
Management of companies and enterprises	55100	11,794	i	11,173	i	622	
Administrative and support services	56100	55,675		27,537		28,138	
Waste management and remediation services	56200	27,493		25,585		1,908	
Offices of physicians	62110	40,574		40,574		0	
Medical and diagnostic laboratories	62150	27,294	i	25,398	i	1,896	i
Other ambulatory health care services (ambulance, dental, home health care)	62199	5,226		5,226		0	
Hospitals and nursing care facilities	62200	32,896		32,609		287	
Social assistance services	62400	77		77		0	
Arts, entertainment, and recreation	71000	20,639		17,723		2,916	
Accommodation and food services	72000	66,954		32,457		34,497	
Other services (not listed elsewhere)	81000	238,452		173,754		64,699	
Less: intersegment eliminations	–	227,524		130,160		97,364	
Undistributed	–	0		0		0	

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

NAICS = 2012 North American Industry Classification System.

[a] Data are tabulated independent of the industry classification of the company. Companies were asked to report their sales and R&D activity in one or more business activity codes.
[b] Business codes and descriptions are based on 2012 NAICS industry definitions.

Note(s)

Domestic sales are the amount of sales that originated from domestic operations. Foreign sales are the amount of sales that originated from foreign operations. Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded R&D.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

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: 2016

(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	374,685	214,959	21,644	16,704	5,584	26,696	6,100	13,674	1,928	10,196	57,200
Manufacturing industries	31–33	250,553	137,103	9,666	10,045	3,802	23,040	3,556	10,138	1,660	6,705	44,838
Food	311	4,828	2,942 i	93 i	131 i	30 i	404 i	61	225 i	166 i	256 i	521
Beverages and tobacco products	312	D	D	16	48	7	78	11	55	0	18	D
Textiles, apparel, and leather products	313–16	1,166 i	771 i	29 i	53 i	2 i	118 i	3 i	23 i	1 i	55 i	109 i
Wood products	321	188	136	D	11	2	24	D	3	* i	2	D
Paper	322	851	D	* i	D	35 i	346 i	D	D	1 i	D	D
Printing and related support activities	323	219 i	D	D	D	10	D	10 i	D	*	*	D
Petroleum and coal products	324	381	251	*	8	D	D	2	D	1	D	D
Chemicals	325	73,575	33,090	3,446	4,651	441	6,394	1,148	3,736	827 i	1,713	18,128
Basic chemicals	3251	2,545	1,576	6	D	49	233	D	147	1	116	D
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	711	D	D	43	D	D	15	D	1	D	D
Pesticides, fertilizers, and other agricultural chemicals	3253	D	D	D	D	3	103 i	D	D	8 i	D	D
Pharmaceuticals and medicines	3254	64,628	27,812	3,411	4,238	360	5,771	983	3,246	817 i	1,472	16,517
Soaps, cleaning compounds, and toilet preparations	3256	2,800	1,625	14	126	6	158	24	D	*	14	D
Paints, coatings, adhesives, and other chemicals	3255, 3259	D	1,016	4	D	D	D	46	D	1	16	D
Plastics and rubber products	326	3,752	2,113	54	87	144	533	41	192	1	192	396
Nonmetallic mineral products	327	1,289	801	1	46	6	92	9	76	1	13	244
Primary metals	331	592	339	3 i	8	1	116	3 i	19	5	8	91 i
Fabricated metal products	332	2,239	1,408	20	D	31	292	21	38	12	30	D
Machinery	333	12,585	7,402	137	703	107	1,654	77	531	21	210	1,743
Agricultural implements	33311	1,565	874	*	116	16	253	6	46	2	7	244
Semiconductor machinery	333242	3,411	1,673	80	108	11	451	3	247	3	85	749
Engines, turbines, and power transmission equipment	3336	1,959	1,181	1	295	*	211 i	1	91	6	9	164 i
Other machinery	other 333	5,650	3,674	56 i	184 i	79	739	67	146	9 i	110	586
Computer and electronic products	334	77,385	47,344	5,488	1,891	1,418	4,641	1,526	3,716	421	2,752	8,188
Communications equipment	3342	13,112	8,016	777	434	159	317	932	560	22 i	621 i	1,273
Semiconductors and other electronic components	3344	31,391	20,208 i	2,263 i	660	345	1,569 i	341 i	1,691 i	112 i	1,062	3,142 i
Navigational, measuring, electromedical, and control instruments	3345	14,885	9,637	208	593	195	1,466	163	345	8	318	1,951
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	2,632	1,557 i	72 i	87 i	16 i	216	33	81 i	3 i	97	470
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	7,533	5,094	32	298	35	879	28	144	D	108	D
Other measuring and controlling devices	other 3345	4,720	2,986	105	208	145	372	102	119	D	113	D
Other computer and electronic products	other 334	17,997	9,483	2,239	205	719	1,289	90	1,120	279	751	1,822
Electrical equipment, appliances, and components	335	4,771	3,183	32	201	40	317	66	125	4	81	722

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: 2016

(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 equipment	336	51,275	27,424	7	1,603	1,306	6,925	461	872	152	997	11,530
Automobiles, bodies, trailers, and parts	3361–63	22,042	12,470	7	1,252	D	3,570	299	640	127	D	D
Aerospace products and parts	3364	26,645	13,397	*	D	167	2,865	130	191	D	665	D
Aircraft, aircraft engines, and aircraft parts	336411–13	25,221	12,747	*	265	165	2,321	128	190	D	665	D
Guided missiles, space vehicles, and related parts	336414–15, 336419	1,424 i	649 i	0	D	2	544	2	1	*	1 i	D
Military armored vehicles, tanks, and tank components	336992	D	D	0	*	0	D	D	*	0	*	D
Other transportation	other 336	D	D	0	D	D	D	D	41	D	D	D
Furniture and related products	337	366	D	0	D	D	D	D	3	1	4 i	41 i
Miscellaneous	339	D	8,525	335	538	219	1,041	113	473	47	363	D
Medical equipment and supplies	3391	11,668	6,884	332	501	209	907	99	436	46	346	1,908
Other miscellaneous manufacturing	3399	D	1,642 i	3 i	37	10 i	135 i	14 i	37 i	1 i	16 i	D
Nonmanufacturing industries	21–23, 42–81	124,132	77,856	11,978	6,658	1,782	3,656	2,544	3,536	268	3,491	12,362
Mining, extraction, and support activities	21	3,296	1,972	37	146	3	166	63	108	3	D	D
Utilities	22	351	115 i	D	33 i	1	D	D	68 i	4 i	D	D
Wholesale trade	42	452 i	327 i	0	8 i	* i	D	D	4 i	8 i	9 i	D
Electronic shopping and electronic auctions	454111–12	1,569 i	1,106 i	D	1 i	* i	1 i	* i	182 i	0	0	D
Transportation and warehousing	48–49	488	389	0	84	1	6	1	0	0	*	6 i
Information	51	70,748	43,191	10,886	3,333	1,353	1,335 i	1,844	1,983	208	984	5,633
Publishing	511	33,574	22,827	2,793	1,297	188	442	589	619	104	821	3,893
Newspaper, periodical, book, and directory publishers	5111	79 i	55 i	* i	1 i	2 i	4 i	* i	7 i	0	10 i	1 i
Software publishers	5112	33,495	22,772	2,793	1,297	186	439	589	612	104	811	3,892
Telecommunications	517	D	2,167	187 i	175	D	745 i	189 i	D	1	2	D
Data processing, hosting, and related services	518	11,914	8,414	D	384	232	67	178	282	103	131	D
Other information	other 51	D	9,782	D	1,476	D	80	887	D	* i	29 i	D
Finance and insurance	52	7,331	4,599	29	1,576	46	9	50	94	0	434	494
Real estate and rental and leasing	53	475	416	D	9	*	2 i	6	9	5	4	D
Lessors of nonfinancial intangible assets (except copyrighted works)	533	27	22	0	*	0	*	*	0	* i	4	* i
Other real estate and rental and leasing	other 53	449	394	D	9	*	2 i	6	9	5	*	D
Professional, scientific, and technical services	54	37,595	24,485	831	1,414	353	1,919	537	1,045	38	1,602 i	5,369
Architectural, engineering, and related services	5413	3,412	2,539	8	124	17	188	41	23	*	122	351
Computer systems design and related services	5415	15,747	10,707	597	574	186	505	178	591	4	95	2,310
Scientific research and development services	5417	14,842	8,300	158	596	102	1,174	284	380	31	1,368 i	2,448
Biotechnology research and development	541711	4,464	2,467	67	203	16	343	87	D	6	634	D
Physical, engineering, and life sciences (except biotechnology) research and development	541712	9,659	5,327 i	86	380 i	81	828	180	307 i	25	726 i	1,720 i

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: 2016

(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
Social sciences and humanities research and development	541720	719	506	6	13	6	2	18	D	*	9	D
Other professional, scientific, and technical services	other 54	3,595	2,939	68 i	121 i	48 i	53	34	52	3	18	260
Health care services	621–23	848	478	56	25 i	9	93	30	34	3	20	101 i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	977 i	777 i	23	30	15 i	47 i	9	8 i	1 i	7	60 i
All companies (number of domestic employees)	–	374,685	214,959	21,644	16,704	5,584	26,696	6,100	13,674	1,928	10,196	57,200
Micro companies[a]												
5 – 9	–	1,581 i	923 i	48 i	81 i	32 i	129 i	35 i	37 i	9 i	52 i	235 i
Small companies												
10 – 19	–	4,958 i	2,884 i	106 i	541	72 i	395 i	115	94 i	32	86 i	631 i
20 – 49	–	9,662 i	6,028 i	284	448	124 i	886	205	193 i	62	159 i	1,275 i
Medium companies												
50 – 99	–	9,298	5,733	314	396	84 i	792	221	245	47	241	1,226
100 – 249	–	14,875	9,198	589	686	179	1,288	290	371	121	298	1,856
Large companies												
250 – 499	–	13,092	7,956	714	470	301	842	228	363	193	271	1,755
500 – 999	–	14,450	8,886	773	543	235	977	344	469	98	340	1,784
1,000 – 4,999	–	63,971	36,794	4,329	2,075	889	3,958	836	2,616	266	1,860	10,348
5,000 – 9,999	–	40,633	22,337	D	2,001	393	2,302	786 i	1,294	51	610	D
10,000 – 24,999	–	65,594	37,692	1,661	2,770	562	6,275	660	3,297	297	2,639	9,742
25,000 or more	–	136,571	76,529	D	6,692	2,713	8,852	2,381	4,696	752 i	3,639	D

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 11

Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2016

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)											
		All companies	5 – 9[a]	10 – 19	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	374,685	1,581 i	4,958 i	9,662 i	9,298	14,875	13,092	14,450	63,971	40,633	65,594	136,571
Manufacturing industries	31–33	250,553	477 i	2,224 i	4,460	5,386	9,238	7,788	9,685	44,885	24,102	54,423	87,884
Food	311	4,828	5 i	6 i	D	58 i	281 i	153	95	664	249	2,456	D
Beverages and tobacco products	312	D	0	0	18 i	3 i	17 i	D	22	24	198	24	676
Textiles, apparel, and leather products	313–16	1,166 i	2 i	1 i	20 i	26 i	337 i	28	14 i	254	274	104	106
Wood products	321	188	0	9 i	4 i	5 i	11 i	7 i	27	56	46	24	0
Paper	322	851	0	4 i	6 i	14 i	30 i	23	21	151	163	418	22
Printing and related support activities	323	219 i	2 i	1 i	22 i	20 i	49	12 i	23	57 i	17	7	8
Petroleum and coal products	324	381	D	3	20 i	14	117	23	45	D	0	135	0
Chemicals	325	73,575	D	1,165	1,855	2,570	3,820	3,065	2,038	14,598	7,220	22,624	D
Basic chemicals	3251	2,545	0	D	52	D	163	156	100	D	501	405	0
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	711	D	D	20 i	D	D	D	62	D	0	D	0
Pesticides, fertilizers, and other agricultural chemicals	3253	D	0	D	D	31	D	D	0	D	*	D	0
Pharmaceuticals and medicines	3254	64,628	222	D	1,623	2,266	3,413	2,722	1,741	11,971	6,072	D	D
Soaps, cleaning compounds, and toilet preparations	3256	2,800	3 i	17 i	D	55 i	D	19	103	D	397 i	D	150 i
Paints, coatings, adhesives, and other chemicals	3255, 3259	D	3 i	D	D	D	D	D	33	593	250	D	65
Plastics and rubber products	326	3,752	3 i	32 i	96 i	111 i	206 i	173	174	912	468	1,422	155
Nonmetallic mineral products	327	1,289	1 i	3 i	18 i	29	48	12	72	119	116	870	0
Primary metals	331	592	4 i	17 i	16 i	68	44 i	35	35	187	44	141 i	0
Fabricated metal products	332	2,239	24 i	92 i	252 i	218 i	401	198	291	308	238	218	0
Machinery	333	12,585	17 i	149 i	485 i	450 i	729	447	605	3,848	1,849	975	3,030
Agricultural implements	33311	1,565	2 i	6	18	13	43	13	62	319	9	0	1,079
Semiconductor machinery	333242	3,411	3 i	5 i	D	D	D	D	175	D	D	0	0
Engines, turbines, and power transmission equipment	3336	1,959	D	D	D	37 i	32	82	D	39	D	0	D
Other machinery	other 333	5,650	D	D	D	D	D	D	D	D	D	975	D
Computer and electronic products	334	77,385	89 i	411 i	941	808	1,622	2,086	3,616	15,157	7,575	13,482	31,599
Communications equipment	3342	13,112	6 i	77 i	D	120	367	D	1,093	3,117	D	D	D
Semiconductors and other electronic components	3344	31,391	13 i	75 i	479	296	566	1,206	1,104	6,612 i	3,140 i	7,877	10,024
Navigational, measuring, electromedical, and control instruments	3345	14,885	63 i	244 i	308 i	317	545	D	669	3,643	D	D	4,514
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	2,632	20 i	162 i	50 i	55	254	124	283	1,011	174	499	0
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	7,533	1	D	53 i	36	D	D	D	D	D	D	D
Other measuring and controlling devices	other 3345	4,720	41 i	D	205 i	226	D	D	D	D	D	D	D
Other computer and electronic products	other 334	17,997	7 i	16	D	75	144	151 i	751	1,784	2,449	D	D
Electrical equipment, appliances, and components	335	4,771	8 i	38 i	160	155	307	208	631	1,085	582	1,218	378
Transportation equipment	336	51,275	1 i	103	146 i	216	503	783	1,239	4,192	3,141	7,041	33,910

TABLE 11

Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2016

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)											
		All companies	5 – 9[a]	10 – 19	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
Automobiles, bodies, trailers, and parts	3361–63	22,042	0	75	D	140	D	D	D	3,108	1,352	2,679	D
Aerospace products and parts	3364	26,645	0	D	17	D	88	40	D	725	D	4,192	19,704
Aircraft, aircraft engines, and aircraft parts	336411–13	25,221	0	13	13	D	88	40	D	618	913	3,590	19,704
Guided missiles, space vehicles, and related parts	336414–15, 336419	1,424 i	0	D	4	6 i	0	0	23	107	D	602	0
Military armored vehicles, tanks, and tanks components	336992	D	* i	*	D	D	D	D	0	0	0	0	0
Other transportation	other 336	D	1 i	D	D	12 i	D	D	D	360	D	171	D
Furniture and related products	337	366	0	3 i	18 i	12 i	40 i	38 i	7 i	58	176	14	0
Miscellaneous manufacturing	339	D	D	187 i	D	610	678	D	728	D	1,745 i	3,250	D
Medical equipment and supplies	3391	11,668	D	174 i	323	524	489	290	533	2,356	1,129	3,250	D
Other miscellaneous manufacturing	3399	D	D	12 i	D	86 i	189 i	D	195	D	615 i	0	208 i
Nonmanufacturing industries	21–23, 42–81	124,132	1,104 i	2,733 i	5,202 i	3,912	5,637	5,304	4,765	19,086	16,531 i	11,171	48,687
Mining, extraction, and support activities	21	3,296	1 i	2	D	25	D	14	10	65	258 i	D	1,390
Utilities	22	351	0	0	D	0	* i	0	3	38	12	D	D
Wholesale trade	42	452 i	D	75 i	107 i	70 i	92 i	D	17 i	11 i	2 i	2 i	1 i
Electronic shopping and electronic auctions	454111–12	1,569 i	5 i	3 i	31 i	5 i	11 i	D	0	3	D	0	D
Transportation and warehousing	48–49	488	0	0	4 i	* i	4	2 i	18	28	0	0	433
Information	51	70,748	D	597 i	1,410 i	D	D	3,109	2,639	11,575	13,128 i	2,427	32,657
Publishing	511	33,574	D	D	566 i	561	781	818	1,165	D	5,190	D	D
Newspaper, periodical, book, and directory publishers	5111	79 i	0	* i	11 i	3 i	18 i	36	9	1 i	0	0	0
Software publishers	5112	33,495	D	D	555 i	558	763	782	1,156	D	5,190	D	D
Telecommunications	517	D	0	6 i	77 i	D	74	124	D	D	0	D	D
Data processing, hosting, and related services	518	11,914	10 i	D	740 i	D	897	2,044	1,256	4,226	D	1,609	D
Other information	other 51	D	D	11	26	D	D	123	D	D	D	5	D
Finance and insurance	52	7,331	0	5 i	8 i	14 i	46	48	588	458	466	2,687	3,013
Real estate and rental and leasing	53	475	0	5 i	1 i	5 i	25	2	2	435	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	27	0	0	1 i	2 i	24	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	449	0	5 i	1 i	4 i	1 i	2	2	435	0	0	0
Professional, scientific, and technical services	54	37,595	954 i	2,012 i	3,551 i	2,449	3,304	1,829	1,234	6,174	1,541 i	4,234	10,313
Architectural, engineering, and related services	5413	3,412	69 i	175 i	468	369 i	533 i	290	203	314	187	102	702
Computer systems design and related services	5415	15,747	151 i	298 i	1,222 i	639 i	1,182 i	595	644	2,010	549	1,837 i	6,619
Scientific research and development services	5417	14,842	661 i	1,024 i	1,468	1,193	1,307	603	134	3,614	744 i	2,283	1,810
Biotechnology research and development	541711	4,464	220 i	226 i	337	D	135 i	96	4	D	0	0	1,810
Physical, engineering, and life sciences (except biotechnology) research and development	541712	9,659	D	785 i	1,107	899	1,168	507	130	1,617	D	2,283	0
Social sciences and humanities research and development	541720	719	D	13 i	24	D	5 i	0	0	D	D	0	0
Other professional, scientific, and technical services	other 54	3,595	72 i	515 i	393 i	248	282	341	253	237	60	11	1,182

TABLE 11

Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2016

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)																							
		All companies		5 – 9[a]		10 – 19		20 – 49		50 – 99		100 – 249		250 – 499		500 – 999		1,000 – 4,999		5,000 – 9,999		10,000 – 24,999		25,000 or more	
Health care services	621–23	848		D		22	i	42		87		200	i	161	i	178		D		44		0		D	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	977	i	14	i	12	i	D		D		57		D		75		D		D		119	i	D	

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

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: 2016

(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	374,685		24,644		61,020		289,021	
Manufacturing industries	31–33	250,553		18,882		42,443		189,228	
Food	311	4,828		502	i	1,470	i	2,856	
Beverages and tobacco products	312	D		155		D		D	
Textiles, apparel, and leather products	313–16	1,166	i	85		120		961	i
Wood products	321	188		13		45		130	
Printing and related support activities	323	219	i	31		33	i	155	
Chemicals	325	73,575		10,117		15,771		47,687	
Pharmaceuticals and medicines	3254	64,628		9,237		13,753		41,638	
Other chemicals	other 325	8,947		880		2,018		6,049	
Plastics and rubber products	326	3,752		346		874		2,532	
Nonmetallic mineral products	327	1,289		150		291		848	
Primary metals	331	592		65	i	115	i	412	
Fabricated metal products	332	2,239		120	i	413	i	1,706	
Machinery	333	12,585		654		1,530		10,401	
Computer and electronic products	334	77,385		2,468	i	10,298		64,619	
Semiconductors and other electronic components	3344	31,391		821	i	4,501		26,069	i
Navigational, measuring, electromedical, and control instruments	3345	14,885		755	i	2,212		11,918	i
Other computer and electronic products	other 334	31,109		892		3,584		26,632	
Electrical equipment, appliances, and components	335	4,771		312	i	727		3,732	
Transportation equipment	336	51,275		3,112	i	7,859		40,305	
Aerospace products and parts	3364	26,645		1,629	i	3,742		21,274	
Other transportation equipment	other 336	24,630		1,483		4,117		19,031	
Furniture and related products	337	366		16	i	85		265	
Miscellaneous manufacturing	322, 324, 339	D		737		D		D	
Nonmanufacturing industries	21–23, 42–81	124,132		5,762		18,576		99,794	
Information	51	70,748		2,028		6,805		61,916	
Publishing	511	33,574		1,092		2,846		29,636	
Telecommunications	517	D		377		D		D	
Data processing, hosting, and related services	518	11,914		D		D		10,051	
Other information	other 51	D		D		D		D	
Professional, scientific, and technical services	54	37,595		2,671	i	9,900	i	25,024	i
Architectural, engineering, and related services	5413	3,412		330		1,423		1,659	
Computer systems design and related services	5415	15,747		873	i	3,342		11,532	
Scientific research and development services	5417	14,842		1,282		4,305	i	9,255	i
Biotechnology research and development	541711	4,464		586		592		3,286	i
Physical, engineering, and life sciences (except biotechnology) research and development	541712	9,659		640	i	3,263	i	5,756	i
Social sciences and humanities research and development	541720	719		57	i	450	i	212	i
Other professional, scientific, and technical services	other 54	3,595		186		831	i	2,578	
Other nonmanufacturing	21–23, 42–49, 52, 53, 55–81	15,789		1,064	i	1,871		12,854	
All companies (number of domestic employees)	–	374,685		24,644		61,020		289,021	
Micro companies[a]									
5 – 9	–	1,581	i	202	i	485	i	894	i
Small companies									
10 – 19	–	4,958	i	383	i	1,471	i	3,104	i
20 – 49	–	9,662	i	860	i	2,554	i	6,248	
Medium companies									
50 – 99	–	9,298		910	i	2,038		6,350	

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: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
100 – 249	–	14,875	1,104	3,243	10,529
Large companies					
250 – 499	–	13,092	788	2,870	9,434
500 – 999	–	14,450	1,158	2,329	10,963
1,000 – 4,999	–	63,971	4,794	12,711	46,466
5,000 – 9,999	–	40,633	1,955	4,468	34,210
10,000 – 24,999	–	65,594	3,826	11,736	50,033
25,000 or more	–	136,571	8,664	17,115	110,792

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 13

Domestic R&D paid for by the company and others and performed by the company, by source of funds and state: 2016

(Millions of U.S. dollars)

State	Total		Paid for by the company		Paid for by others					
					Total		Federal		Nonfederal	
All states	374,685		317,731		56,954		23,772		33,182	
Alabama	1,694		868		826		681		145	
Alaska	34	e	27	e	7	e	4		3	e
Arizona	6,472		4,743		1,730		829		900	
Arkansas	366		340		27		4		22	
California	117,569		105,769		11,800		5,500		6,300	
Colorado	4,355		3,542		813		549		265	
Connecticut	7,987		6,101		1,886	i	1,544	i	342	
Delaware	2,069		1,463		605		7		598	
District of Columbia	328		230		98		76		21	
Florida	6,273		4,441		1,832	i	1,209	i	623	
Georgia	5,245		4,273		972	i	95	i	877	i
Hawaii	164		114	i	49		11		38	
Idaho	1,590		1,398		192		7		185	
Illinois	13,733		11,822		1,911		748		1,163	
Indiana	5,949		4,988		961		108		853	
Iowa	2,862		2,225		636		D		D	
Kansas	2,204		1,469		735	i	32	i	703	i
Kentucky	1,070		752		317		265		53	i
Louisiana	274		228		45	i	17	i	28	e
Maine	290		261		29		21		8	e
Maryland	5,676		3,335		2,341		1,877		464	
Massachusetts	21,560		18,084		3,476		633		2,843	
Michigan	18,847		17,454		1,393		205		1,188	
Minnesota	7,084		6,601		483		219		265	
Mississippi	222		198		24		12		12	e
Missouri	5,958	i	3,466		2,492	i	D		D	
Montana	140		121		19		5	i	14	
Nebraska	604		491		114		71		43	
Nevada	574		412		162		21		141	
New Hampshire	1,919		767		1,151		886		265	
New Jersey	15,715		12,902		2,813		266		2,547	
New Mexico	487		323		164		140		24	
New York	15,714		13,454		2,260		1,049		1,211	
North Carolina	10,064		7,226		2,838	i	194		2,644	i
North Dakota	254		237		17		2	i	15	
Ohio	8,892		6,366		2,526		497	i	2,029	
Oklahoma	692		642		50	i	9	e	41	i
Oregon	6,523		6,316		207		87		120	
Pennsylvania	12,300		11,161		1,138		178		961	
Rhode Island	875	i	822	i	53		36		17	
South Carolina	1,301		1,146		155		63		92	
South Dakota	151		135		16	i	5	i	11	i
Tennessee	1,610		1,383		226		37		189	
Texas	17,353		14,913		2,440		698		1,742	
Utah	3,453		2,876		577		408		169	
Vermont	248		230		17		7		10	i
Virginia	3,773		2,240		1,532		1,202	i	330	
Washington	19,673		19,001		671		183		488	
West Virginia	182		157		25		19		6	e

TABLE 13

Domestic R&D paid for by the company and others and performed by the company, by source of funds and state: 2016

(Millions of U.S. dollars)

State	Total		Paid for by the company		Paid for by others					
					Total		Federal		Nonfederal	
Wisconsin	4,972		4,387		585		71		514	
Wyoming	172		164		8	i	2		5	i
Undistributed[a]	7,173		5,664		1,509		D		D	

D = data withheld to avoid disclosing operations of individual companies; e = estimated; more than 50% of the estimate is modeled—see Technical Notes; i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

[a] Includes data reported on Form BRDI-1 that were not allocated to a specific state, as well as data reported on Form BRDI-1(S) by multiestablishment companies. For single-establishment companies, data reported on Form BRDI-1(S) were allocated to the state in the address used to mail the survey form.

Note(s)

Detail may not add to total because of rounding. For a given estimate in this table, if the conditions are satisfied for both the i and e flags, the e flag is assigned because the imputation rate may be found in the corresponding table of imputation rates. Statistics are representative of companies located in the United States that performed or funded R&D.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 14

Domestic R&D performed by companies, by source of funds and core-based statistical area: 2016

(Millions of U.S. dollars)

Core-based statistical area	CBSA code	Total		Paid for by the company		Paid for by others	
All locations		374,685		317,731		56,954	
San Jose-Sunnyvale-Santa Clara, CA	41940	57,434		54,021		3,413	
San Francisco-Oakland-Hayward, CA	41860	27,961		26,799		1,162	
New York-Newark-Jersey City, NY-NJ-PA	35620	24,024	i	20,520	i	3,503	
Boston-Cambridge-Newton, MA-NH	14460	19,899		16,952		2,947	i
Seattle-Tacoma-Bellevue, WA	42660	18,606		18,061		545	
Los Angeles-Long Beach-Anaheim, CA	31080	15,803	i	11,607	i	4,195	i
Detroit-Warren-Dearborn, MI	19820	15,408		14,689		719	
Chicago-Naperville-Elgin, IL-IN-WI	16980	10,626		8,851		1,774	
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	37980	10,498	i	8,939	i	1,560	
San Diego-Carlsbad, CA	41740	10,423	i	8,460	i	1,962	i
Minneapolis-St. Paul-Bloomington, MN-WI	33460	6,375		5,926		449	
Portland-Vancouver-Hillsboro, OR-WA	38900	6,254		6,098		156	i
Dallas-Fort Worth-Arlington, TX	19100	5,698	i	4,299	i	1,399	i
Austin-Round Rock, TX	12420	5,250	i	5,022	i	228	
Houston-The Woodlands-Sugar Land, TX	26420	5,007	i	4,364	i	643	
Phoenix-Mesa-Scottsdale, AZ	38060	4,895	i	3,587	i	1,308	i
St. Louis, MO-IL	41180	4,809	i	2,556	i	2,252	i
Washington-Arlington-Alexandria, DC-VA-MD-WV	47900	4,691	i	2,773		1,918	i
Atlanta-Sandy Springs-Roswell, GA	12060	4,578		3,643		935	i
Norwich-New London, CT	35980	4,140	i	D		D	
Indianapolis-Carmel-Anderson, IN	26900	4,013		3,175		838	
Durham-Chapel Hill, NC	20500	3,564	i	2,139	i	1,425	i
Cincinnati, OH-KY-IN	17140	3,314		2,624		690	
Baltimore-Columbia-Towson, MD	12580	3,109		1,496		1,612	
Raleigh, NC	39580	3,060		1,883		1,177	
Kansas City, MO-KS	28140	2,217		1,451		766	i
Oxnard-Thousand Oaks-Ventura, CA	37100	2,156	i	1,866	i	290	
Salt Lake City, UT	41620	2,014	i	1,858	i	156	i
Miami-Fort Lauderdale-West Palm Beach, FL	33100	1,852	i	1,636	i	216	i
Columbus, OH	18140	1,845		683	i	1,162	
Albany-Schenectady-Troy, NY	10580	1,835		1,597		238	
Denver-Aurora-Lakewood, CO	19740	1,811	i	1,596	i	214	i
Pittsburgh, PA	38300	1,802	i	1,697	i	105	i
Charlotte-Concord-Gastonia, NC-SC	16740	1,758	i	1,644	i	114	i
Hartford-West Hartford-East Hartford, CT	25540	1,703		1,243		461	
Milwaukee-Waukesha-West Allis, WI	33340	1,650		1,552		98	i
Madison, WI	31540	1,575		1,170		405	
Boise City, ID	14260	1,469		1,292		177	
Manchester-Nashua, NH	31700	1,428		388		1,040	
Boulder, CO	14500	1,304	i	1,182	i	123	i
Trenton, NJ	45940	1,302		796		505	i
Peoria, IL	37900	1,285	i	1,262	i	23	i
Tampa-St. Petersburg-Clearwater, FL	45300	1,285	i	962		322	i
Cleveland-Elyria, OH	17460	1,276		1,129		147	i
Bridgeport-Stamford-Norwalk, CT	14860	1,232		D		D	
Tucson, AZ	46060	1,214	i	840	i	373	i
Palm Bay-Melbourne-Titusville, FL	37340	1,168	i	334	i	834	i
Huntsville, AL	26620	1,139		385		753	
Worcester, MA-CT	49340	1,131	i	860	i	271	i
Rochester, NY	40380	1,121	i	1,082	i	39	i

TABLE 14

Domestic R&D performed by companies, by source of funds and core-based statistical area: 2016

(Millions of U.S. dollars)

Core-based statistical area	CBSA code	Total		Paid for by the company		Paid for by others	
Providence-Warwick, RI-MA	39300	1,088	i	1,015	i	72	
Sacramento–Roseville–Arden-Arcade, CA	40900	1,061	i	710	i	351	i
Lancaster, PA	29540	1,014	i	909	i	105	i
Des Moines-West Des Moines, IA	19780	974		966		9	e
New Haven-Milford, CT	35300	813	i	791	i	23	i
Orlando-Kissimmee-Sanford, FL	36740	750	i	547	i	203	i
Buffalo-Cheektowaga-Niagara Falls, NY	15380	750	i	495	i	255	i
Akron, OH	10420	747		678		69	i
Cedar Rapids, IA	16300	746		D		D	
Ogden-Clearfield, UT	36260	728		396		332	
Riverside-San Bernardino-Ontario, CA	40140	706	i	643	i	63	i
Bloomington, IL	14010	699		694		5	i
Corning, NY	18500	659		659		*	e
Grand Rapids-Wyoming, MI	24340	652		545		108	
Santa Rosa, CA	42220	613	i	600	i	14	i
Provo-Orem, UT	39340	604		521	i	83	
Richmond, VA	40060	582	i	532	i	50	i
Greensboro-High Point, NC	24660	551	i	521	i	31	
Jacksonville, FL	27260	545	i	453	i	92	i
Wichita, KS	48620	536		523		14	i
San Antonio-New Braunfels, TX	41700	536	i	469	i	68	i
Colorado Springs, CO	17820	526	i	390	i	136	i
Allentown-Bethlehem-Easton, PA-NJ	10900	497	i	480	i	16	i
Dayton, OH	19380	496	i	271	i	224	
Oshkosh-Neenah, WI	36780	495		494		1	e
Omaha-Council Bluffs, NE-IA	36540	484		381		103	
Syracuse, NY	45060	477	i	354		122	i
Ann Arbor, MI	11460	476		294	i	182	
Niles-Benton Harbor, MI	35660	450		447		4	
Memphis, TN-MS-AR	32820	448	i	430	i	19	i
Columbus, IN	18020	439		381	i	58	
Santa Maria-Santa Barbara, CA	42200	438	i	313	i	125	i
Albuquerque, NM	10740	433	i	283		150	i
Kalamazoo-Portage, MI	28020	417		156		261	
Midland, MI	33220	357		357		*	e
Greenville-Anderson-Mauldin, SC	24860	354	i	332	i	22	i
Davenport-Moline-Rock Island, IA-IL	19340	340		336		4	e
Nashville-Davidson--Murfreesboro--Franklin, TN	34980	338	i	286	i	52	i
Charleston-North Charleston, SC	16700	335		239		96	i
Pueblo, CO	39380	328		16	i	312	
Waterloo-Cedar Falls, IA	47940	322	i	321	i	1	e
Lexington-Fayette, KY	30460	314		290		25	i
Spokane-Spokane Valley, WA	44060	312	i	290	i	23	i
Hickory-Lenoir-Morganton, NC	25860	307	i	300	i	7	e
Las Vegas-Henderson-Paradise, NV	29820	299	i	268	i	30	i
Fort Collins, CO	22660	295	i	274	i	21	
Virginia Beach-Norfolk-Newport News, VA-NC	47260	290	i	132	i	158	i
Rochester, MN	40340	285	i	284	i	2	i
Dubuque, IA	20220	283		282		*	e
Kingsport-Bristol-Bristol, TN-VA	28700	271		D		D	
All other CBSAs		20,353	i	17,141	i	3,212	i

TABLE 14

Domestic R&D performed by companies, by source of funds and core-based statistical area: 2016

(Millions of U.S. dollars)

Core-based statistical area	CBSA code	Total		Paid for by the company		Paid for by others	
Locations outside a CBSA		2,689	i	2,198	i	491	i
Undistributed[a]		7,173		5,664		1,509	

* = amount < $500,000. D = data withheld to avoid disclosing operations of individual companies. e = estimated; more than 50% of the estimate is modeled—see Technical Notes. i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

CBSA = core-based statistical area.

[a] Includes data reported on Form BRDI-1 that were not allocated to a specific state as well as data reported on Form BRDI-1(S) by multiestablishment companies. For single-establishment companies, data reported on Form BRDI-1(S) were allocated to the location of the address used to mail the form.

Note(s)

Detail may not add to total because of rounding. Statistics are representative of companies located in the United States that performed or funded R&D. For a given estimate in this table, if the conditions are satisfied for both the i and e flags, the e flag is assigned because the imputation rate may be found in the corresponding table of imputation rates. A CBSA is a U.S. geographic area that consists of one or more counties (or equivalents) anchored by an urban center of at least 10,000 people plus adjacent counties that are socioeconomically tied to the urban center by commuting. CBSAs are defined by the Office of Management and Budget in the Executive Office of the President.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

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: 2016

(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	374,685		6,526	i	25,760		33,208		20,064		289,127	
Manufacturing industries	31–33	250,553		3,851	i	13,443		19,968		14,378		198,914	
Food	311	4,828		200	i	516		491		515		3,106	
Beverages and tobacco products	312	D		D		66		84		D		676	
Textiles, apparel, and leather products	313–16	1,166	i	78	i	415	i	350		322		0	
Wood products	321	188		28	i	78		83		0		0	
Paper	322	851		52	i	82		101		63		553	
Printing and related support activities	323	219	i	63	i	78		79	i	0		0	
Petroleum and coal products	324	381		21	i	152		73		135		0	
Chemicals	325	73,575		572	i	2,889		6,183		4,255		59,676	
Basic chemicals	3251	2,545		81	i	364		649		592		860	
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	711		D		156		184		0		D	
Pesticides, fertilizers, and other agricultural chemicals	3253	D		14	i	55		D		D		D	
Pharmaceuticals and medicines	3254	64,628		144	i	1,881		4,937		3,043		54,621	
Soaps, cleaning compounds, and toilet preparations	3256	2,800		84	i	175	i	204		147		2,190	
Paints, coatings, adhesives, and other chemicals	3255, 3259	D		D		258		D		D		D	
Plastics and rubber products	326	3,752		305	i	595		728		298		1,826	
Nonmetallic mineral products	327	1,289		63	i	138		218		0		870	
Primary metals	331	592		D		184		215		D		0	
Fabricated metal products	332	2,239		497	i	832		449		312		149	
Machinery	333	12,585		577	i	1,603		1,807		1,300		7,298	
Agricultural implements	33311	1,565		24	i	113		160		189		1,079	
Semiconductor machinery	333242	3,411		10	i	D		162		226		D	
Engines, turbines, and power transmission equipment	3336	1,959		28	i	D		D		0		D	
Other machinery	other 333	5,650		516	i	D		D		885		D	
Computer and electronic products	334	77,385		672	i	2,234		3,433		3,562		67,483	
Communications equipment	3342	13,112		161	i	284		614		753		11,300	
Semiconductors and other electronic components	3344	31,391		134	i	767		1,223		984		28,283	
Navigational, measuring, electromedical, and control instruments	3345	14,885		294	i	1,024		1,092		1,168		11,306	
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	2,632		48	i	300	i	298		642	i	1,344	
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	7,533		D		151		236		D		7,033	
Other measuring and controlling devices	other 3345	4,720		D		573		558		D		2,929	
Other computer and electronic products	other 334	17,997		82	i	160		504		657		16,594	
Electrical equipment, appliances, and components	335	4,771		122	i	617		1,077		568		2,387	
Transportation equipment	336	51,275		109	i	1,433		2,169		1,786		45,780	
Automobiles, bodies, trailers, and parts	3361–63	22,042		D		1,101		1,394		D		D	
Aerospace products and parts	3364	26,645		19	i	D		D		D		25,516	
Aircraft, aircraft engines, and aircraft parts	336411–13	25,221		17	i	D		D		D		24,271	
Guided missiles, space vehicles, and related parts	336414–15, 336419	1,424	i	2		16	i	54		107		1,245	i

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: 2016

(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	
Military armored vehicles, tanks, and tank components	336992	D		1		D		0		0		0	
Other transportation	other 336	D		D		D		D		D		D	
Furniture and related products	337	366		64	i	98		203		0		0	
Miscellaneous manufacturing	339	D		D		1,434		2,225		895		9,109	
Medical equipment and supplies	3391	11,668		167	i	1,073		1,725		895		7,808	
Other miscellaneous manufacturing	3399	D		D		361		499		0		1,301	i
Nonmanufacturing industries	21–23, 42–81	124,132		2,675	i	12,317		13,241		5,687		90,213	
Mining, extraction, and support activities	21	3,296		13	i	92		83		85		3,024	
Utilities	22	351		5	i	D		D		D		D	
Wholesale trade	42	452	i	339	i	113	i	0		0		0	
Electronic shopping and electronic auctions	454111–12	1,569	i	30	i	28	i	D		0		D	
Transportation and warehousing	48–49	488		10	i	50		19		86		323	
Information	51	70,748		493	i	3,828		5,189		3,644		57,595	
Publishing	511	33,574		353	i	D		1,790		D		28,548	
Newspaper, periodical, book, and directory publishers	5111	79	i	25	i	22		32		0		0	
Software publishers	5112	33,495		328	i	D		1,758		D		28,548	
Telecommunications	517	D		D		D		210		D		2,803	i
Data processing, hosting, and related services	518	11,914		117	i	1,734		2,968		1,918		5,176	
Other information	other 51	D		D		171		221		D		21,067	
Finance and insurance	52	7,331		13	i	71		522		0		6,725	
Real estate and rental and leasing	53	475		13	i	5	i	45		103		309	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	27		D		0		D		0		0	
Other real estate and rental and leasing	other 53	449		D		5	i	D		103		309	
Professional, scientific, and technical services	54	37,595		D		7,459		6,520		D		20,609	
Architectural, engineering, and related services	5413	3,412		331	i	1,133		1,059		187		702	
Computer systems design and related services	5415	15,747		556	i	2,232	i	1,900		860		10,199	
Scientific research and development services	5417	14,842		493	i	2,977		2,657		186		8,529	
Biotechnology research and development	541711	4,464		136	i	674		D		0		D	
Physical, engineering, and life sciences (except biotechnology) research and development	541712	9,659		349	i	2,250		2,107		186		4,766	
Social sciences and humanities research and development	541720	719		9	i	53		D		0		D	
Other professional, scientific, and technical services	other 54	3,595		D		1,117	i	904		D		1,179	
Health care services	621–23	848		45	i	197		515	i	91		0	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	977	i	D		D		D		D		0	
All companies (number of domestic employees)	–	374,685		6,526	i	25,760		33,208		20,064		289,127	
Micro companies[a]													
5 – 9	–	1,581	i	870	i	596		115	i	0		0	
Small companies													
10 – 19	–	4,958	i	D		2,787	i	616		D		0	
20 – 49	–	9,662	i	1,656	i	6,697		1,309		0		0	
Medium companies													

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: 2016

(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
50 – 99	–	9,298	1,086 i	4,496	3,235	481	0
100 – 249	–	14,875	D	4,740	6,433	1,926	D
Large companies							
250 – 499	–	13,092	D	2,679	5,226	2,060	D
500 – 999	–	14,450	134 i	1,696	4,904	4,066	3,649
1,000 – 4,999	–	63,971	64 i	1,528	7,921	7,768	46,689
5,000 – 9,999	–	40,633	D	D	2,089	2,153	36,047
10,000 – 24,999	–	65,594	4 i	112	916	875	63,686
25,000 or more	–	136,571	2 i	D	444	D	135,397

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 16

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2016

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	Total		Paid for by the company		Paid for by others	
All business activities	21100–81000	374,685		317,731		56,954	
Oil and gas extraction	21100	867		841		25	i
Mining	21200	58		57		2	
Support activities for mining, including oil and gas	21300	1,544		1,185		359	
Utilities	22100	349		323		26	
Construction	23000	255	i	254	i	1	
Food manufacturing	31100	4,893		4,700		193	
Beverages manufacturing	31210	D		601	i	D	
Tobacco manufacturing	31220	153		152		1	
Textiles, apparel, and leather products manufacturing	31990	1,244	i	1,235	i	9	
Wood products manufacturing	32100	241		234		7	i
Paper manufacturing	32200	1,168		1,168		*	
Printing and related support activities	32300	304		303		*	i
Petroleum refineries	32401	441		437		4	
Asphalt paving, roofing, and saturated materials manufacturing	32402	75		75		0	
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	316		304		12	
Basic chemicals manufacturing	32510	2,839		2,589		250	
Resins, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	932		909		23	
Pesticides, fertilizers, and other agricultural chemicals manufacturing	32530	1,883	i	1,529	i	354	
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing	32541	45,271		38,589		6,682	
In vitro diagnostic substances manufacturing	32542	1,013		962		51	i
Biotechnology-based pharmaceutical and biological products (except diagnostic substances) manufacturing	32543	16,421		14,613		1,808	
Soaps, cleaning compounds, and toilet preparations manufacturing	32591	2,551		2,387		164	
Paints, adhesives, and other chemical manufacturing	32592	D		1,639		D	
Plastics and rubber products manufacturing	32600	3,402		3,230		173	
Clay and glass products manufacturing	32710	991		983		7	
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	382		374		8	
Primary metal manufacturing	33100	601		596		4	
Fabricated metal products manufacturing	33200	2,356		2,248		108	i
Agricultural machinery and equipment manufacturing	33311	1,194		1,184		10	
Construction machinery manufacturing	33312	1,211		1,202		9	
Mining, oil, and gas field machinery and equipment manufacturing	33319	1,107		1,076		32	
Semiconductor machinery manufacturing	33321	3,374		2,990		383	
Industrial machinery manufacturing (except semiconductor machinery)	33322	901		718		183	
Photographic and photocopying equipment manufacturing	33331	83		56		28	
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	1,686		1,612		74	
Digital cameras manufacturing	33333	421	i	421	i	0	
Engine, turbine, and power transmission equipment manufacturing	33360	2,367		2,143		224	
Metalworking and other general purpose machinery manufacturing	33390	2,123		1,897		225	
Computers and peripheral equipment manufacturing and magnetic and optical media	33412	18,324		18,246		78	
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	8,184		8,180		3	i
Radio, television, and wireless communication equipment manufacturing	33422	D		1,880		D	
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	1,799		1,487		312	
Audio and video equipment manufacturing	33430	972		966		7	
Semiconductor and other electronic components manufacturing	33440	31,413		29,530		1,883	
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	3,485	i	3,305	i	180	

TABLE 16

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2016

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	Total		Paid for by the company		Paid for by others	
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments manufacturing	33452	8,276		2,435		5,841	
Measuring and control instruments manufacturing (not listed elsewhere)	33459	4,223		4,068		155	
Electrical equipment, appliances, and components manufacturing	33500	4,816		4,337		478	i
Motor vehicles manufacturing	33610	14,810		13,184		1,627	
Motor vehicle body and trailer manufacturing	33620	114		114		0	
Motor vehicle parts manufacturing	33630	6,613		5,619		994	i
Aircraft manufacturing	33641	11,989	i	5,501		6,488	i
Aircraft engine and engine parts manufacturing	33642	1,738		1,196		542	
Other aircraft parts and auxiliary equipment manufacturing	33643	3,817		2,398		1,420	
Guided missiles, space vehicles, and related parts manufacturing	33644	3,063	i	810		2,253	i
Railroad rolling stock manufacturing	33651	D		186		D	
Ship and boat building	33660	D		574	i	D	
Motorcycle, bicycle, and parts manufacturing	33691	286		285		1	
Military armored vehicles, tanks, and tank components manufacturing	33692	392		111		281	
All other transportation equipment manufacturing	33699	368		365		3	
Furniture and related products manufacturing	33700	405		405		*	
Medical equipment and supplies manufacturing	33910	11,727		11,254		474	
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	2,600	i	2,558	i	42	
Merchant wholesalers, durable goods	42300	559	i	540	i	19	
Merchant wholesalers, nondurable goods	42400	153	i	148	i	6	
Wholesale electronic markets and agents and brokers (business to business)	42500	23		23		*	
Retail trade (except electronic shopping and electronic auctions)	44000	153		69		83	
Electronic shopping and electronic auctions	45411	1,587	i	1,587	i	0	
Transportation	48000	100		97		3	
Couriers, messengers, and express delivery services	49200	394		394		0	
Warehousing and storage	49300	0		0		0	
Newspaper, periodical, book, and directory publishers (except Internet)	51110	80	i	77	i	3	i
Software publishers (except Internet)	51120	26,811		26,571		239	
Motion picture and sound recording (except Internet)	51200	16		16		0	
Broadcasting (except Internet)	51500	D		149	i	D	
Wired telecommunications carriers	51710	1,067	i	1,060	i	8	
Wireless telecommunications carriers (except satellite)	51720	1,477	i	1,417	i	60	
Satellite telecommunications	51740	699	i	698	i	1	
Other telecommunications (not listed elsewhere)	51790	448		321		126	
Data processing, hosting, and related services	51800	6,130		5,951		179	i
Cloud computing applications and Internet-based software services	51801	9,798		9,706		92	
Other information services, including Internet publishing, broadcasting, and Web search portals	51910	D		23,910		D	
Finance: banking and credit intermediation	52200	4,474		4,380		94	
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	1,516		1,516		0	
Insurance carriers and related activities	52400	1,216		1,216		0	
Real estate	53100	438		438		0	
Rental and leasing services	53200	22		22		0	
Lessors of nonfinancial intangible assets, including patent licensing	53300	40		40		*	
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	891		887		4	
Architectural, engineering, and related services	54130	3,424		1,823		1,601	
Specialized design services	54140	78		26		52	
Computer systems design and related services	54150	14,431		12,008		2,424	

TABLE 16

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2016

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	Total		Paid for by the company		Paid for by others	
Management, scientific, and technical consulting services	54160	2,137	i	1,602		535	i
Research and development services in social sciences and humanities	54172	D		D		D	
Research and development services in biotechnology	54173	3,939	i	835	i	3,104	i
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	10,667		2,296		8,371	i
Advertising and related services	54180	344		344		0	
Professional, scientific, and technical services (not listed elsewhere)	54190	885		558		326	
Management of companies and enterprises	55100	28		19		10	
Administrative and support services	56100	419		416		2	i
Waste management and remediation services	56200	25		8	i	17	
Offices of physicians	62110	106	i	70	i	36	i
Medical and diagnostic laboratories	62150	1,280	i	729		550	i
Other ambulatory health care services (ambulance, dental, home health care)	62199	23	i	19	i	4	i
Hospitals and nursing care facilities	62200	9		6	i	3	
Social assistance services	62400	2		2		0	
Arts, entertainment, and recreation	71000	44		44		0	
Accommodation and food services	72000	61		61		0	
Other services (not listed elsewhere)	81000	D		D		D	
Undistributed	–	0		0		0	

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

NAICS = 2012 North American Industry Classification System.

[a] Data are tabulated independent of the industry classification of the company. Companies were asked to report their sales and R&D activity in one or more business activity codes.
[b] Business codes and descriptions are based on 2012 NAICS industry definitions.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

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: 2016

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US$millions)		Percent of domestic sales of R&D performers or funders[a]		Percent of domestic sales of R&D performers[b]	
All industries	21–23, 31–33, 42–81	374,685		4.1		4.2	
Manufacturing industries	31–33	250,553		4.6		4.7	
Food	311	4,828		0.9		0.9	
Beverages and tobacco products	312	D		D		D	
Textiles, apparel, and leather products	313–16	1,166	i	1.2		1.2	
Wood products	321	188		0.5		0.5	
Paper	322	851		1.3		1.3	
Printing and related support activities	323	219	i	0.9		0.9	
Petroleum and coal products	324	381		0.2		0.2	
Chemicals	325	73,575		7.1		7.1	
Basic chemicals	3251	2,545		1.2		D	
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	711		1.6		1.6	
Pesticides, fertilizer, and other agricultural chemicals	3253	D		D		D	
Pharmaceuticals and medicines	3254	64,628		11.2		D	
Soaps, cleaning compounds, and toilet preparations	3256	2,800		3.0		3.0	
Paints, coatings, adhesives, and other chemicals	3255, 3259	D		D		D	
Plastics and rubber products	326	3,752		2.0		2.0	
Nonmetallic mineral products	327	1,289		2.3		2.5	
Primary metals	331	592		0.6		0.6	
Fabricated metal products	332	2,239		2.0		2.0	
Machinery	333	12,585		4.2		4.2	
Agricultural implements	33311	1,565		3.8		3.8	
Semiconductor machinery	333242	3,411		20.1		20.1	
Engines, turbines, and power transmission equipment	3336	1,959		6.2		6.2	
Other machinery	other 333	5,650		2.7		2.7	
Computer and electronic products	334	77,385		9.8		9.8	
Communications equipment	3342	13,112		12.6		12.6	
Semiconductors and other electronic components	3344	31,391		11.5		11.5	
Navigational, measuring, electromedical, and control instruments	3345	14,885		8.6		8.6	
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	2,632		11.8		11.8	
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	7,533		10.3		10.3	
Other measuring and controlling devices	other 3345	4,720		6.2		6.2	
Other computer and electronic products	other 334	17,997		7.6		7.6	
Electrical equipment, appliances, and components	335	4,771		3.2		3.2	
Transportation equipment	336	51,275		4.0		4.2	
Automobiles, bodies, trailers, and parts	3361–63	22,042		2.5		2.7	
Aerospace products and parts	3364	26,645		7.9		7.9	
Aircraft, aircraft engines, and aircraft parts	336411–13	25,221		7.9		7.9	
Guided missiles, space vehicles, and related parts	336414–15, 336419	1,424	i	8.3		8.3	
Military armored vehicles, tanks, and tank components	336992	D		D		D	
Other transportation	other 336	D		D		D	
Furniture and related products	337	366		1.0		1.0	
Miscellaneous manufacturing	339	D		D		D	
Medical equipment and supplies	3391	11,668		6.5		6.5	
Other miscellaneous manufacturing	3399	D		D		D	

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: 2016

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US$millions)		Percent of domestic sales of R&D performers or funders[a]		Percent of domestic sales of R&D performers[b]	
Nonmanufacturing industries	21–23, 42–81	124,132		3.3		3.5	
Mining, extraction, and support activities	21	3,296		1.6		1.7	
Utilities	22	351		0.1		0.2	
Wholesale trade	42	452	i	0.3		0.3	
Electronic shopping and electronic auctions	454111–12	1,569	i	1.4		1.4	
Transportation and warehousing	48–49	488		0.2		0.2	
Information	51	70,748		6.6		6.7	
Publishing	511	33,574		8.4		8.4	
Newspaper, periodical, book, and directory publishers	5111	79	i	2.2		2.2	
Software publishers	5112	33,495		8.5		8.5	
Telecommunications	517	D		D		D	
Data processing, hosting, and related services	518	11,914		11.3		11.4	
Other information	other 51	D		D		D	
Finance and insurance	52	7,331		1.0		1.0	
Real estate and rental and leasing	53	475		9.0		9.0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	27		3.8		3.8	
Other real estate and rental and leasing	other 53	449		9.7		9.7	
Professional, scientific, and technical services	54	37,595		8.9		8.9	
Architectural, engineering, and related services	5413	3,412		3.4		3.4	
Computer systems design and related services	5415	15,747		9.0		9.0	
Scientific research and development services	5417	14,842		22.3		22.3	
Biotechnology research and development	541711	4,464		16.3		16.3	
Physical, engineering, and life sciences (except biotechnology) research and development	541712	9,659		26.3		26.4	
Social sciences and humanities research and development	541720	719		27.9		27.9	
Other professional, scientific, and technical services	other 54	3,595		4.6		4.6	
Health care services	621–23	848		1.1		1.1	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	977	i	0.2		0.2	
All companies (number of domestic employees)	–	374,685		4.1		4.2	
Micro companies[c]							
5 – 9	–	1,581	i	23.3		23.4	
Small companies							
10 – 19	–	4,958	i	19.2		19.3	
20 – 49	–	9,662	i	9.7		9.7	
Medium companies							
50 – 99	–	9,298		8.2		8.2	
100 – 249	–	14,875		5.5		5.5	
Large companies							
250 – 499	–	13,092		4.7		4.7	
500 – 999	–	14,450		4.4		4.6	
1,000 – 4,999	–	63,971		5.2		5.3	
5,000 – 9,999	–	40,633		4.1		4.2	
10,000 – 24,999	–	65,594		3.9		4.1	
25,000 or more	–	136,571		3.3		3.4	

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

NAICS = 2012 North American Industry Classification System.

[a] Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed or funded R&D.
[b] Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed R&D. The calculation of percentages in this column excludes R&D and sales of companies that fund R&D but do not perform R&D.
[c] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

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: 2016

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US$millions)		Percent of domestic sales of R&D performers or funders[a]		Percent of domestic sales of R&D performers only[b]	
All industries	21–23, 31–33, 42–81	421,539		4.6		4.7	
Manufacturing industries	31–33	291,684		5.4		5.5	
Food	311	4,968		0.9		0.9	
Beverages and tobacco products	312	D		D		D	
Textiles, apparel, and leather products	313–16	1,178	i	1.2		1.2	
Wood products	321	D		D		D	
Paper	322	855		1.3		1.3	
Printing and related support activities	323	D		D		D	
Petroleum and coal products	324	D		D		D	
Chemicals	325	104,949		10.1		D	
Basic chemicals	3251	2,656		1.3		D	
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	728		1.6		1.6	
Pesticides, fertilizers, and other agricultural chemicals	3253	1,416	i	3.0		3.0	
Pharmaceuticals and medicines	3254	95,404		16.5		D	
Soaps, cleaning compounds, and toilet preparations	3256	3,199		3.4		3.4	
Paints, coatings, adhesives, and other chemicals	3255, 3259	1,546		2.3		2.3	
Plastics and rubber products	326	3,907		2.1		2.1	
Nonmetallic mineral products	327	1,587		2.8		2.8	
Primary metals	331	D		D		D	
Fabricated metal products	332	2,351		2.1		2.1	
Machinery	333	13,053		4.4		4.4	
Agricultural implements	33311	1,747		4.3		4.3	
Semiconductor machinery	333242	3,433		20.3		20.3	
Engines, turbines, and power transmission equipment	3336	1,968		6.2		6.2	
Other machinery	other 333	5,906		2.8		2.8	
Computer and electronic products	334	78,952		10.0		10.0	
Communications equipment	3342	13,395		12.8		12.8	
Semiconductors and other electronic components	3344	31,823		11.6		11.6	
Navigational, measuring, electromedical, and control instruments	3345	15,335		8.9		8.9	
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	2,684		12.0		12.0	
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	7,815		10.6		10.6	
Other measuring and controlling devices	other 3345	4,836		6.3		6.3	
Other computer and electronic products	other 334	18,399		7.8		7.8	
Electrical equipment, appliances, and components	335	4,930		3.3		3.3	
Transportation equipment	336	56,867		4.4		4.6	
Automobiles, bodies, trailers, and parts	3361–63	24,178		2.7		2.9	
Aerospace products and parts	3364	30,056		8.9		8.9	
Aircraft, aircraft engines, and aircraft parts	336411–13	28,510		8.9		8.9	
Guided missiles, space vehicles, and related parts	336414–15, 336419	1,546	i	9.0		9.0	
Military armored vehicles, tanks, and tank components	336992	D		D		D	
Other transportation	other 336	D		D		D	
Furniture and related products	337	391		1.1		1.1	
Miscellaneous manufacturing	339	14,936		5.9		D	
Medical equipment and supplies	3391	12,508		7.0		7.0	
Other miscellaneous manufacturing	3399	2,428	i	3.2		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: 2016

(Millions of U.S. dollars and percent)

Industry and company size	NAICS code	Domestic R&D (US$millions)		Percent of domestic sales of R&D performers or funders[a]		Percent of domestic sales of R&D performers only[b]	
Nonmanufacturing industries	21–23, 42–81	129,854		3.4		3.6	
Mining, extraction, and support activities	21	3,569		1.7		1.8	
Utilities	22	555		0.2		0.2	
Wholesale trade	42	532	i	0.3		0.3	
Electronic shopping and electronic auctions	454111–12	1,581	i	1.4		1.4	
Transportation and warehousing	48–49	504		0.3		0.3	
Information	51	72,820		6.8		6.9	
Publishing	511	34,975		8.7		8.8	
Newspaper, periodical, book, and directory publishers	5111	86	i	2.4		2.4	
Software publishers	5112	34,889		8.8		8.8	
Telecommunications	517	D		D		0.8	
Data processing, hosting, and related services	518	12,188		11.6		11.6	
Other information	other 51	D		D		23.1	
Finance and insurance	52	7,426		1.0		1.0	
Real estate and rental and leasing	53	478		9.0		9.0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	30		4.3		4.3	
Other real estate and rental and leasing	other 53	449		9.7		9.7	
Professional, scientific, and technical services	54	40,438		9.6		9.6	
Architectural, engineering, and related services	5413	3,875		3.9		3.9	
Computer systems design and related services	5415	15,950		9.1		9.1	
Scientific research and development services	5417	16,896		25.4		25.2	
Biotechnology research and development	541711	4,947		18.1		18.0	
Physical, engineering, and life sciences (except biotechnology) research and development	541712	11,113		30.3		30.1	
Social sciences and humanities research and development	541720	837		32.5		32.5	
Other professional, scientific, and technical services	other 54	3,718		4.7		4.7	
Health care services	621–23	873		1.1		1.1	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,077	i	0.2		0.3	
All companies (number of domestic employees)	–	421,539		4.6		4.7	
Micro companies[c]							
5 – 9	–	1,926	i	28.4		28.5	
Small companies							
10 – 19	–	5,689	i	22.1		22.1	
20 – 49	–	11,321		11.3		11.3	
Medium companies							
50 – 99	–	11,214		9.9		9.9	
100 – 249	–	17,576		6.5		6.5	
Large companies							
250 – 499	–	14,529		5.3		5.3	
500 – 999	–	16,219		5.0		5.1	
1,000 – 4,999	–	73,223		5.9		6.0	
5,000 – 9,999	–	44,095		4.4		4.5	
10,000 – 24,999	–	77,971		4.6		4.8	
25,000 or more	–	147,776		3.6		3.7	

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

NAICS = 2012 North American Industry Classification System.

[a] Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed or funded R&D.
[b] Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed R&D. The calculation of percentages in this column excludes R&D and sales of companies that fund R&D but do not perform R&D.
[c] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

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: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Software products and embedded software R&D																			
				Total				Paid for by the company				Paid for by others											
												Total				Federally funded							
		Companies[a] (number)	Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount				
All industries	21–23, 31–33, 42–81	31,784	374,685		13,408	i	120,824	i	12,851	i	111,933	i	1,488	i	8,890		780	i	4,481	i			
Manufacturing industries	31–33	19,522	250,553		5,967	i	35,984	i	5,767	i	31,527	i	509	i	4,457		124		3,057	i			
Food	311	1,185	4,828		29	i	16		12		11		18	i	4		0		0				
Chemicals	325	2,907	73,575		286	i	575	i	224	i	430	i	116	i	145	i	4		1	i			
Basic chemicals	3251	346	2,545		30	i	41		30	i	41		0		0		0		0				
Pharmaceuticals and medicines	3254	1,089	64,628		149		302	i	88		165		D		137	i	4		1	i			
Other chemicals	other 325	1,473	6,402		106	i	232	i	105	i	224	i	D		8		0		0				
Plastics and rubber products	326	1,238	3,752		124	i	91		123	i	91		D		*		D		*				
Nonmetallic mineral products	327	416	1,289		22	i	17	i	22	i	17	i	0		0		0		0				
Fabricated metal products	332	2,406	2,239		435	i	167	i	434	i	167	i	D		*	i	0		0				
Machinery	333	2,780	12,585		1,183	i	1,290		1,179	i	1,245		17		44		D		D				
Agricultural implements	33311	198	1,565		69	i	187		69	i	185		D		2		D		2				
Semiconductor machinery	333242	50	3,411		25	i	222		22	i	212	i	3		9		D		*				
Engines, turbines, and power transmission equipment	3336	128	1,959		43	i	217		43	i	216		D		1		0		0				
Other machinery	other 333	2,405	5,650		1,046	i	664	i	1,045	i	632	i	10		32		D		D				
Computer and electronic products	334	3,090	77,385		2,313	i	24,540	i	2,221	i	22,935	i	257	i	1,606		D		D				
Semiconductors and other electronic components	3344	858	31,391		462	i	8,134	i	401	i	8,033	i	115	i	101		D		D				
Other electronic products	other 334	2,232	45,993		1,851	i	16,406		1,820	i	14,902	i	142	i	1,504		D		D				
Electrical equipment, appliances, and components	335	727	4,771		449	i	855	i	449	i	616	i	25	i	238	i	D		1	i			
Transportation equipment	336	1,154	51,275		299	i	6,301		290	i	3,903		38		2,398		D		D				
Automobiles, bodies, trailers, and parts	3361–63	768	22,042		220	i	1,592		212	i	1,456		29		136	i	D		1				
Other transportation	other 336	386	29,234		79	i	4,709		78	i	2,446	i	9		2,262		D		D				
Miscellaneous manufacturing	339	D	D		499	i	2,011	i	487	i	1,990	i	35	i	21	i	14	i	1				
Other manufacturing	312–16, 321–24, 331, 337	D	D		328	i	121	i	327	i	121	i	D		*		D		*				
Nonmanufacturing industries	21–23, 42–81	12,263	124,132		7,441	i	84,840	i	7,084	i	80,406	i	978	i	4,434	i	656	i	1,424				
Mining, extraction, and support activities	21	69	3,296		25		601		21		524		6		77		0		0				

TABLE 19

Companies with domestic R&D paid for by the company and others and performed by the company in the software products and embedded software technology focus area, by industry and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D			Software products and embedded software R&D																	
					Total				Paid for by the company				Paid for by others									
													Total				Federally funded					
		Companies[a] (number)	Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount			
Utilities	22	34	351		14	i	5		14	i	5		D		*		0		0			
Wholesale trade	42	1,652	452	i	801	i	106	i	801	i	106	i	0		0		0		0			
Information	51	2,362	70,748		2,143	i	63,213	i	2,135	i	62,870	i	58	i	343		D		11			
Publishing	511	1,349	33,574		1,228	i	27,864		1,226	i	27,689		40	i	176		4		3			
Telecommunications	517	D	D		103		2,996	i	D		D		D		D		0		0			
Data processing, hosting, and related services	518	765	11,914		704		11,233		703		11,171		10		62		D		6			
Other information	other 51	D	D		108	i	21,120	i	D		D		D		D		D		2			
Professional, scientific, and technical services	54	7,181	37,595		4,340	i	14,185	i	3,995	i	10,174	i	911	i	4,011	i	629	i	1,411			
Architectural, engineering, and related services	5413	1,544	3,412		376	i	515	i	302	i	231	i	144	i	284	i	124	i	209	i		
Scientific research and development services	5417	1,940	14,842		652	i	2,060	i	490	i	363	i	341	i	1,698	i	213	i	768			
Biotechnology research and development	541711	411	4,464		35	i	29	i	31	i	16	i	10		14	i	4		4			
Other scientific research and development	other 5417	1,529	10,378		616	i	2,031	i	458	i	347	i	331	i	1,684	i	209	i	764			
Other professional, scientific, and technical services	other 54	3,697	19,341		3,313	i	11,610	i	3,204	i	9,581	i	425	i	2,029	i	292	i	435			
Health care services	621–23	284	848		11		74	i	10		73	i	D		1	i	0		0			
Other nonmanufacturing	23, 44–45, 48–49, 52–53, 55–56, 624, 71–72, 81	682	10,841		107		6,655		107		6,654		D		2		D		1			
All companies (number of domestic employees)	–	31,784	374,685		13,408	i	120,824	i	12,851	i	111,933	i	1,488	i	8,890		780	i	4,481	i		
Micro companies[c]																						
5 – 9	–	3,921	1,581	i	2,018	i	359	i	1,911	i	246	i	309	i	113	i	208	i	71	i		
Small companies																						
10 – 19	–	6,757	4,958	i	3,308	i	1,329	i	3,186	i	1,135	i	314	i	195	i	197	i	99	i		
20 – 49	–	8,397	9,662	i	3,454	i	3,152	i	3,306	i	2,626	i	417	i	526	i	224	i	329			
Medium companies																						
50 – 99	–	4,712	9,298		1,727	i	2,534		1,661	i	2,144		166		390		64	i	192			

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: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Software products and embedded software R&D																	
				Total				Paid for by the company				Paid for by others									
												Total				Federally funded					
		Companies[a] (number)	Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		
100 – 249	–	4,062	14,875		1,361	i	4,273		1,306	i	3,409		115	i	864		39		251		
Large companies																					
250 – 499	–	1,623	13,092		586	i	4,493		565	i	4,338		54	i	154		15	i	42		
500 – 999	–	868	14,450		312		5,383		302		5,224		29		159		7		35		
1,000 – 4,999	–	959	63,971		403		21,095		385		20,098		42		997		6		325		
5,000 – 9,999	–	235	40,633		105		17,595	i	100		17,143	i	14		452	i	5		47		
10,000 – 24,999	–	153	65,594		82		11,982		76		9,820		16		2,162	i	6		671		
25,000 or more	–	98	136,571		52		48,629	i	52		45,751	i	11		2,878		9		2,421	i	

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

NAICS = 2012 North American Industry Classification System.

[a] Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not include an adjustment to the weight to account for unit nonresponse. A company having multiple reporting parts for data collection may contribute to the statistics for multiple industries, so the detail may not add to the total for the number of companies.

[b] Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not include an adjustment to the weight to account for unit nonresponse. These company count estimates reflect a new imputation process implemented for survey year 2014. This change has affected the comparability of these company count estimates with estimates published for years prior to 2014. A company having multiple reporting parts for data collection may contribute to the statistics for multiple industries, so the detail may not add to the total for the number of companies.

[c] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

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: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Biotechnology R&D											
				Total				Paid for by the company				Paid for by others			
		Companies[a] (number)	Amount	Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
All industries	21–23, 31–33, 42–81	31,784	374,685	2,562	i	44,793		2,266	i	36,970		707	i	7,823	
Manufacturing industries	31–33	19,522	250,553	1,766	i	40,839		1,630	i	35,313		367		5,526	
Food	311	1,185	4,828	161	i	474	i	146	i	454	i	27	i	20	
Chemicals	325	2,907	73,575	946	i	35,277		857		30,271		255		5,005	
Basic chemicals	3251	346	2,545	120	i	397		81	i	233		52	i	163	
Pharmaceuticals and medicines	3254	1,089	64,628	734		34,251		688		29,526		196		4,725	
Other chemicals	other 325	1,473	6,402	92	i	629	i	87	i	512	i	7		117	
Plastics and rubber products	326	1,238	3,752	83	i	282		83	i	282		0		0	
Nonmetallic mineral products	327	416	1,289	12	i	5	i	12	i	5	i	0		0	
Fabricated metal products	332	2,406	2,239	6		6		6		6		D		*	
Machinery	333	2,780	12,585	38	i	17	i	38	i	12		D		5	i
Agricultural implements	33311	198	1,565	0		0		0		0		0		0	
Semiconductor machinery	333242	50	3,411	D		1		D		1		0		0	
Engines, turbines, and power transmission equipment	3336	128	1,959	0		0		0		0		0		0	
Other machinery	other 333	2,405	5,650	D		16	i	D		11		D		5	i
Computer and electronic products	334	3,090	77,385	239	i	3,230	i	228	i	2,837	i	29	i	393	
Semiconductors and other electronic components	3344	858	31,391	32	i	1,245	i	31	i	1,245	i	D		*	
Other electronic products	other 334	2,232	45,993	207	i	1,985		198	i	1,592	i	D		393	
Electrical equipment, appliances, and components	335	727	4,771	8		20		8		20		D		*	i
Transportation equipment	336	1,154	51,275	10		154		10		145		D		9	
Automobiles, bodies, trailers, and parts	3361–63	768	22,042	D		3		D		3		0		0	
Other transportation	other 336	386	29,234	D		151		D		142		D		9	
Miscellaneous manufacturing	339	D	D	237	i	1,253		216	i	1,164		47	i	89	
Other manufacturing	312–16, 321–24, 331, 337	D	D	27	i	121		26	i	118		D		3	
Nonmanufacturing industries	21–23, 42–81	12,263	124,132	796	i	3,954		636	i	1,657	i	340	i	2,297	
Mining, extraction, and support activities	21	69	3,296	5		14	i	5		14	i	0		0	
Utilities	22	34	351	D		1		D		1		D		*	
Wholesale trade	42	1,652	452	i 0		0		0		0		0		0	
Information	51	2,362	70,748	37	i	230		36	i	229		D		1	
Publishing	511	1,349	33,574	33	i	220		33	i	220		D		*	
Telecommunications	517	D	D	0		0		0		0		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: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D			Biotechnology R&D											
					Total				Paid for by the company				Paid for by others			
		Companies[a] (number)	Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
Data processing, hosting, and related services	518	765	11,914		4		10		3		10		D		1	
Other information	other 51	D	D		0		0		0		0		0		0	
Professional, scientific, and technical services	54	7,181	37,595		721	i	3,284	i	563	i	1,015	i	330	i	2,269	
Architectural, engineering, and related services	5413	1,544	3,412		3		7		D		7		D		*	
Scientific research and development services	5417	1,940	14,842		547	i	3,013		416	i	832	i	271	i	2,181	
Biotechnology research and development	541711	411	4,464		329	i	2,283		257	i	541	i	169	i	1,742	
Other scientific research and development	other 5417	1,529	10,378		217	i	730	i	159	i	291	i	102	i	439	i
Other professional, scientific, and technical services	other 54	3,697	19,341		171	i	264	i	D		176	i	D		88	i
Health care services	621–23	284	848		26		423	i	25		396	i	7		27	
Other nonmanufacturing	23, 44–45, 48–49, 52–53, 55–56, 624, 71–72, 81	682	10,841		D		2	i	D		2	i	0		0	
All companies (number of domestic employees)	–	31,784	374,685		2,562	i	44,793		2,266	i	36,970		707	i	7,823	
Micro companies[c]																
5 – 9	–	3,921	1,581	i	418	i	455	i	322	i	294	i	177	i	161	i
Small companies																
10 – 19	–	6,757	4,958	i	571	i	1,369		479	i	1,155		184	i	214	i
20 – 49	–	8,397	9,662	i	596	i	1,948		549	i	1,645		144		303	
Medium companies																
50 – 99	–	4,712	9,298		332	i	2,319		314	i	1,991		58		328	
100 – 249	–	4,062	14,875		318	i	3,761		298	i	3,138		66		623	
Large companies																
250 – 499	–	1,623	13,092		96	i	2,758		89	i	2,416		21		342	
500 – 999	–	868	14,450		67		1,673		65		1,539		9	i	134	i
1,000 – 4,999	–	959	63,971		89		11,570		81		8,667		22		2,902	
5,000 – 9,999	–	235	40,633		27		1,940		23		792		9		1,149	
10,000 – 24,999	–	153	65,594		33		13,225	i	32		12,232	i	9		993	i
25,000 or more	–	98	136,571		16		3,775		15		3,100		8		675	i

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

NAICS = 2012 North American Industry Classification System.

[a] Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not include an adjustment to the weight to account for unit nonresponse. A company having multiple reporting parts for data collection may contribute to the statistics for multiple industries, so the detail may not add to the total for the number of companies.

[b] Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not include an

adjustment to the weight to account for unit nonresponse. These company count estimates reflect a new imputation process implemented for survey year 2014. This change has affected the comparability of these company count estimates with estimates published for years prior to 2014. A company having multiple reporting parts for data collection may contribute to the statistics for multiple industries, so the detail may not add to the total for the number of companies.

[c] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

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: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Nanotechnology R&D											
				Total				Paid for by the company				Paid for by others			
		Companies[a] (number)	Amount	Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
All industries	21–23, 31–33, 42–81	31,784	374,685	1,804	i	25,305	i	1,677	i	23,823	i	267	i	1,482	i
Manufacturing industries	31–33	19,522	250,553	987	i	23,217	i	922	i	22,113	i	155	i	1,105	i
Food	311	1,185	4,828	0		0		0		0		0		0	
Chemicals	325	2,907	73,575	320	i	1,424	i	286	i	1,292	i	59	i	132	i
Basic chemicals	3251	346	2,545	84	i	52	i	55	i	32		36	i	21	i
Pharmaceuticals and medicines	3254	1,089	64,628	34		522	i	29		412	i	17		110	i
Other chemicals	other 325	1,473	6,402	202	i	850	i	202	i	848	i	5		2	
Plastics and rubber products	326	1,238	3,752	25		22	i	15		12		13	i	10	i
Nonmetallic mineral products	327	416	1,289	30	i	9		30	i	5		D		3	
Fabricated metal products	332	2,406	2,239	10		28	i	10		28	i	0		0	
Machinery	333	2,780	12,585	95	i	1,877		94	i	1,824		6		54	
Agricultural implements	33311	198	1,565	0		0		0		0		0		0	
Semiconductor machinery	333242	50	3,411	19	i	1,802		18	i	1,791		D		11	
Engines, turbines, and power transmission equipment	3336	128	1,959	D		*		D		*		0		0	
Other machinery	other 333	2,405	5,650	D		75		D		32	i	D		43	
Computer and electronic products	334	3,090	77,385	341	i	19,363	i	326	i	18,473	i	63	i	890	i
Semiconductors and other electronic components	3344	858	31,391	162	i	18,816	i	157	i	17,958	i	30	i	858	i
Other electronic products	other 334	2,232	45,993	180	i	547		169	i	515		32	i	32	
Electrical equipment, appliances, and components	335	727	4,771	51	i	115	i	48	i	110	i	6	i	5	i
Transportation equipment	336	1,154	51,275	17		148		15		138		4		10	
Automobiles, bodies, trailers, and parts	3361–63	768	22,042	5		11		5		11		0		0	
Other transportation	other 336	386	29,234	12	i	137		10	i	127		4		10	
Miscellaneous manufacturing	339	D	D	68	i	214	i	68	i	213	i	D		*	i
Other manufacturing	312–16, 321–24, 331, 337	D	D	29	i	18		29	i	18		D		*	
Nonmanufacturing industries	21–23, 42–81	12,263	124,132	817	i	2,087		755	i	1,710		112	i	377	i
Mining, extraction, and support activities	21	69	3,296	11		57		11		54		D		3	
Utilities	22	34	351	0		0		0		0		0		0	
Wholesale trade	42	1,652	452 i	0		0		0		0		0		0	
Information	51	2,362	70,748	35	i	620		34	i	615		D		5	
Publishing	511	1,349	33,574	D		617		D		612		D		5	
Telecommunications	517	D	D	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: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D			Nanotechnology R&D											
					Total				Paid for by the company				Paid for by others			
		Companies[a] (number)	Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
Data processing, hosting, and related services	518	765	11,914		D		3	i	D		3	i	0		0	
Other information	other 51	D	D		0		0		0		0		0		0	
Professional, scientific, and technical services	54	7,181	37,595		766	i	1,408	i	705	i	1,039	i	109	i	369	i
Architectural, engineering, and related services	5413	1,544	3,412		4		6		D		D		D		D	
Scientific research and development services	5417	1,940	14,842		181	i	434	i	129	i	115	i	92	i	319	i
Biotechnology research and development	541711	411	4,464		25	i	29		21	i	20	i	7		10	
Other scientific research and development	other 5417	1,529	10,378		156	i	404	i	108	i	95	i	85	i	309	i
Other professional, scientific, and technical services	other 54	3,697	19,341		580	i	968	i	D		D		D		D	
Health care services	621–23	284	848		0		0		0		0		0		0	
Other nonmanufacturing	23, 44–45, 48–49, 52–53, 55–56, 624, 71–72, 81	682	10,841		6	i	3	i	6	i	3	i	0		0	
All companies (number of domestic employees)	–	31,784	374,685		1,804	i	25,305	i	1,677	i	23,823	i	267	i	1,482	i
Micro companies[c]																
5 – 9	–	3,921	1,581	i	330	i	57	i	303	i	35	i	45	i	22	i
Small companies																
10 – 19	–	6,757	4,958	i	439	i	175	i	394	i	128	i	65	i	47	i
20 – 49	–	8,397	9,662	i	455	i	611		439	i	514		64	i	96	
Medium companies																
50 – 99	–	4,712	9,298		208	i	300	i	196	i	214	i	27		86	
100 – 249	–	4,062	14,875		154	i	438	i	143	i	260	i	23	i	178	i
Large companies																
250 – 499	–	1,623	13,092		63		878	i	54		802	i	15		76	
500 – 999	–	868	14,450		41		760	i	40		692	i	5		68	
1,000 – 4,999	–	959	63,971		71		5,207	i	68		4,900	i	9		307	i
5,000 – 9,999	–	235	40,633		17		4,272	i	15		3,932	i	4		340	i
10,000 – 24,999	–	153	65,594		18		6,019	i	17		5,804	i	5		215	
25,000 or more	–	98	136,571		9		6,587	i	8		6,541	i	4		46	

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

NAICS = 2012 North American Industry Classification System.

[a] Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not include an adjustment to the weight to account for unit nonresponse. A company having multiple reporting parts for data collection may contribute to the statistics for multiple industries, so the detail may not add to the total for the number of companies.

[b] Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not include an

adjustment to the weight to account for unit nonresponse. These company count estimates reflect a new imputation process implemented for survey year 2014. This change has affected the comparability of these company count estimates with estimates published for years prior to 2014. A company having multiple reporting parts for data collection may contribute to the statistics for multiple industries, so the detail may not add to the total for the number of companies.

[c] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 22

Foreign R&D paid for by the company and others and performed by the company, by type of R&D, industry, and company size: 2016

(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	77,146	70,326	6,820	17,430	15,569	1,861 i	59,716	54,757	4,959 i
Manufacturing industries	31–33	52,689	51,421	1,268	12,910	12,685	225	39,779	38,736	1,042
Food	311	994	991	3	227 i	227 i	* i	766 i	763 i	3
Beverages and tobacco products	312	543	543	0	162	162	0	381	381	0
Textiles, apparel, and leather products	313–16	81	81	*	10	10	0	71	70	*
Wood products	321	15	15	0	1	1	0	13	13	0
Paper	322	78	78	0	16	16	0	62	62	0
Printing and related support activities	323	4	4	*	2	2	0	2	2	*
Petroleum and coal products	324	44	44	0	9	9	0	35	35	0
Chemicals	325	12,313	12,146	167	3,944	3,898	47	8,369	8,248	120
Basic chemicals	3251	537	533	4	236	232	3	301	301	*
Resins, synthetic rubbers, and artificial synthetic fibers and filaments	3252	333	333	*	241	241	*	93	92	*
Pesticides, fertilizers, and other agricultural chemicals	3253	432 i	422 i	10	D	D	10	D	D	0
Pharmaceuticals and medicines	3254	9,914	9,768	146	2,984	2,952	32	6,930	6,816	114
Soaps, cleaning compounds, and toilet preparations	3256	789	788	1	112	112	*	677	676	1
Paints, coatings, adhesives, and other chemicals	3255, 3259	307	302	5	D	D	*	D	D	5
Plastics and rubber products	326	831	829	2	222	222	*	608	606	2
Nonmetallic mineral products	327	185	185	*	25	25	0	160	160	*
Primary metals	331	69	69	*	34 i	34 i	* i	35	35	*
Fabricated metal products	332	245	243	1	63	63	0	182	181	1
Machinery	333	3,179	3,164	15	334	329	4	2,845	2,834	11
Agricultural implements	33311	625	623	1	D	D	*	D	D	1
Semiconductor machinery	333242	727	717	10	52 i	50 i	2	675	667	8
Engines, turbines, and power transmission equipment	3336	368	368	*	D	D	0	D	D	*
Other machinery	other 333	1,459	1,456	3	191	189	2	1,268	1,267	1
Computer and electronic products	334	20,791	20,530	261	5,830 i	5,734 i	96	14,961 i	14,796 i	165
Communications equipment	3342	2,963	2,955	8	1,751 i	1,750 i	1 i	1,212	1,205	7
Semiconductors and other electronic components	3344	10,304	10,278	26	2,118 i	2,114 i	4	8,186 i	8,164 i	22
Navigational, measuring, electromedical, and control instruments	3345	3,227	3,004	223	880	790	90	2,347 i	2,213 i	133
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	922	919	2	124 i	124 i	* i	797 i	795 i	2
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	840	636	204	388	D	D	452	D	D

TABLE 22

Foreign R&D paid for by the company and others and performed by the company, by type of R&D, industry, and company size: 2016

(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
Other measuring and controlling devices	other 3345	1,465	1,448	17	367 i	D	D	1,098 i	D	D
Other computer and electronic products	other 334	4,297	4,293	4	1,081	1,080	1	3,217	3,213	4
Electrical equipment, appliances, and components	335	1,436	1,436	1	207	207	*	1,229	1,229	*
Transportation equipment	336	9,050	8,253	798	1,324	1,249	75	7,726	7,003	722
Automobiles, bodies, trailers, and parts	3361–63	7,130	6,659	470 i	943	892	51	6,187	5,768	419 i
Aerospace products and parts	3364	1,817	1,490	327	339	315	24	1,478	1,175	303
Aircraft, aircraft engines, and aircraft parts	336411–13	1,813	1,488	326	337	314	23	1,476	1,173	303
Guided missiles, space vehicles, and related parts	336414–15, 336419	4	2	2	2	*	2	2	2	*
Military armored vehicles, tanks, and tank components	336992	0	0	0	0	0	0	0	0	0
Other transportation	other 336	104	103	*	43	43	0	61	61	*
Furniture and related products	337	40	40	0	16	16	0	24	24	0
Miscellaneous	339	2,792	2,773	20	482 i	479 i	3	2,310	2,294	16
Medical equipment and supplies	3391	2,475	2,455	20	401 i	398 i	3	2,074	2,058	16
Other miscellaneous manufacturing	3399	317 i	317 i	0	81 i	81 i	0	236 i	236 i	0
Nonmanufacturing industries	21–23, 42–81	24,457	18,905	5,552	4,520 i	2,884 i	1,636 i	19,937	16,021	3,917 i
Mining, extraction, and support activities	21	308	270	38	60	47	13	248	223	24
Utilities	22	1	1	*	*	*	0	1	1	*
Wholesale trade	42	12 i	12 i	0	D	D	0	D	D	0
Electronic shopping and electronic auctions	454111–12	D	D	0	D	D	0	D	D	0
Transportation and warehousing	48–49	7	7	0	*	*	0	7	7	0
Information	51	13,384	13,355	29	1,805	1,800	5	11,580	11,556	24
Publishing	511	8,698	8,686	12	1,392	1,392	0	7,306	7,294	12
Newspaper, periodical, book, and directory publishers	5111	4	4	0	* i	* i	0	4	4	0
Software publishers	5112	8,693	8,682	12	1,392	1,392	0	7,301	7,289	12
Telecommunications	517	49	49	0	14 i	14 i	0	35	35	0
Data processing, hosting, and related services	518	1,752	1,735	17	279 i	274 i	5	1,473	1,461	12
Other information	other 51	2,886	2,886	0	120 i	120 i	0	2,766 i	2,766 i	0
Finance and insurance	52	1,136	1,136	0	46	46	0	1,090	1,090	0
Real estate and rental and leasing	53	2	2	0	*	*	0	2	2	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	*	*	0	*	*	0	*	*	0

TABLE 22

Foreign R&D paid for by the company and others and performed by the company, by type of R&D, industry, and company size: 2016

(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
Other real estate and rental and leasing	other 53	2	2	0	0	0	0	2	2	0
Professional, scientific, and technical services	54	9,176	3,690	5,486	2,446 i	829 i	1,617 i	6,730 i	2,862	3,868 i
Architectural, engineering, and related services	5413	64	23	41	5	5	* i	58	18	41
Computer systems design and related services	5415	3,421	3,332	89	707 i	619 i	88 i	2,714	2,713	1
Scientific research and development services	5417	5,412	64	5,348	1,545 i	16	1,528 i	3,867 i	47	3,820 i
Biotechnology research and development	541711	1,615	3 i	1,612	247	3 i	244	1,368 i	* i	1,368 i
Physical, engineering, and life sciences (except biotechnology) research and development	541712	3,793	61	3,732	1,294 i	14	1,280 i	2,499 i	47	2,452 i
Social sciences and humanities research and development	541720	4	0	4	4	0	4	0	0	0
Other professional, scientific, and technical services	other 54	279	272	7	189 i	188 i	*	91	84	7
Health care services	621–23	154	154	0	150	150	0	4	4	0
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	D	D	0	D	D	0	178	178	0
All companies (number of domestic employees)	–	77,146	70,326	6,820	17,430	15,569	1,861 i	59,716	54,757	4,959 i
Micro companies[a]										
5 – 9	–	145	144	1 i	15	14	* i	130	130	1 i
Small companies										
10 – 19	–	101	77	24	17 i	14 i	2	85	63	22
20 – 49	–	338	326	12	77	75	2	260	251	10
Medium companies										
50 – 99	–	364	354	11	101 i	100 i	2	263	254	9
100 – 249	–	1,319	1,277	43 i	355	316	39 i	965	961	4
Large companies										
250 – 499	–	1,774	1,738	37	374	348	25	1,401	1,389	12
500 – 999	–	2,159	2,146	13	481	479	2	1,678	1,667	12
1,000 – 4,999	–	15,626	14,099	1,527	4,494 i	3,624	870 i	11,132	10,474	657 i
5,000 – 9,999	–	8,986	8,321	665 i	2,356	1,866	490 i	6,630	6,455	176 i
10,000 – 24,999	–	14,661	11,910	2,751	2,568	2,515	52	12,093	9,395	2,698 i
25,000 or more	–	31,672	29,935	1,736	6,594	6,216	377	25,078	23,719	1,359

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 23

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 for companies that performed foreign R&D: 2016

(Millions of U.S. dollars)

Industry	NAICS code	Total	Paid for by company	Paid for by others	Research (basic and applied)			Development		
					Total	Paid for by company	Paid for by others	Total	Paid for by company	Paid for by others
Domestic R&D performance										
All industries	21–23, 31–33, 42–81	271,023	240,862	30,161	53,859	46,434	7,424	217,164	194,428	22,736
Manufacturing industries	31–33	182,727	161,405	21,321	41,296	36,679	4,617	141,431	124,726	16,705
Chemicals	325	45,301	43,517	1,784	15,527	14,987	541	29,774	28,530	1,243
Pharmaceuticals and medicines	3254	38,893	37,597	1,296	13,665	13,482	183	25,228	24,115	1,113
Other chemicals	other 325	6,408	5,920	488	1,862	1,504	358	4,546	4,416	131
Computer and electronic products	334	67,266	62,642	4,624	10,320	9,631	689	56,946 i	53,012 i	3,935
Semiconductors and other electronic components	3344	28,655	28,289	366	4,826	4,815	11	23,829 i	23,474 i	355
Other computer and electronic products	other 334	38,611	34,353	4,258	5,494	4,816	678	33,117	29,537	3,580 i
Nonmanufacturing industries	21–23, 42–81	88,296	79,457	8,839	12,563	9,755	2,808 i	75,733	69,701	6,032 i
Information	51	59,960	59,653	307	5,391	5,322	69	54,568	54,331	238
Software publishers	5112	29,817	29,566	251	3,137	3,105	32	26,680	26,461	219
Other information	other 51	30,143	30,086	56	2,254	2,217	37	27,888	27,869	19
Professional, scientific, and technical services	54	20,080	11,663	8,417	5,719 i	2,983 i	2,736 i	14,360 i	8,680	5,681 i
Scientific research and development services	5417	8,155	333	7,822	2,398 i	138 i	2,261 i	5,756 i	195	5,561 i
Other professional, scientific, and technical services	other 54	11,925	11,330	595	3,321 i	2,845 i	476	8,604	8,485	120
Foreign R&D performance										
All industries	21–23, 31–33, 42–81	77,146	70,326	6,820	17,430	15,569	1,861 i	59,716	54,757	4,959 i
Manufacturing industries	31–33	52,689	51,421	1,268	12,910	12,685	225	39,779	38,736	1,042
Chemicals	325	12,313	12,146	167	3,944	3,898	47	8,369	8,248	120
Pharmaceuticals and medicines	3254	9,914	9,768	146	2,984	2,952	32	6,930	6,816	114
Other chemicals	other 325	2,399	2,378	21	960 i	946 i	14	1,439	1,432	7
Computer and electronic products	334	20,791	20,530	261	5,830 i	5,734 i	96	14,961 i	14,796 i	165
Semiconductors and other electronic components	3344	10,304	10,278	26	2,118 i	2,114 i	4	8,186 i	8,164 i	22
Other computer and electronic products	other 334	10,487	10,252	235	3,712 i	3,620 i	91	6,775	6,632	143
Nonmanufacturing industries	21–23, 42–81	24,457	18,905	5,552	4,520 i	2,884 i	1,636 i	19,937	16,021	3,917 i
Information	51	13,384	13,355	29	1,805	1,800	5	11,580	11,556	24
Software publishers	5112	8,693	8,682	12	1,392	1,392	0	7,301	7,289	12
Other information	other 51	4,691	4,674	17	412 i	408 i	5	4,278 i	4,266 i	12
Professional, scientific, and technical services	54	9,176	3,690	5,486	2,446 i	829 i	1,617 i	6,730 i	2,862	3,868 i
Scientific research and development services	5417	5,412	64	5,348	1,545 i	16	1,528 i	3,867 i	47	3,820 i

TABLE 23

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 for companies that performed foreign R&D: 2016

(Millions of U.S. dollars)

Industry	NAICS code	Total	Paid for by company	Paid for by others	Research (basic and applied)						Development					
					Total		Paid for by company		Paid for by others		Total		Paid for by company		Paid for by others	
Other professional, scientific, and technical services	other 54	3,764	3,627	138	901	i	812	i	89	i	2,863		2,814		49	

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

NAICS = 2012 North American Industry Classification System.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 24

Foreign R&D paid for by the company and others and performed by the company, by type of R&D and selected industry and location: 2016

(Millions of U.S. dollars)

Industry	NAICS code and location	Total foreign R&D performance		Research (basic and applied)		Development	
All locations							
All industries	21–23, 31–33, 42–81	77,146		17,430		59,716	
Manufacturing industries	31–33	52,689		12,910		39,779	
Chemicals	325	12,313		3,944		8,369	
Pharmaceuticals and medicines	3254	9,914		2,984		6,930	
Computer and electronic products	334	20,791		5,830	i	14,961	i
Semiconductors and other electronic components	3344	10,304		2,118	i	8,186	i
Nonmanufacturing industries	21–23, 42–81	24,457		4,520	i	19,937	
Information	51	13,384		1,805		11,580	
Software publishers	5112	8,693		1,392		7,301	
Professional, scientific, and technical services	54	9,176		2,446	i	6,730	i
Scientific research and development services	5417	5,412		1,545	i	3,867	i
Africa							
All industries	21–23, 31–33, 42–81	251		33		218	i
Manufacturing industries	31–33	101		25		76	
Chemicals	325	47		19		28	
Pharmaceuticals and medicines	3254	35		11		23	
Computer and electronic products	334	17		1		16	
Semiconductors and other electronic components	3344	5	i	*		5	i
Nonmanufacturing industries	21–23, 42–81	150		8		142	i
Information	51	74		2		72	
Software publishers	5112	D		1		D	
Professional, scientific, and technical services	54	74	i	6	i	68	i
Scientific research and development services	5417	66	i	6	i	61	i
Asia and Pacific							
All industries	21–23, 31–33, 42–81	23,581		5,018		18,563	
Manufacturing industries	31–33	16,240		3,883	i	12,356	
Chemicals	325	2,475		792		1,683	
Pharmaceuticals and medicines	3254	1,974		671		1,303	
Computer and electronic products	334	8,739		2,365	i	6,374	
Semiconductors and other electronic components	3344	4,923		942	i	3,981	i
Nonmanufacturing industries	21–23, 42–81	7,342		1,135		6,207	
Information	51	4,224		640		3,584	
Software publishers	5112	3,237		551		2,686	
Professional, scientific, and technical services	54	2,446	i	474	i	1,971	i
Scientific research and development services	5417	1,411	i	195	i	1,216	i
Canada							
All industries	21–23, 31–33, 42–81	4,734		1,107	i	3,627	
Manufacturing industries	31–33	2,848		699		2,149	
Chemicals	325	544		152		392	
Pharmaceuticals and medicines	3254	474		124		349	
Computer and electronic products	334	1,541		430		1,111	
Semiconductors and other electronic components	3344	557	i	85	i	472	i
Nonmanufacturing industries	21–23, 42–81	1,886		407	i	1,478	
Information	51	1,078		118		960	
Software publishers	5112	832		79		753	
Professional, scientific, and technical services	54	688		268	i	419	
Scientific research and development services	5417	291		199	i	92	i
Europe							

TABLE 24

Foreign R&D paid for by the company and others and performed by the company, by type of R&D and selected industry and location: 2016

(Millions of U.S. dollars)

Industry	NAICS code and location	Total foreign R&D performance		Research (basic and applied)		Development	
All industries	21–23, 31–33, 42–81	38,500		8,774		29,726	
Manufacturing industries	31–33	26,346		6,385		19,961	
Chemicals	325	8,313		2,602		5,711	
Pharmaceuticals and medicines	3254	6,841		2,007		4,834	
Computer and electronic products	334	6,548		1,908	i	4,640	i
Semiconductors and other electronic components	3344	2,970		709	i	2,261	i
Nonmanufacturing industries	21–23, 42–81	12,153		2,389	i	9,764	
Information	51	6,798		835	i	5,962	
Software publishers	5112	3,853		616	i	3,237	
Professional, scientific, and technical services	54	4,528		1,383	i	3,145	i
Scientific research and development services	5417	3,351		1,067	i	2,285	i
Latin America and OWH							
All industries	21–23, 31–33, 42–81	3,908		1,080	i	2,828	
Manufacturing industries	31–33	3,348		964	i	2,384	
Chemicals	325	658		271	i	388	
Pharmaceuticals and medicines	3254	409		118		292	
Computer and electronic products	334	1,212		421	i	791	
Semiconductors and other electronic components	3344	306		79	i	226	i
Nonmanufacturing industries	21–23, 42–81	561		116	i	445	i
Information	51	188		14		175	
Software publishers	5112	D		D		95	
Professional, scientific, and technical services	54	332	i	98	i	234	i
Scientific research and development services	5417	232	i	63	i	169	i
Middle East							
All industries	21–23, 31–33, 42–81	3,886		883	i	3,003	i
Manufacturing industries	31–33	2,643		661	i	1,982	i
Chemicals	325	158		55		102	
Pharmaceuticals and medicines	3254	130		42		87	
Computer and electronic products	334	2,203		568	i	1,635	i
Semiconductors and other electronic components	3344	1,435		280	i	1,156	i
Nonmanufacturing industries	21–23, 42–81	1,243		222		1,021	
Information	51	817		126		691	
Software publishers	5112	D		D		430	
Professional, scientific, and technical services	54	374		68	i	306	
Scientific research and development services	5417	53	i	12	i	42	i
Puerto Rico[a]							
All industries	21–23, 31–33, 42–81	159		55		104	
Manufacturing industries	31–33	141		D		D	
Chemicals	325	74		45		29	
Pharmaceuticals and medicines	3254	32		D		D	
Computer and electronic products	334	3		1	i	3	i
Semiconductors and other electronic components	3344	3		1	i	3	i
Nonmanufacturing industries	21–23, 42–81	18		D		D	
Information	51	D		D		D	
Software publishers	5112	*		0		*	
Professional, scientific, and technical services	54	D		D		*	i
Scientific research and development services	5417	D		D		*	i

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

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

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

Note(s)

Detail within a select location may not add to total because of rounding. Sum of locations do not equal all locations due to the undistributed portion not being published. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed foreign R&D.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 25

Domestic R&D paid for and performed by the company, by type of cost, industry, and company size: 2016

(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	317,731	180,885	21,068	14,836	5,160	21,595	5,107	12,520	1,872	7,285	47,402
Manufacturing industries	31–33	211,660	113,845	9,293	8,745	3,510	19,021	2,935	9,337	1,617	5,314	38,042
Food	311	4,611	2,809 i	93 i	123 i	30 i	389 i	51 i	218 i	166 i	245 i	486 i
Beverages and tobacco products	312	987	502	16	45	3	72	7	46	0	6 i	291 i
Textiles, apparel, and leather products	313–16	1,156 i	766 i	29 i	53 i	2 i	117 i	3 i	23 i	1 i	55 i	106 i
Wood products	321	181	132	*	11	2	23	1	2	0	1	8
Paper	322	851	393 i	0	10 i	35 i	346 i	3 i	7 i	1 i	1 i	54 i
Printing and related support activities	323	219 i	149 i	5 i	8 i	10	13	10 i	10 i	*	*	13 i
Petroleum and coal products	324	367	242	*	8	1	13	2	34	1	10	57
Chemicals	325	64,165	28,511	3,098	4,166	383	5,878	897	3,371	806 i	1,236	15,818
Basic chemicals	3251	2,284	1,402	5	54	35	209	32	133	1	100	311
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	693	422	D	42	4	45	15	35	1	D	D
Pesticides, fertilizers, and other agricultural chemicals	3253	1,061 i	469 i	D	51 i	3	85 i	39 i	134 i	8 i	D	D
Pharmaceuticals and medicines	3254	55,983	23,686	3,064	3,885	320	5,303	751	2,927	795 i	1,015	14,239
Soaps, cleaning compounds, and toilet preparations	3256	2,660	1,533	14	115	6	153	14	91	*	11	723
Paints, coatings, adhesives, and other chemicals	3255, 3259	1,484	999	4	19	16	83	46	51	1	15	249
Plastics and rubber products	326	3,584	2,086	54	85	61	485	40	189	1	190	393
Nonmetallic mineral products	327	1,274	791	1	46	6	89	9	76	1	13	242
Primary metals	331	583	333	3 i	8	1	111	3 i	19	5	8	91 i
Fabricated metal products	332	2,127	1,366	20	39	31	277	18	38	10	30	299
Machinery	333	11,699	6,793	137	692	105	1,480	72	506	21	201	1,693
Agricultural implements	33311	1,552	865	*	116	15	252	6	45	2	7	243
Semiconductor machinery	333242	3,028	1,347	80	107	11	425	3	227	3	82	743
Engines, turbines, and power transmission equipment	3336	1,901	1,159	1	295	*	204 i	1	91	6	9	135 i
Other machinery	other 333	5,218	3,422	56 i	174 i	78	598	62	143	9 i	105	571
Computer and electronic products	334	68,515	41,261	5,464	1,476	1,363	3,899	1,425	3,507	406	2,525	7,188
Communications equipment	3342	11,293	6,589	775	332	150	288	925	522	13	576 i	1,122
Semiconductors and other electronic components	3344	29,176	18,752 i	2,253 i	550	321 i	1,492 i	272 i	1,605 i	108 i	908 i	2,915 i
Navigational, measuring, electromedical, and control instruments	3345	10,131	6,501	197	395	173	833	140	262	6	295	1,330
Electromedical, electrotherapeutic, and radiation apparatuses	334510, 334517	2,466	1,445 i	72 i	81 i	15 i	204	27 i	78 i	3 i	97	445
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	3,121	2,170	21	124	16	273	11	70	D	87	D
Other measuring and controlling devices	other 3345	4,544	2,885	104	190	142	356	101	114	D	111	D
Other computer and electronic products	other 334	17,914	9,420	2,238	199	719	1,287	88	1,118	279	747	1,820
Electrical equipment, appliances, and components	335	4,302	2,839	32	187	37	278	56	114	4	78	677

TABLE 25

Domestic R&D paid for and performed by the company, by type of cost, industry, and company size: 2016

(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 equipment	336	32,905	16,205	7	1,257	1,228	4,503	227	702	148	356	8,273
Automobiles, bodies, trailers, and parts	3361–63	19,293	11,115	7	1,059	1,087	2,971	192	525	122	203	2,011
Aerospace products and parts	3364	12,272	4,260	*	162	126	1,231	23	151	D	138	D
Aircraft, aircraft engines, and aircraft parts	336411–13	11,930	4,084	*	155	124	1,163	21	150	D	138	D
Guided missiles, space vehicles, and related parts	336414–15, 336419	342	175	0	7	2	68	2	1	*	*	86
Military armored vehicles, tanks, and tank components	336992	3	1	0	0	0	2	*	0	0	0	0
Other transportation	other 336	1,337	829	0	36	15	298	12	26	D	15	D
Furniture and related products	337	366	268	0	9	1	38 i	1 i	3	1	4 i	41 i
Miscellaneous	339	13,768	8,398	335	522	211	1,010	111	471	47	352	2,312
Medical equipment and supplies	3391	11,474	6,786	332	487	203	877	97	434	46	335	1,876
Other miscellaneous manufacturing	3399	2,294 i	1,612 i	3 i	35	9 i	132 i	14 i	36 i	1 i	16 i	436 i
Nonmanufacturing industries	21–23, 42–81	106,071	67,041	11,775	6,091	1,650	2,574 i	2,172	3,183	255	1,971	9,360
Mining, extraction, and support activities	21	2,897	1,747	34	122	3	137	47	97	*	348	362
Utilities	22	325	108 i	D	31 i	*	21 i	1 i	68 i	4 i	82 i	D
Wholesale trade	42	442 i	320 i	0	7 i	* i	48 i	3 i	4 i	8 i	9 i	43 i
Electronic shopping and electronic auctions	454111–12	1,569 i	1,106 i	D	1 i	* i	1 i	* i	182 i	0	0	D
Transportation and warehousing	48–49	486	388	0	84	0	6	1	0	0	*	6 i
Information	51	70,075	42,705	10,843	3,322	1,350	1,318 i	1,831	1,967	208	943	5,589
Publishing	511	33,174	22,533	2,773	1,292	184	433	582	611	104	783	3,880
Newspaper, periodical, book, and directory publishers	5111	77 i	53 i	0	1 i	2 i	3 i	* i	7 i	0	10 i	1 i
Software publishers	5112	33,098	22,480	2,773	1,291	183	430	582	603	104	773	3,880
Telecommunications	517	3,530 i	2,135	187 i	172	D	745 i	186 i	26	1	2	D
Data processing, hosting, and related services	518	11,776	8,307	1,098	382	232	65	176	279	103	129	1,005
Other information	other 51	21,594	9,730	6,785	1,476	D	75	887	1,051	* i	29 i	D
Finance and insurance	52	7,237	4,505	29	1,576	46	9	50	94	0	434	494
Real estate and rental and leasing	53	475	416	D	9	*	2 i	6	9	5	4	D
Lessors of nonfinancial intangible assets (except copyrighted works)	533	27	22	0	*	0	*	*	0	* i	4	* i
Other real estate and rental and leasing	other 53	449	394	D	9	*	2 i	6	9	5	*	D
Professional, scientific, and technical services	54	20,845	14,570	673	884	226	900	198	721	27	128	2,516
Architectural, engineering, and related services	5413	1,816	1,528	7	76	12 i	75 i	16	19	*	29	54
Computer systems design and related services	5415	13,255	9,037	520	558	140	472	80	570	4	34	1,840
Scientific R&D services	5417	2,811	1,579	86	141	31	312	83	84	21	57	417
Biotechnology R&D	541711	750 i	381 i	39 i	23 i	9 i	93 i	29 i	24 i	5	13 i	134 i
Physical, engineering, and life sciences (except biotechnology) R&D	541712	2,029	1,172	48	118	22	220	53	58	15	43	280

TABLE 25

Domestic R&D paid for and performed by the company, by type of cost, industry, and company size: 2016

(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
Social sciences and humanities R&D	541720	32	26	0	0	*	*	*	3 i	0	0	2
Other professional, scientific, and technical services	other 54	2,962	2,427 i	60 i	109 i	44 i	41 i	18	47	3	9	205 i
Health care services	621–23	782	429	56	25 i	9	88	27 i	33	3	16	96 i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	939 i	747 i	23	29	15 i	45 i	8	8 i	1 i	6 i	58 i
All companies (number of domestic employees)	–	317,731	180,885	21,068	14,836	5,160	21,595	5,107	12,520	1,872	7,285	47,402
Micro companies[a]												
5 – 9	–	1,044 i	597 i	42 i	57 i	15 i	86 i	23 i	31 i	8 i	30	156 i
Small companies												
10 – 19	–	3,887 i	2,211 i	99 i	512	53 i	296 i	77	81 i	30	57 i	470 i
20 – 49	–	7,473 i	4,724 i	276	380	82 i	600	150	172 i	57	117 i	914 i
Medium companies												
50 – 99	–	7,728	4,734	293	332	68 i	642	162	216	44	201	1,037
100 – 249	–	11,722	7,279	561	472	137	1,020	218	315	119	231	1,369
Large companies												
250 – 499	–	11,438	6,921	650	422	277	729	185	301	191	225	1,537
500 – 999	–	13,525	8,344	749	521	209	901	306	450	96	311	1,637
1,000 – 4,999	–	53,305	31,052	4,070	1,626	766	3,013	592	2,187	254	1,012	8,732
5,000 – 9,999	–	35,887	19,670	4,352 i	1,773	388	2,020	757 i	1,241	49	365	5,272
10,000 – 24,999	–	53,384	30,855	1,537	2,420	532	4,700	440	2,948	274	1,701	7,977
25,000 or more	–	118,339	64,498	8,438	6,321	2,634	7,588	2,196	4,578	750 i	3,035	18,301

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 26

Domestic R&D paid for and performed by the company, by industry and company size: 2016

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)											
		All companies	5 – 9[a]	10 – 19	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	317,731	1,044 i	3,887 i	7,473 i	7,728	11,722	11,438	13,525	53,305	35,887	53,384	118,339
Manufacturing industries	31–33	211,660	389 i	2,014 i	3,529	4,829	7,877	6,903	9,053	38,100	20,236	45,978	72,752
Food	311	4,611	5 i	6 i	27 i	58 i	199 i	147	94	588	202	2,456	829 i
Beverages and tobacco products	312	987	0	0	18 i	3 i	17 i	5	22	24	197	24	676
Textiles, apparel, and leather products	313–16	1,156 i	0	1 i	18 i	23 i	337 i	24	14 i	254	274	104	106
Wood products	321	181	0	9 i	4 i	5 i	11 i	7 i	24	52	46	24	0
Paper	322	851	0	4 i	6 i	14 i	29 i	23	21	151	163	418	22
Printing and related support activities	323	219 i	2 i	1 i	22 i	20 i	49	12 i	23	57 i	17	7	8
Petroleum and coal products	324	367	D	2 i	20 i	14	115	23	45	D	0	124	0
Chemicals	325	64,165	193	1,059	1,619	2,225	3,280	2,789	1,875	11,286	5,534	19,930	14,375
Basic chemicals	3251	2,284	0	11 i	52	97	118	124	100	913	465	405	0
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	693	2 i	D	20 i	27 i	27	65	62	175 i	0	D	0
Pesticides, fertilizers, and other agricultural chemicals	3253	1,061 i	0	D	D	31	D	D	0	152	*	D	0
Pharmaceuticals and medicines	3254	55,983	185	993	1,396	1,932	2,935	2,486	1,579	9,053	4,423	16,844	14,159
Soaps, cleaning compounds, and toilet preparations	3256	2,660	3 i	16 i	24 i	55 i	106 i	19	103	400	397 i	1,385	150 i
Paints, coatings, adhesives, and other chemicals	3255, 3259	1,484	3 i	D	D	82 i	D	D	33	593	250	D	65
Plastics and rubber products	326	3,584	3 i	10 i	92 i	99 i	178 i	173	161	825	468	1,418	155
Nonmetallic mineral products	327	1,274	1 i	2 i	18 i	26	42 i	10	70	119	116	870	0
Primary metals	331	583	3 i	17 i	16 i	68	44 i	35	35	185	42	137 i	0
Fabricated metal products	332	2,127	21 i	89 i	178 i	209 i	394	190	291	300	237	218	0
Machinery	333	11,699	9 i	143 i	301 i	394 i	650	426	593	3,462	1,724	973	3,025
Agricultural implements	33311	1,552	1 i	6	16 i	13	42	13	62	311	9	0	1,079
Semiconductor machinery	333242	3,028	D	D	D	D	78	D	175	1,462	D	0	0
Engines, turbines, and power transmission equipment	3336	1,901	D	D	D	D	32	78	D	39	D	0	D
Other machinery	other 333	5,218	D	D	D	D	499 i	D	D	1,649	D	973	D
Computer and electronic products	334	68,515	64 i	364 i	640 i	738	1,244	1,793	3,373	13,673	6,597	10,598	29,430
Communications equipment	3342	11,293	6 i	73 i	D	119	257	294	1,066	2,519	1,397	D	D
Semiconductors and other electronic components	3344	29,176	13 i	61 i	215	263	426	1,047	986	6,068 i	2,442 i	7,663	9,993
Navigational, measuring, electromedical, and control instruments	3345	10,131	40 i	214 i	273 i	282	421	316	595	3,337	308	1,969	2,376
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	2,466	D	155 i	44 i	54	174	112	283	967	D	499	0
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	3,121	1	5 i	45 i	26	74	28	30	483	D	D	D
Other measuring and controlling devices	other 3345	4,544	D	54 i	184 i	202	173	176	282	1,887	D	D	D
Other computer and electronic products	other 334	17,914	6 i	16	D	74	141	136 i	726	1,750	2,449	D	D
Electrical equipment, appliances, and components	335	4,302	6 i	33 i	154	153	260	204	627	1,053	582	851	378
Transportation equipment	336	32,905	1 i	95	52	165	330	628	1,114	2,840	2,115	4,578	20,986

TABLE 26

Domestic R&D paid for and performed by the company, by industry and company size: 2016

(Millions of U.S. dollars)

| Industry | NAICS code | Company size (domestic employees) | | |

TABLE 26

Domestic R&D paid for and performed by the company, by industry and company size: 2016

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)																							
		All companies		5 – 9[a]		10 – 19		20 – 49		50 – 99		100 – 249		250 – 499		500 – 999		1,000 – 4,999		5,000 – 9,999		10,000 – 24,999		25,000 or more	
Health care services	621–23	782		6		16	i	33		73		191	i	147	i	173		15	i	44		0		85	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	939	i	14	i	11	i	D		18	i	57		D		75		254		D		119	i	D	

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 27

Domestic R&D paid for and performed by the company, by type of R&D, industry, and company size: 2016

(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	317,731		19,143		48,806		249,782	
Manufacturing industries	31–33	211,660		14,841		35,845		160,974	
Food	311	4,611		494	i	1,399	i	2,718	
Beverages and tobacco products	312	987		143		231		613	
Textiles, apparel, and leather products	313–16	1,156	i	84		117		955	i
Wood products	321	181		13		43		125	
Printing and related support activities	323	219	i	31		33	i	155	
Chemicals	325	64,165		8,027		14,290		41,847	
Pharmaceuticals and medicines	3254	55,983		7,276		12,636		36,071	
Other chemicals	other 325	8,181		751		1,654		5,776	
Plastics and rubber products	326	3,584		342		868		2,373	
Nonmetallic mineral products	327	1,274		149		287		838	
Primary metals	331	583		65	i	114	i	403	
Fabricated metal products	332	2,127		118	i	399	i	1,610	
Machinery	333	11,699		638		1,400		9,661	
Computer and electronic products	334	68,515		2,103		8,966		57,447	i
Semiconductors and other electronic components	3344	29,176		796	i	4,225		24,155	i
Navigational, measuring, electromedical, and control instruments	3345	10,131		668	i	1,525	i	7,938	i
Other computer and electronic products	other 334	29,208		639		3,215		25,354	
Electrical equipment, appliances, and components	335	4,302		308	i	697		3,296	
Transportation equipment	336	32,905		1,579		4,413		26,913	
Aerospace products and parts	3364	12,272		552		1,834		9,885	
Other transportation equipment	other 336	20,633		1,027		2,578		17,028	
Furniture and related products	337	366		16	i	85		265	
Miscellaneous manufacturing	322, 324, 339	14,986		729		2,502		11,755	
Nonmanufacturing industries	21–23, 42–81	106,071		4,302		12,961		88,808	
Information	51	70,075		1,942		6,695		61,438	
Publishing	511	33,174		1,072		2,820		29,282	
Telecommunications	517	3,530	i	377		1,359		1,795	i
Data processing, hosting, and related services	518	11,776		427		1,390		9,958	
Other information	other 51	21,594		66		1,125		20,403	
Professional, scientific, and technical services	54	20,845		1,332	i	4,481	i	15,032	
Architectural, engineering, and related services	5413	1,816		231	i	600	i	985	i
Computer systems design and related services	5415	13,255		665	i	2,429	i	10,161	
Scientific research and development services	5417	2,811		315	i	831	i	1,665	
Biotechnology research and development	541711	750	i	114	i	216	i	421	
Physical, engineering, and life sciences (except biotechnology) research and development	541712	2,029		197	i	610	i	1,223	
Social sciences and humanities research and development	541720	32		5	i	6	i	22	
Other professional, scientific, and technical services	other 54	2,962		121		621	i	2,221	
Other nonmanufacturing	21–23, 42–49, 52, 53, 55–81	15,152		1,029	i	1,786		12,337	
All companies (number of domestic employees)	–	317,731		19,143		48,806		249,782	
Micro companies[a]									
5 – 9	–	1,044	i	136	i	308	i	600	i
Small companies									
10 – 19	–	3,887	i	286	i	1,082	i	2,518	i
20 – 49	–	7,473	i	630	i	2,119	i	4,724	
Medium companies									
50 – 99	–	7,728		742	i	1,776		5,210	
100 – 249	–	11,722		774		2,523		8,424	

TABLE 27

Domestic R&D paid for and performed by the company, by type of R&D, industry, and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research	Applied research	Development
Large companies					
250 – 499	–	11,438	674	2,336	8,427
500 – 999	–	13,525	1,129	2,112	10,285
1,000 – 4,999	–	53,305	3,008	8,908	41,388
5,000 – 9,999	–	35,887	1,872	3,391	30,623
10,000 – 24,999	–	53,384	3,073	10,240	40,072
25,000 or more	–	118,339	6,818	14,010	97,511

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 28-A

Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (A–M): 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total[a] (number)	United States	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia	Florida	Georgia	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana
All industries	21–23, 31–33, 42–81	29,999	317,731	868	27 e	4,743	340	105,769	3,542	6,101	1,463	230	4,441	4,273	114 i	1,398	11,822	4,988	2,225	1,469	752	228	261	3,335	18,084	17,454	6,601	198	3,466	121
Manufacturing industries	31–33	18,634	211,660	563	12	3,799	224	60,439	2,311	5,712	1,304	37	2,426	2,336	80 i	1,346	9,589	4,818	2,103	1,047	664	132	202	2,351	12,949	16,823	5,692	155	2,679	61
Food	311	1,153	4,611	6 e	5 e	4 e	46	130	40	22	804	* e	17	24	1 e	56	810 i	93	840	21	15	5 e	1 e	48	17	163	360	6	28	1 e
Beverages and tobacco products	312	88	987	* e	* e	* e	* e	38	22	3	* e	* e	14	D	* e	* e	101	* e	* e	* e	25	* e	1 i	* e	3	1 e	* e	* e	21	* e
Textiles, apparel, and leather products	313–16	419	1,156 i	13 e	* e	2 e	1 e	155 i	12	4 e	* e	* e	23	118	1 e	1 e	15 e	7 e	2 e	2 e	2 e	2 e	4 e	3 e	74	15	4 e	3 e	5 e	1 e
Wood products	321	153	181	1	* e	* e	2	14	1	* e	* e	0	2	6	* e	* e	3 i	1 e	8	* e	6	1	* e	* e	3	1 i	42	1	* e	*
Paper	322	242	851	1 i	* e	* e	64	10	*	1 i	0	0	2	49	* e	* e	8 i	2 i	1	4	25	*	13	8	19	13	7	* e	1 e	* e
Printing and related support activities	323	309	219 i	* e	* e	2 i	1	63 i	6	1 e	* e	* e	2 e	3	* e	* i	6 i	2 i	2 i	1 e	* e	1 i	* e	1 e	3	9 i	8 i	* e	7	* e
Petroleum and coal products	324	126	367	7 e	* e	1 e	3 e	25	8	1 e	* i	* e	3 e	3 e	* e	* e	51	15	* e	3	* e	5 e	* e	8	3 e	12	1 e	2 e	6 e	* e
Chemicals	325	2,640	64,165	114	* e	305 i	23	13,219	222	4,098	349 i	26	483	365	51 i	25	4,247 i	2,442	146	141 i	314	16 e	15 e	1,021	7,881	375	407	32 i	1,562	26
Basic chemicals	3251	284	2,284	2	0	9	6	112	16	15	66	* e	19	21	0	* e	37	11	18	3	23	3 e	* e	49	73	38	2 e	4	12	2
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	213	693	1 e	0	* e	* e	15	* e	2 i	2	0	1 e	15	* e	* e	D	4 i	1 i	* e	18	1 i	* e	* e	11 i	4 i	6	* e	*	0
Pesticides, fertilizers, and other agricultural chemicals	3253	57	1,061 i	1 e	0	5 i	3 i	33 i	10 i	* e	* e	1 i	8 e	6	D	2	D	D	47 i	6 i	*	3 e	* e	3 i	8 i	4	7 i	16 i	D	2 i
Pharmaceuticals and medicines	3254	960	55,983	102	0	265 i	12	12,793	187	3,979	276 i	25	437	297	D	21	3,994 i	D	69	61	44	6	14 e	966	7,679	206	240	9	D	22
Soaps, cleaning compounds, and toilet preparations	3256	432	2,660	1 e	* e	3 i	2	186	3 e	60	4	* e	10	15	* e	* e	91	3 e	2 e	65 i	1 e	1 e	* e	2 e	83	74	96	1 e	10 i	* e
Paints, coatings, adhesives, and other chemicals	3255, 3259	696	1,484	7	0	23	1 e	78	6	42	* e	* e	9 i	10 i	0	1 i	66 i	21	9	6 i	227	2 e	* e	2 e	26 i	50	56	2 i	37	* e
Plastics and rubber products	326	1,201	3,584	11	* e	258	10	111	25	29	33	0	44	105	13	2 i	76	328	24	12	61 i	27	1 e	121	81	511	77	12	12 i	1 i
Nonmetallic mineral products	327	409	1,274	2	* e	3	1 e	71	36	D	* e	1	29	11	* e	* e	30	6	1 e	1 e	2 e	1 e	D	1 e	81	11	9	2	3	* e
Primary metals	331	337	583	10	* e	1 e	3 i	13 i	2	4	3 i	0	1 e	D	* e	* e	26	38	16 i	1	7	* e	* e	13	5 i	34	9	8	5	* e
Fabricated metal products	332	2,229	2,127	26	* e	63	3 e	219	9 i	70	1 e	* e	26	22 i	* e	2 e	129	79	16 i	21	19	16 i	2 e	11	44 i	97	53	4 e	41	1 e
Machinery	333	2,648	11,699	23	* e	46	10 e	3,024	36	D	1	0	92	110	1	6 i	1,796	260	762	119 i	48	25	5	179	217	346	489	15	76	1 e
Agricultural implements	33311	190	1,552	1	0	4	1 e	32	7	D	* e	0	1	33	0	1 e	283	3	737	75 i	* e	13	* e	1 i	0	4	106	D	1	D
Semiconductor machinery	333242	48	3,028	0	0	4	0	2,176	2	D	0	0	16	0	0	* i	0	0	0	0	0	0	0	D	76	* i	D	0	0	0
Engines, turbines, and power transmission equipment	3336	125	1,901	1	0	1	* e	108	2 e	D	0	0	12	18	0	* e	D	115	* e	6	* e	* e	3	D	5	41	D	D	1 e	D
Other machinery	other 333	2,285	5,218	21	* e	38	9 e	707 i	24	194	1	0	63	59	1	4 i	D	142	25	38	48	11 e	2 e	177	136	301	295	15	74	1 e
Computer and electronic products	334	2,980	68,515	162	4	2,875	34	36,785	1,363	199	84	10	908	721	9	1,234	1,131	108	182	357	34	18	17	355	2,880	294	919	5 e	50	6
Communications equipment	3342	502	11,293	95	4	40	1	6,330	262	25	1	8	230	486	8	6	509	23	*	D	3	* i	2	219	436	21	68	1 e	15	2
Semiconductors and other electronic components	3344	822	29,176	31	*	1,838	16	15,497	322	31	38	1	161	107	1	1,115	241	23	9 i	9	1 e	*	8	64	1,057	42	138	1	18	* i
Navigational, measuring, electromedical, and control instruments	3345	1,258	10,131	27	* e	991	17 i	3,395	268	133	45	*	231	120	* e	7	256	31	172	D	15 i	11	6 i	56	943	83	279	2 e	17 i	3
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	250	2,466	* e	0	48 i	14 i	1,184 i	20 i	D	2 i	*	84 i	22 i	* i	* e	D	7 i	D	* e	6 i	D	4 i	32	202	16 i	21 i	* e	1 e	* e
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	171	3,121	6	0	883	0	464	49	D	* e	0	66	33	0	1 e	D	6	D	D	1	D	1	11	197	11	139	1 e	1	* e
Other measuring and controlling devices	other 3345	837	4,544	21	* e	60 i	3	1,746	199	67	42	0	81	65	* e	6	82	17	21 i	5	9	2 e	1 i	13	544	56	119	1 e	15 i	3
Other computer and electronic products	other 334	399	17,914	9	0	6	* e	11,564	511	10	1	1	286	8	0	107	125	31	1	88	15	6 i	1	16	445	149	433	2 e	1 e	*
Electrical equipment, appliances, and components	335	719	4,302	2 e	*	40	2 e	576	19	66	2	* e	49	113	*	1 i	226	37	9	4	4	2 e	* e	14	216	536	89	18	57	8

TABLE 28-A

Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (A–M): 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total[a] (number)	United States	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia	Florida	Georgia	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana
Transportation equipment	336	1,114	32,905	142	1	90	16	2,493	315	906	2	*	466	353 i	2	9	629	959	34	336	84	8 e	D	427	284	14,254	368	22	767	13
Automobiles, bodies, trailers, and parts	3361–63	738	19,293	67	* e	16	15	1,150	5 e	12	* e	0	14 e	D	* e	6	380	844	19 e	D	78	3 e	1 e	56	109	14,000	67	16	D	1 e
Aerospace products and parts	3364	168	12,272	30	1	60	1	1,277	301	886	2	*	415	94	1	1	198	108	14	D	5	4	D	336	168	112	111	5	D	13
Aircraft, aircraft engines, and aircraft parts	336411–13	151	11,930	25	1	50	1	1,234	170	875	2	*	415	94	1	1	198	108	14	D	* e	4	D	336	168	112	72	5	D	* e
Guided missiles, space vehicle, and related parts	336414–15, 336419	17	342	5	0	10	0	43 i	131	11	0	0	1	0	0	0	0	0	0	0	5	0	0	0	0	0	39	0	*	13
Military armored vehicles, tanks, and tank components	336992	6	3	0	0	* i	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	*	*	0	0	0
Other transportation	other 336	202	1,337	45	* e	14	1 e	66	9	9 i	* e	0	37 i	D	* e	1	51	8	* e	*	* e	2 e	1 i	34	7	142	190	1 e	12	* e
Furniture and related products	337	275	366	4	* e	2 i	1 i	11 i	28 i	* e	* e	* e	1 e	5	* e	* e	10	25	23	5	7	* e	* i	* e	* e	96	12	13	1 e	* e
Miscellaneous	339	1,603	13,768	39 i	* e	106	5 e	3,483	166	86	24 i	* e	265	189	1 e	10	295	416	36	17 i	11 e	5 e	121	140	1,136	56 i	2,838	11	37	2 e
Medical equipment and supplies	3391	928	11,474	34 i	* e	80	4 e	3,126	124	76	24 i	0	249	90	1 e	2 e	144	399	4 e	9	7 e	3 e	120	135	1,091	34 e	2,819	10	23	2 e
Other miscellaneous manufacturing	3399	675	2,294 i	5 i	* e	27	1 e	357 i	42	11 i	* e	* e	15 i	99 i	* e	8	151 i	17	32	8 i	3 i	2 e	1 e	6	44 i	22 i	19	1 e	13	* e
Nonmanufacturing industries	21–23, 42–81	11,366	106,071	305	15 e	944	116	45,330	1,231	389	159	193 i	2,015	1,937	35	51	2,234	169 i	123	421	89 i	97 e	59	983	5,135	631	909	43	786	60
Mining, extraction, and support activities	21	62	2,897	* e	* e	16	* e	144	11	* e	* e	* e	1 i	8	* e	* e	* e	3	* e	4	* e	* e	* e	* e	59	1	1	2	* e	* e
Utilities	22	34	325	D	0	0	0	191	D	0	*	*	3	D	1	0	1	0	0	*	0	0	0	1	*	*	0	3	1	0
Wholesale trade	42	1,642	442 i	D	* e	4 e	3 i	60 i	6 i	6 i	1 e	* e	17 e	14 i	1 e	2 i	22 i	15 i	5 i	3 e	6 i	3 e	1 e	4 e	13 i	10 e	8 e	1 e	7 e	1 i
Electronic shopping and electronic auctions	454111–12	241	1,569 i	* e	* e	2 i	* e	1,059 i	D	1 e	* e	* e	2 e	D	* e	* e	3 e	1	* e	* e	2 i	* e	* e	1 e	3 i	1 e	1 e	* e	1 e	* e
Transportation and warehousing	48–49	32	486	* e	2	1	1	2 i	6	* e	*	* e	6	2	* i	* e	8	* e	* e	6	* e	* e	* e	323	* e	* i	* i	2	*	* i
Information	51	2,327	70,075	132	4 e	210	94	36,691	658	171	66	78 i	1,074	1,031	8 e	20 e	823	67 e	85	89	15 e	29 e	18	359	3,415	288	345	18	153	38
Publishing	511	1,341	33,174	67	1 e	118	5 e	12,819	333	90	34	32	352	531	4	11 e	326	26 e	30	18 i	5 e	10 e	12	183	2,363	185	232	14	32	14
Newspaper, periodical, book, and directory publishers	5111	103	77 i	* e	* e	* e	* e	27	* e	* e	* e	5	1 e	* e	* e	* e	1 e	* e	* e	* e	* e	* e	* e	3 i	11	* e	1 e	* e	* e	* e
Software publishers	5112	1,238	33,098	67	1 e	118	5 e	12,792	333	90	34	26 e	351	531	4	11 e	325	26 e	30	18 i	5 e	10 e	12	180	2,352	185	231	14	32	14
Telecommunications	517	121	3,530 i	2	1 e	3 i	2 e	355 i	43	1 e	* e	16 i	370	229 i	1 e	* e	248 i	1 e	2 e	34	2 e	1 e	1 e	8	40	2 e	2 e	* e	1 e	* e
Data processing, hosting, and related services	518	744	11,776	62	1 e	83	85	5,419	160	78	31	11 e	327 i	225	3 e	8 e	150 e	37 e	42	17 e	8 e	15 e	3	160	688	49 e	101	3 e	115	23
Other information	other 51	121	21,594	1	1	7	2	18,098	122	3	* e	19 i	25	46	* e	2 i	99	3	10	20	1 e	3	*	8	325	52	11	*	5	* e
Finance and insurance	52	70	7,237	5	*	399	1	1,233 i	16	28	59	*	392	546	* e	*	920	1	*	2	1	*	2	6	40	51	3	*	11	*
Real estate and rental and leasing	53	48	475	* e	* e	* i	* e	190	1	* e	* e	73	1 i	D	*	* e	7	* e	2	* i	*	1 i	* e	* e	4 i	* e	* e	* e	* e	* e
Lessors of nonfinancial intangible assets (except copyrighted works)	533	11	27	0	0	* i	0	D	*	0	0	0	1 i	D	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	37	449	* e	* e	* e	* e	D	1	* e	* e	73	1 i	4	*	* e	7	* e	2	* i	*	1 i	* e	* e	4 i	* e	* e	* e	* e	* e
Professional, scientific, and technical services	54	6,385	20,845	138	9 e	304	11 e	5,129 i	512 i	171	30	41 e	463	300	24	28	411	70 e	27 e	309	44 i	58 e	37	279 e	1,446	266 i	539	15	601	20
Architectural, engineering, and related services	5413	1,354	1,816	36	5 e	22	3 e	224 i	39	39	2 e	5 e	60 e	35 e	8	10 i	56 i	17 e	8 e	7 e	8 e	37	16	34 e	102	45 i	23 e	6	26	7
Computer systems design and related services	5415	2,543	13,255	74	2 e	209	4 e	3,670 i	397 i	53	21	17 e	233	156	13	8	196	26 e	15	294	21 i	11 e	17	124 e	790	127 i	418	2 e	541	3 e
Scientific research and development services	5417	1,480	2,811	20 i	*	56	1 i	890	47	70	4	2 i	117	21 i	1 e	4 i	26 i	19 i	2 i	4 i	11 i	1 i	2 i	76	429 i	65	52	5	27	9
Biotechnology research and development	541711	315	750 i	1 i	*	8 i	0	251	2 i	34	1	* e	26 i	4 i	* e	* e	9	1 i	* i	* e	5 i	* i	* e	16 i	175 i	3	18	* e	1 i	2 i
Physical, engineering, and life sciences (except biotechnology) research and development	541712	1,134	2,029	19 i	0	48	1 i	634	45	37 i	3	2 i	90	17 i	1 e	4 i	17 i	18 i	1 i	4 i	7	1 i	2 i	58	253	62	34 i	5	23	6

TABLE 28-A

Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (A–M): 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total[a] (number)	United States	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia	Florida	Georgia	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana
Social sciences and humanities research and development	541720	31	32	* e	0	* e	0	6	* e	* e	* e	* i	* e	*	* i	* e	* e	* e	* e	* e	* e	* e	* e	1 i	1 e	* e	* e	* e	3 i	*
Other professional, scientific, and technical services	other 54	1,008	2,962	8 e	1 e	16 e	2 e	345	30 i	9 e	3 e	17 e	53 e	88	1 e	7	133	8 e	3 e	4 e	4 e	8 e	2 e	46 e	125	29 e	46	1 e	8 e	1 e
Health care services	621–23	241	782	2	* e	2 i	* e	456	1 e	1 e	* e	* e	33	1 e	* e	* e	2 e	1 e	* e	1	* e	1 e	* e	1 e	39	2 e	1 e	* e	1 e	* e
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	286	939 i	8	1 e	6 i	5	174 i	14 i	11	3	1 e	23 i	9 i	1 e	1 e	36	12	4 i	6	20	5 i	1 i	9 i	115	13	11	1 e	12	1 e
All companies (number of domestic employees)	–	29,999	317,731	868	27 e	4,743	340	105,769	3,542	6,101	1,463	230	4,441	4,273	114 i	1,398	11,822	4,988	2,225	1,469	752	228	261	3,335	18,084	17,454	6,601	198	3,466	121
Micro companies[b]																														
5 – 9	–	3,507	1,044 i	11 e	1 e	8 e	2 e	240 i	26 i	18 i	1 e	3 e	41 i	15 e	1 e	2 e	33 e	14 e	5 e	4 e	3 e	4 e	2 e	63	122 i	24 e	23 i	2 e	10 e	4 i
Small companies																														
10 – 19	–	6,390	3,887 i	35 e	3 e	58 e	12 e	853 i	58 e	42 e	D	15 e	116 e	182 i	5 e	13 e	139 e	47 e	25 e	18 e	41 i	17 e	10 e	92 e	306 i	92 e	85 e	8 e	49 e	4 e
20 – 49	–	7,873	7,473 i	47 e	4 e	95 e	18 e	1,910	94 e	117 i	18 e	24 e	197 e	136 e	11 e	13 e	288 e	96 e	38 e	38 e	32 e	30 e	13 e	212 e	741	231 i	156 e	21 e	62 e	8 e
Medium companies																														
50 – 99	–	4,519	7,728	47 e	3 e	70	14 e	2,106	91	117	13 e	13 e	175 e	113 e	6 e	15 e	271 i	125	44 i	37 e	38	32 e	12 e	132	947	228	180	12 e	71	16
100 – 249	–	3,909	11,722	103 i	3 e	151	14 e	3,819	197	157	13	30	237	184	7 e	24 i	381	115	86	47	51	30 e	11 e	118	850	260	203	26	114	8
Large companies																														
250 – 499	–	1,567	11,438	81	2	74	13 e	3,953	216	76	39	4 e	152	150	3 e	12	269	164	36	53	36	9 e	3 e	132	1,141	280	241	13	102	16
500 – 999	–	840	13,525	14	* e	113	5	3,943	184	104	D	12	517	120	6	13	424	116	67	51	47	7	14	211	1,148	491	332	3	56	1 e
1,000 – 4,999	–	926	53,305	336	5	708	104	19,280	849	774	153	84	575	898	14	71 i	1,910	532	145	327	367	55	151	940	5,845	1,428	977	28	197 i	17
5,000 – 9,999	–	226	35,887	90	* e	380	73	16,710	691	700	22	17 i	446	377	1 e	48	664	390	46	186	55	8	1 i	192	1,259	666	704	19	258	18
10,000 – 24,999	–	146	53,384	44	1	644	29 i	14,530	254	856	849	20 i	814	843	56 i	1,074	3,868 i	3,201	1,028	569	45	9	32	535	2,286	1,940	1,356	44	1,117 i	19
25,000 or more	–	98	118,339	61	5	2,441	56	38,424	882	3,139	95	9	1,170	1,255	5	114	3,575	189	706	138	36	27	11	708	3,439	11,815	2,345	23	1,429	12

* = amount < $500,000. D = data withheld to avoid disclosing operations of individual companies. e = estimated; more than 50% of the estimate is modeled—see Technical Notes. i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Statistics for number of companies are based only on companies in the United States that reported to the survey. These statistics do not include an adjustment to the weight to account for unit nonresponse. A company having multiple reporting parts for data collection may contribute to the statistics for multiple industries, so the detail may not add to the total for the number of companies.
[b] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.
[c] Includes data reported on Form BRDI-1 that were not allocated to a specific state as well as data reported on Form BRDI-1(S) by multiestablishment companies. For single-establishment companies, data reported on Form BRDI-1(S) were allocated to the state in the address used to mail the survey form.

Note(s)

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded R&D. For a given estimate in this table, if the conditions are satisfied for both the i and e flags, the e flag is assigned because the imputation rate may be found in the corresponding table of imputation rates. Changes in data collection and imputation processes have affected the comparability of company count estimates in this table with estimates published for previous years.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 28-B

Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (N–Z): 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total[a] (number)	United States	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming	Undistributed[c]
All industries	21–23, 31–33, 42–81	29,999	317,731	491	412	767	12,902	323	13,454	7,226	237	6,366	642	6,316	11,161	822 i	1,146	135	1,383	14,913	2,876	230	2,240	19,001	157	4,387	164	5,664
Manufacturing industries	31–33	18,634	211,660	188	304	491	9,432	266	7,732	4,206	128	5,622	428	5,465	9,696	775 i	812	109	1,131	8,829	1,187	154	1,196	6,526	142	3,198	148	3,639
Food	311	1,153	4,611	62	1 e	9 i	379	2 i	36	14	2 e	136	13	16 i	48	2 i	5	5	44	31 i	9 i	4	11	64	* e	84	* e	71
Beverages and tobacco products	312	88	987	* e	* e	* e	* e	* e	269	49	* e	* e	* e	2 e	1 e	* e	* e	* e	4	168	* i	* e	93	D	* e	1 e	* e	D
Textiles, apparel, and leather products	313–16	419	1,156 i	1 e	1 e	2 e	15 e	* e	68 i	203	* e	87	2 e	27	15 e	6 e	75	* e	11 e	22 e	4 i	* e	7 e	D	* e	12 i	* e	D
Wood products	321	153	181	* e	* e	* e	2	* e	1 i	7 i	9	1 i	1	14	2 i	2	8	* e	3	1 e	1 i	* i	5	D	*	5	* e	D
Paper	322	242	851	1	* e	2	14	* e	9 i	20	* e	24	* e	1 i	46	2	41	* e	24	5	1 i	1	7	D	* e	412	* e	D
Printing and related support activities	323	309	219 i	* e	* e	* e	2 e	* e	7 i	16	* e	8	* e	2	6	* e	* e	* e	5	2 e	1 i	* e	6	* e	* e	19	* e	24
Petroleum and coal products	324	126	367	* e	1 e	1 e	53	* e	10 e	6 e	* e	15 e	67	2	12 e	* e	2 e	1 e	1 e	25	1 e	0	3 e	D	* e	3	* e	D
Chemicals	325	2,640	64,165	35	23 i	72	7,552	21 i	2,979	1,727	4	2,455	52	98	6,740 i	61	143	7 e	342	957	279	37	403	1,073	104	427	95	574
Basic chemicals	3251	284	2,284	1 e	1	27	170 i	3 e	247	125	* e	268	10	6	95	12	8	1 e	266	134	8	* e	112	58	D	9	87	D
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	213	693	* e	* e	13	D	0	58 i	6 i	* e	326	* e	12	34	4	13	0	11	85	2	* e	2 i	2	* e	19	0	D
Pesticides, fertilizers, and other agricultural chemicals	3253	57	1,061 i	1	D	*	D	* e	1	30 i	1 i	5 i	2 e	* e	1 e	0	2 i	3 i	2 i	7 i	1 i	* e	9	3 i	* e	54	0	D
Pharmaceuticals and medicines	3254	960	55,983	33	D	27 i	6,954	18	2,435	1,496	3	435	35	67	6,448 i	43	39	3 e	51	639	266	33	273	1,006	D	182	8	359
Soaps, cleaning compounds, and toilet preparations	3256	432	2,660	* e	* e	1 e	272 i	* e	198 i	22	* e	1,225	* e	1 e	10 e	1 e	3 e	* e	7 i	49	* e	4	3	2 i	1 e	128	*	17
Paints, coatings, adhesives, and other chemicals	3255, 3259	696	1,484	* e	2 i	4	68	* e	40	49	0	196	4 i	11	152	2	77	* e	5 e	44 i	2 e	* e	4 e	2 e	5	34	* e	99
Plastics and rubber products	326	1,201	3,584	6	3 e	6 i	25	* e	77	82	D	291	36	7	183	13	18	9	22	336	5 i	* e	30	D	10	104	* e	D
Nonmetallic mineral products	327	409	1,274	1 e	* e	5	33	* e	687	42	* e	63	1 e	D	74	* e	7	* e	3 i	13	2	4	2 e	D	3	8	* e	D
Primary metals	331	337	583	* e	1 i	6	6	* e	12	10	* e	66	1 e	13	144	1 e	11	* e	25 i	38 i	3	1 i	2 e	D	2	18	* e	D
Fabricated metal products	332	2,229	2,127	7	5	11	41	1 e	42 i	45	3 i	155	17 i	26	74 i	3 e	30	4	17 i	170	15	1 e	13	42	2 e	256	1	175
Machinery	333	2,648	11,699	32	11	39	61	7	233	203	75	298	153	D	329	15	67	12	76	726	21	17	27	143	5 e	301	5	D
Agricultural implements	33311	190	1,552	D	0	0	* e	D	D	D	26	4	D	D	1 e	0	4	1	7	D	* i	* e	* e	7	1	D	* e	D
Semiconductor machinery	333242	48	3,028	0	0	D	24	0	D	0	0	6	0	D	10	0	0	0	*	D	* i	* i	* i	0	0	0	0	D
Engines, turbines, and power transmission equipment	3336	125	1,901	D	2	D	1 e	D	26	D	1	8 i	D	D	8	* e	22	* e	14 i	68	* e	1 i	7	3	* e	D	* e	13
Other machinery	other 333	2,285	5,218	9	9	39	36	7	186	99	48	281	152	85	311	15	41	11	54	396	20	16	19	133	4 e	218	5	D
Computer and electronic products	334	2,980	68,515	26	29	267	685	224	1,208	1,093	D	532 i	40	4,547	857	65	148	61	64	5,610 i	243	41	234	771	3 e	224	2 e	D
Communications equipment	3342	502	11,293	D	6	66	396	14	200 i	414	* e	83	4	55	330	1 e	9	*	5	504	71	2	124 i	149	* e	7	0	D
Semiconductors and other electronic components	3344	822	29,176	7	2 e	129	116	164	481	356 i	0	79 i	7	4,267	213	20 i	83	29	20	1,750	83	8	24	169	* e	77	1 i	326
Navigational, measuring, electromedical, and control instruments	3345	1,258	10,131	D	16	49	157	39	256	157	D	310 i	27	137	209	37	53	24	36	378	87	31	68	259	1 i	117	1 e	D
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	250	2,466	*	D	6 i	29 i	0	83 i	22 i	0	59 i	1	13 i	115	1 e	12 i	*	27	44 i	D	D	22 i	46 i	1	47 i	*	D
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	171	3,121	D	D	21	36	27	82	39	D	45	20	95	31	16	9	11	1 e	147	D	D	32	42	0	6	* e	D
Other measuring and controlling devices	other 3345	837	4,544	11	2 e	22	92	12	91	96	* e	206 i	6 i	30	63	21	32	13	8 i	187 i	41	6	14	171	1 e	63	* e	176
Other computer and electronic products	other 334	399	17,914	1 e	5	23	16	7	270	166	*	60	1	89	105	7	2 i	8	3 e	2,977 i	3	*	19	194	1 e	23	* e	121
Electrical equipment, appliances, and components	335	719	4,302	1	18	7	73	* e	66	171	* e	64	7	101	346	3	124	2	55 i	88	3	2	25	D	* e	532	44	D
Transportation equipment	336	1,114	32,905	14	40	29	108	6	1,305	254	15	1,098	32	205	309	1 e	109	7	205	397	382	32	258 i	D	10	695	* e	D

TABLE 28-B

Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (N–Z): 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total[a] (number)	United States	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming	Undistributed[c]
Automobiles, bodies, trailers, and parts	3361–63	738	19,293	8 e	2	8	25	1 e	189	171	D	379	13 e	190	148	1 e	74	4 e	171	103	246	* e	28	86	2 e	D	* e	D
Aerospace products and parts	3364	168	12,272	4	38	19	74	5	1,116	72	D	716	15	13	149	1	25	*	6	276	136	32	78	D	8	D	* i	D
Aircraft, aircraft engines, and aircraft parts	336411–13	151	11,930	4	38	19	74	5	1,116	72	D	715	15	12	149	1	25	*	5	276	62	32	73	D	8	D	* i	D
Guided missiles, space vehicles, and related parts	336414–15, 336419	17	342	0	* i	0	*	*	0	0	0	1	0	1 i	0	0	0	0	* i	*	74	0	6 i	1 i	0	0	0	*
Military armored vehicles, tanks, and tank components	336992	6	3	0	0	0	0	0	0	0	0	*	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Other transportation	other 336	202	1,337	1 i	* e	3	9	0	1 e	10	1	3	3	2 i	12	* e	8	3	27	18	* e	* e	151 i	5	* e	228	0	D
Furniture and related products	337	275	366	* e	* e	* e	2 i	* e	6 i	25	* e	18	1 i	2 i	14 i	* e	3 i	* e	1 e	4 i	5 i	3	9	D	* e	14	* e	D
Miscellaneous	339	1,603	13,768	2 e	169	34	381	3 e	715 i	239	1 e	311	6	53	497	598 i	21	1 e	230	237	213	9	62 i	358	1 e	84	* e	47
Medical equipment and supplies	3391	928	11,474	1 e	1 e	27	364	2 e	570 i	194	1 e	223	4	45	440	38	13	* e	226	212	175	1 e	20	217	1 e	59	* e	31
Other miscellaneous manufacturing	3399	675	2,294 i	1 e	168	7	16 i	1 e	146 i	45 i	* e	87 i	2 e	8 i	58 i	561 i	8	1 e	4 e	25 i	38	8	42 i	141	1 e	25 i	* e	15
Nonmanufacturing industries	21–23, 42–81	11,366	106,071	303 i	108 i	277	3,471 i	57	5,722	3,020	109	744	214	851	1,465	46	334	26	253	6,084	1,688	76	1,045	12,475	16 e	1,189	16	2,025
Mining, extraction, and support activities	21	62	2,897	*	2	* e	325	* e	* i	* e	1	*	57	* e	1 i	* e	* e	* e	* e	2,232	D	* e	* e	1 i	* e	* e	3	D
Utilities	22	34	325	0	0	0	D	*	7	*	D	22	*	*	13	0	*	*	0	1	D	0	D	*	*	*	D	D
Wholesale trade	42	1,642	442 i	2 e	2 e	2 i	17 e	1 e	26 e	5 e	D	22 i	3 e	3 e	10 e	1 i	2 e	1 e	10 i	22 e	D	1 i	6 e	6 e	* e	7 e	D	D
Electronic shopping and electronic auctions	454111–12	241	1,569 i	* e	1 i	* e	2 e	* e	7 e	1 e	D	1 e	* e	1 e	2 e	* i	2 i	* e	* e	4 i	D	* e	D	10 i	* e	1 e	* e	D
Transportation and warehousing	48–49	32	486	* e	* e	* e	*	* e	* e	*	* e	4	* e	* e	22	* e	* e	* e	56	21	* e	*	6	6	* e	1	* e	8
Information	51	2,327	70,075	222 i	58 i	186	1,851 i	15	2,838	1,161	80	296	65	605	725	10 e	245	15	70 e	1,450	574	22	573	11,644	4	796	5 e	586
Publishing	511	1,341	33,174	11 e	49 i	98	441	9 e	1,071 i	939	76	237	16 e	379	317	4 e	48	7	36	538	376	14	215	9,532	2	691	3	215
Newspaper, periodical, book, and directory publishers	5111	103	77 i	* e	* e	* e	1 e	* e	3 e	1 i	* e	1 e	* e	* e	1 e	* e	* e	* e	* e	8	* e	* e	* e	1 e	* e	1 e	* e	8
Software publishers	5112	1,238	33,098	11 e	49 i	98	440	9 e	1,068 i	938	76	236	16 e	379	316	4 e	48	7	36	530	376	14	215	9,532	2	691	3	207
Telecommunications	517	121	3,530 i	1 e	1 e	1 e	1,259 i	* e	260	12	1 e	4 e	D	9	52	* e	D	1 e	3	211 i	7	1 e	111	184 i	* e	18	* e	D
Data processing, hosting, and related services	518	744	11,776	197 i	7 e	86	122	4	541	164	3 e	51 e	9 e	189	286	5	151	7	27 e	608	183	8 e	232	564	1	76	1 e	351
Other information	other 51	121	21,594	13	1 e	1	29	2	965	46	* e	3	D	28	69	*	D	* e	4	93	8 i	* e	15	1,363 i	* e	10	* e	D
Finance and insurance	52	70	7,237	14	3	1	289	1	1,016	657	* e	95	8	*	211	19	27	*	1	290	5	*	16	16	*	227	* e	626
Real estate and rental and leasing	53	48	475	5	* i	* e	D	* e	19	*	* e	4	* e	3	2	* e	* e	* e	1 i	* e	* e	* e	D	129	* e	*	* i	D
Lessors of nonfinancial intangible assets (except copyrighted works)	533	11	27	* i	0	0	0	0	*	*	0	* i	0	3	1 i	0	0	0	0	0	0	0	D	*	0	0	0	D
Other real estate and rental and leasing	other 53	37	449	4	* i	* e	D	* e	19	* e	* e	4	* e	* e	2	* e	* e	* e	1 i	* e	* e	* e	* e	129	* e	*	* i	D
Professional, scientific, and technical services	54	6,385	20,845	51 i	39	84	963 i	40	1,768	1,176	10 e	265	77	225	457	15 e	52 i	9 i	96	1,957 i	676	52	426 e	604	10 e	99	4 e	408
Architectural, engineering, and related services	5413	1,354	1,816	11 i	12	11	28 e	5 e	71 e	32	3 e	28 e	11 e	104	118	3 e	10 e	2 e	16 e	222	17	2 e	60 i	61	3 e	29	1 e	80
Computer systems design and related services	5415	2,543	13,255	19	16	29	204 e	14 i	1,507	1,035	2 e	143	25	81	157 i	8 e	30	5 i	30 e	1,497 i	26 e	48	276 e	382	6	32 e	1 e	238
Scientific research and development services	5417	1,480	2,811	11	7	34	98	9 i	78 i	76	4	48	4 i	22	128 i	3 i	6 i	2 i	14	121	24	* i	25	97 i	* e	14	* i	23
Biotechnology research and development	541711	315	750 i	11	* e	1	20	3 i	29 i	34 i	* e	15 i	1 i	1 i	10 i	1 i	4 i	1	4 i	18	4 i	*	5 i	19	* e	9	0	4
Physical, engineering, and life sciences (except biotechnology) research and development	541712	1,134	2,029	*	7	33	76	6 i	43	42	4	33	1 i	21	117 i	3 i	2 i	* i	10	103	14 i	* i	20	77 i	* e	4	* i	20
Social sciences and humanities research and development	541720	31	32	* e	* e	*	1	* e	5 i	* e	* e	* e	2 i	* i	1 i	* e	* e	0	* e	* e	6	0	* e	1 i	* e	* e	0	0
Other professional, scientific, and technical services	other 54	1,008	2,962	9	5 e	11	632 i	12	112 e	33 i	1 e	45	36	17	54 e	2 e	6 e	* e	36	116 e	609	2 e	65 e	64	1 e	25	1	67

TABLE 28-B

Companies with domestic R&D paid for and performed by the company, by industry, company size, and state (N–Z): 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Companies, U.S. total[a] (number)	United States	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming	Undistributed[c]
Health care services	621–23	241	782	* e	* e	1	13 i	* e	5 e	3	* e	10	* e	6	3 e	* e	1 e	* e	1 e	11	D	* e	3	40	* e	48	* e	D
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	286	939 i	9	4 e	2	8 e	1 e	36	15	1	25	4 i	7	20	1 e	6 i	2 i	16	97	7 i	* e	7 e	20	1 e	10	1 i	141
All companies (number of domestic employees)	–	29,999	317,731	491	412	767	12,902	323	13,454	7,226	237	6,366	642	6,316	11,161	822 i	1,146	135	1,383	14,913	2,876	230	2,240	19,001	157	4,387	164	5,664
Micro companies[b]																												
5 – 9	–	3,507	1,044 i	3 e	4 e	4 e	36 i	2 e	46 e	19 e	1 e	29 e	8 i	14 i	34 e	2 e	8 i	1 e	9 e	57 e	12 e	1 e	30 e	24 e	1 e	15 e	* e	4
Small companies																												
10 – 19	–	6,390	3,887 i	17 e	19 e	22 e	201 e	11 e	197 e	89 e	4 e	106 e	18 e	43 e	153 e	11 e	28 e	4 e	33 e	195 e	83 e	5 e	105 e	117 e	3 e	66 e	2 e	D
20 – 49	–	7,873	7,473 i	18 e	41	36 e	265 e	24	402 e	181	11 e	198 e	33 e	75 e	304 i	24 i	33 e	7 e	64 e	419 e	87 e	17 i	225 e	192 e	7 e	84 e	4 e	71
Medium companies																												
50 – 99	–	4,519	7,728	26 e	23 e	51	344	31	266 e	225 i	9 e	171 e	39 e	83	275	20	43 e	9 e	45 e	344	95	15	142 e	195	6 e	110 i	4 e	230
100 – 249	–	3,909	11,722	32 i	56 i	62	605	13	409	221	10	243	32 e	133	509	20 i	72	26	78	503	110	19	200	450	14	262	2 e	400
Large companies																												
250 – 499	–	1,567	11,438	37	34	94	226	8	362	220	3 e	283	26	138	371	8	49	10	102	454	163	19	74	757	2 e	170	3	551
500 – 999	–	840	13,525	25	9	141	295	1 e	826	251	2	156	30	147	276	17	104	19	29	736	160	D	132	633	* e	266	14	D
1,000 – 4,999	–	926	53,305	212 i	170	181	2,068	18	2,118	1,179	75	1,007	184	995	1,493	296	306	39	195	1,496	247	14	359	1,179	10	749	91	1,853
5,000 – 9,999	–	226	35,887	33	6	55	783	2 i	1,635	1,417	2	749	33	54	982	340 i	258	6	215	1,153	900	D	227	1,295 i	93	1,239	1 i	D
10,000 – 24,999	–	146	53,384	31	26 i	46	2,322	23	2,267	1,517	11	1,942	174	376	2,831	55	108	5 i	328	3,061	186	33	166 i	472	20	942	0	384
25,000 or more	–	98	118,339	56	25	77	5,757 i	190	4,927	1,906	110	1,482	66	4,258	3,933 i	28	136	10	284	6,495 i	833	68	580	13,688	1	485	44	795

* = amount < $500,000. D = data withheld to avoid disclosing operations of individual companies. e = estimated; more than 50% of the estimate is modeled—see Technical Notes. i = > 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = 2012 North American Industry Classification System.

[a] Statistics for number of companies are based only on companies in the United States that reported to the survey. These statistics do not include an adjustment to the weight to account for unit nonresponse. A company having multiple reporting parts for data collection may contribute to the statistics for multiple industries, so the detail may not add to the total for the number of companies.
[b] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.
[c] Includes data reported on Form BRDI-1 that were not allocated to a specific state as well as data reported on Form BRDI-1(S) by multiestablishment companies. For single-establishment companies, data reported on Form BRDI-1(S) were allocated to the state in the address used to mail the survey form.

Note(s)

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded R&D. For a given estimate in this table, if the conditions are satisfied for both the i and e flags, the e flag is assigned because the imputation rate may be found in the corresponding table of imputation rates. Changes in data collection and imputation processes have affected the comparability of company count estimates in this table with estimates published for previous years.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 29

Domestic R&D paid for and performed by the company, by industry, company size, and domestic R&D program size: 2016

(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	317,731		5,875	i	21,552		28,264		18,098		243,942	
Manufacturing industries	31–33	211,660		3,602	i	11,901		18,071		13,054		165,032	
Food	311	4,611		194	i	506		426		455		3,029	
Beverages and tobacco products	312	987		D		66		84		D		676	
Textiles, apparel, and leather products	313–16	1,156	i	76	i	408	i	350		322		0	
Wood products	321	181		28	i	70		83		0		0	
Paper	322	851		52	i	82		101		63		553	
Printing and related support activities	323	219	i	62	i	78		79	i	0		0	
Petroleum and coal products	324	367		21	i	149		73		124		0	
Chemicals	325	64,165		502	i	2,438		5,722		3,913		51,589	
Basic chemicals	3251	2,284		50	i	326		574		553		780	
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	693		49	i	150		179		0		314	
Pesticides, fertilizers, and other agricultural chemicals	3253	1,061	i	14	i	54		D		D		D	
Pharmaceuticals and medicines	3254	55,983		119	i	1,492		4,560		2,740		47,073	
Soaps, cleaning compounds, and toilet preparations	3256	2,660		81	i	169	i	203		147		2,059	
Paints, coatings, adhesives, and other chemicals	3255, 3259	1,484		187	i	248		D		D		D	
Plastics and rubber products	326	3,584		290	i	542		696		231		1,826	
Nonmetallic mineral products	327	1,274		61	i	129		215		0		870	
Primary metals	331	583		78	i	181		213		110	i	0	
Fabricated metal products	332	2,127		479	i	753		433		312		149	
Machinery	333	11,699		535	i	1,386		1,628		1,298		6,853	
Agricultural implements	33311	1,552		22	i	102		160		189		1,079	
Semiconductor machinery	333242	3,028		8	i	33		136		226		2,625	
Engines, turbines, and power transmission equipment	3336	1,901		27	i	D		156		0		D	
Other machinery	other 333	5,218		477	i	D		1,177		883		D	
Computer and electronic products	334	68,515		620	i	1,799		2,782		3,140		60,174	
Communications equipment	3342	11,293		156	i	261		449		674		9,753	
Semiconductors and other electronic components	3344	29,176		126	i	464		1,003		741		26,842	
Navigational, measuring, electromedical, and control instruments	3345	10,131		257	i	923		889		1,069		6,993	
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	2,466		37	i	277	i	218		599	i	1,335	
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	3,121		D		110		148		D		2,752	
Other measuring and controlling devices	other 3345	4,544		D		536		523		D		2,906	
Other computer and electronic products	other 334	17,914		81	i	151		440		655		16,587	
Electrical equipment, appliances, and components	335	4,302		116	i	597		1,001		568		2,020	
Transportation equipment	336	32,905		D		1,253		1,841		D		28,216	
Automobiles, bodies, trailers, and parts	3361–63	19,293		47	i	965		1,113		1,066		16,101	
Aerospace products and parts	3364	12,272		18	i	187		463		333		11,271	
Aircraft, aircraft engines, and aircraft parts	336411–13	11,930		16	i	183		409		225		11,097	
Guided missiles, space vehicles, and related parts	336414–15, 336419	342		2	i	4		54		107		174	

TABLE 29

Domestic R&D paid for and performed by the company, by industry, company size, and domestic R&D program size: 2016

(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	
Military armored vehicles, tanks, and tank components	336992	3		1		3		0		0		0	
Other transportation	other 336	1,337		D		99		265		D		844	
Furniture and related products	337	366		64	i	98		203		0		0	
Miscellaneous manufacturing	339	13,768		315	i	1,364		2,143		870		9,076	
Medical equipment and supplies	3391	11,474		156	i	1,025		1,648		870		7,775	
Other miscellaneous manufacturing	3399	2,294	i	159	i	339		495		0		1,301	i
Nonmanufacturing industries	21–23, 42–81	106,071		2,273	i	9,651		10,193		5,044		78,909	
Mining, extraction, and support activities	21	2,897		13	i	63		57		85		2,678	
Utilities	22	325		5	i	37		D		D		D	
Wholesale trade	42	442	i	335	i	107	i	0		0		0	
Electronic shopping and electronic auctions	454111–12	1,569	i	30	i	28	i	D		0		D	
Transportation and warehousing	48–49	486		10	i	48		19		86		323	
Information	51	70,075		488	i	3,708		5,128		3,515		57,235	
Publishing	511	33,174		348	i	1,610	i	1,786		1,196		28,234	
Newspaper, periodical, book, and directory publishers	5111	77	i	22	i	22		32		0		0	
Software publishers	5112	33,098		326	i	1,588	i	1,754		1,196		28,234	
Telecommunications	517	3,530	i	D		255		184		D		2,803	i
Data processing, hosting, and related services	518	11,776		117	i	1,673		2,937		1,918		5,130	
Other information	other 51	21,594		D		169		221		D		21,067	
Finance and insurance	52	7,237		13	i	63		522		0		6,639	
Real estate and rental and leasing	53	475		13	i	5	i	45		103		309	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	27		D		0		D		0		0	
Other real estate and rental and leasing	other 53	449		D		5	i	D		103		309	
Professional, scientific, and technical services	54	20,845		1,270	i	5,024	i	3,577		876		10,097	
Architectural, engineering, and related services	5413	1,816		254	i	827		581		66		88	
Computer systems design and related services	5415	13,255		499	i	1,825	i	1,419		710		8,800	
Scientific research and development services	5417	2,811		283	i	1,595		879		23		32	
Biotechnology research and development	541711	750	i	72	i	434		218	i	0		26	
Physical, engineering, and life sciences (except biotechnology) research and development	541712	2,029		206	i	1,133		661		23		6	
Social sciences and humanities research and development	541720	32		4	i	28		*		0		0	
Other professional, scientific, and technical services	other 54	2,962		234	i	776	i	698		77		1,177	
Health care services	621–23	782		25	i	152		514	i	91		0	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	939	i	71	i	415		D		D		0	
All companies (number of domestic employees)	–	317,731		5,875	i	21,552		28,264		18,098		243,942	
Micro companies[a]													
5 – 9	–	1,044	i	589	i	384		71	i	0		0	
Small companies													
10 – 19	–	3,887	i	D		1,892	i	616		D		0	
20 – 49	–	7,473	i	1,558	i	4,820		1,095		0		0	
Medium companies													

TABLE 29

Domestic R&D paid for and performed by the company, by industry, company size, and domestic R&D program size: 2016

(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
50 – 99	–	7,728	1,049 i	3,840	2,457	382	0
100 – 249	–	11,722	893 i	4,464	4,249	1,531	585
Large companies							
250 – 499	–	11,438	302 i	2,549	4,698	1,568	2,321
500 – 999	–	13,525	127 i	1,593	4,405	3,754	3,646
1,000 – 4,999	–	53,305	62 i	1,480	7,494	7,291	36,976
5,000 – 9,999	–	35,887	D	335	1,961	D	31,569
10,000 – 24,999	–	53,384	4 i	109	834	843	51,594
25,000 or more	–	118,339	2 i	86	384	616	117,251

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 30

Companies with domestic R&D paid for and performed by the company in energy and environmental protection application areas, by industry and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D			Energy				Environmental protection			
		Companies[a] (number)	Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
All industries	21–23, 31–33, 42–81	29,999	317,731		5,988	i	20,341		3,746	i	7,426	
Manufacturing industries	31–33	18,634	211,660		4,280	i	15,260		2,878	i	6,140	
Food	311	1,153	4,611		103	i	35	i	127	i	51	i
Chemicals	325	2,640	64,165		459	i	595		512	i	397	
Basic chemicals	3251	284	2,284		140	i	368		116	i	206	
Pharmaceuticals and medicines	3254	960	55,983		4		13	i	5		20	i
Other chemicals	other 325	1,397	5,898		315	i	214		391	i	171	
Plastics and rubber products	326	1,201	3,584		265	i	336		229	i	211	
Nonmetallic mineral products	327	409	1,274		113	i	105		82	i	114	
Fabricated metal products	332	2,229	2,127		557	i	292	i	298	i	81	i
Machinery	333	2,648	11,699		959	i	1,600		658	i	1,126	
Agricultural implements	33311	190	1,552		31	i	19		30	i	145	
Semiconductor machinery	333242	48	3,028		14	i	115	i	D		*	
Engines, turbines, and power transmission equipment	3336	125	1,901		78	i	507		55	i	544	
Other machinery	other 333	2,285	5,218		837	i	959	i	D		437	i
Computer and electronic products	334	2,980	68,515		724	i	5,376	i	283	i	771	i
Semiconductors and other electronic components	3344	822	29,176		242	i	3,222	i	16		60	
Other electronic products	other 334	2,159	39,339		482	i	2,154		267	i	712	i
Electrical equipment, appliances, and components	335	719	4,302		434	i	1,375	i	115	i	144	i
Transportation equipment	336	1,114	32,905		191	i	4,677		128	i	3,020	
Automobiles, bodies, trailers, and parts	3361–63	738	19,293		121		3,895		103	i	2,842	
Other transportation	other 336	376	13,612		70	i	783		25	i	178	i
Miscellaneous manufacturing	339	1,603	13,768		54	i	478		18		59	
Other manufacturing	312–16, 321–24, 331, 337	1,949	4,710		422	i	391		429	i	166	
Nonmanufacturing industries	21–23, 42–81	11,366	106,071		1,708	i	5,081		868	i	1,286	
Mining, extraction, and support activities	21	62	2,897		26		2,115		16		625	
Utilities	22	34	325		34		310		21		65	
Wholesale trade	42	1,642	442	i	401	i	30	i	D		*	
Information	51	2,327	70,075		250	i	1,157		11		78	
Publishing	511	1,341	33,174		221	i	577		7		63	
Telecommunications	517	121	3,530	i	5		26		D		1	
Data processing, hosting, and related services	518	744	11,776		21	i	536		D		14	
Other information	other 51	121	21,594		3		18		0		0	
Professional, scientific, and technical services	54	6,385	20,845		950	i	1,395	i	784	i	499	i
Architectural, engineering, and related services	5413	1,354	1,816		504	i	609	i	396	i	176	i
Scientific research and development services	5417	1,480	2,811		241	i	371		215	i	195	i
Biotechnology research and development	541711	315	750	i	3		1		3		3	

TABLE 30

Companies with domestic R&D paid for and performed by the company in energy and environmental protection application areas, by industry and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D			Energy				Environmental protection			
		Companies[a] (number)	Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
Other scientific research and development	other 5417	1,165	2,062		238	i	370		212	i	192	i
Other professional, scientific, and technical services	other 54	3,551	16,217		204	i	415	i	173	i	129	i
Health care services	621–23	241	782		D		*		D		*	
Other nonmanufacturing	23, 44–45, 48–49, 52–53, 55–56, 624, 71–72, 81	676	10,706		D		74	i	33	i	19	i
All companies (number of domestic employees)	–	29,999	317,731		5,988	i	20,341		3,746	i	7,426	
Micro companies[c]												
5 – 9	–	3,507	1,044	i	592	i	65	i	341	i	27	i
Small companies												
10 – 19	–	6,390	3,887	i	1,294	i	288	i	705	i	113	i
20 – 49	–	7,873	7,473	i	1,533	i	602	i	977	i	206	i
Medium companies												
50 – 99	–	4,519	7,728		891	i	531	i	576	i	188	i
100 – 249	–	3,909	11,722		788	i	892		524	i	286	i
Large companies												
250 – 499	–	1,567	11,438		296	i	584		198	i	195	i
500 – 999	–	840	13,525		186		962		126		274	
1,000 – 4,999	–	926	53,305		240		3,437		181		996	i
5,000 – 9,999	–	226	35,887		83		1,730		49		651	
10,000 – 24,999	–	146	53,384		52		3,792		45		1,732	
25,000 or more	–	98	118,339		33		7,458		24		2,759	

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

NAICS = 2012 North American Industry Classification System.

[a] Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not include an adjustment to the weight to account for unit nonresponse. A company having multiple reporting parts for data collection may contribute to the statistics for multiple industries, so the detail may not add to the total for the number of companies.

[b] Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not include an adjustment to the weight to account for unit nonresponse. These company count estimates reflect a new imputation process implemented for survey year 2014. This change has affected the comparability of these company count estimates with estimates published for years prior to 2014. A company having multiple reporting parts for data collection may contribute to the statistics for multiple industries, so the detail may not add to the total for the number of companies.

[c] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 31

Companies with domestic R&D paid for and performed by the company in health or medical, defense, and agricultural application areas, by industry and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Health or medical		Defense		Agriculture	
		Companies[a] (number)	Amount	Companies[b] (number)	Amount	Companies[b] (number)	Amount	Companies[b] (number)	Amount
All industries	21–23, 31–33, 42–81	29,999	317,731	7,712 i	78,699	4,301 i	10,369	2,163 i	5,705 i
Manufacturing industries	31–33	18,634	211,660	5,448 i	72,245	2,538 i	8,372	1,885 i	5,518 i
Food	311	1,153	4,611	267 i	252	0	0	258 i	1,552 i
Chemicals	325	2,640	64,165	1,325 i	55,881	253 i	157	406 i	1,482 i
Basic chemicals	3251	284	2,284	96 i	176	48 i	69	107 i	63
Pharmaceuticals and medicines	3254	960	55,983	893	55,474	27	45	224 i	424
Other chemicals	other 325	1,397	5,898	336 i	231	178 i	42	76	994 i
Plastics and rubber products	326	1,201	3,584	364 i	388	103 i	60	192 i	566
Nonmetallic mineral products	327	409	1,274	78 i	56	36 i	17	D	2
Fabricated metal products	332	2,229	2,127	592 i	162 i	430 i	159 i	311 i	40 i
Machinery	333	2,648	11,699	456 i	137 i	238 i	236	391 i	1,175
Agricultural implements	33311	190	1,552	D	* i	D	* i	172 i	1,053
Semiconductor machinery	333242	48	3,028	D	*	8 i	37	3 i	58
Engines, turbines, and power transmission equipment	3336	125	1,901	3	6	6	1	40 i	30
Other machinery	other 333	2,285	5,218	449 i	130 i	D	198	177 i	34 i
Computer and electronic products	334	2,980	68,515	847 i	4,382 i	933 i	2,766 i	170 i	549 i
Semiconductors and other electronic components	3344	822	29,176	290 i	799 i	393 i	757 i	12	43
Other electronic products	other 334	2,159	39,339	558 i	3,583 i	541 i	2,009 i	158 i	507 i
Electrical equipment, appliances, and components	335	719	4,302	195 i	150 i	144 i	214 i	50 i	67 i
Transportation equipment	336	1,114	32,905	26	1,172	155	4,573	14	21
Automobiles, bodies, trailers, and parts	3361–63	738	19,293	D	D	12	14	5	6
Other transportation	other 336	376	13,612	D	D	143	4,559	9	15
Miscellaneous manufacturing	339	1,603	13,768	919 i	9,545	51 i	150	9	11
Other manufacturing	312–16, 321–24, 331, 337	1,949	4,710	380 i	120 i	194 i	39 i	D	54
Nonmanufacturing industries	21–23, 42–81	11,366	106,071	2,264 i	6,454 i	1,763 i	1,996 i	278 i	187 i
Mining, extraction, and support activities	21	62	2,897	D	2 i	0	0	5	6
Utilities	22	34	325	D	*	0	0	4 i	2
Wholesale trade	42	1,642	442 i	4	10	D	*	5	6
Information	51	2,327	70,075	401 i	2,020 i	248 i	824 i	17	23
Publishing	511	1,341	33,174	306 i	1,600 i	200 i	704 i	6	6
Telecommunications	517	121	3,530 i	D	3	D	41	D	3
Data processing, hosting, and related services	518	744	11,776	80	398	38	75	6	9 i

TABLE 31

Companies with domestic R&D paid for and performed by the company in health or medical, defense, and agricultural application areas, by industry and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D			Health or medical			Defense			Agriculture		
		Companies[a] (number)	Amount		Companies[b] (number)	Amount		Companies[b] (number)	Amount		Companies[b] (number)	Amount	
Other information	other 51	121	21,594		D	18		D	4		D	5	
Professional, scientific, and technical services	54	6,385	20,845		1,764	3,621	i	1,502	1,157	i	240	146	i
Architectural, engineering, and related services	5413	1,354	1,816		101	37	i	182	50	i	70	21	i
Scientific research and development services	5417	1,480	2,811		964	1,703	i	456	288	i	153	111	i
Biotechnology research and development	541711	315	750	i	263	570	i	20	14	i	41	68	i
Other scientific research and development	other 5417	1,165	2,062		701	1,134	i	436	274	i	112	42	i
Other professional, scientific, and technical services	other 54	3,551	16,217		699	1,880	i	864	819		17	14	i
Health care services	621–23	241	782		59	746	i	D	*		0	0	
Other nonmanufacturing	23, 44–45, 48–49, 52–53, 55–56, 624, 71–72, 81	676	10,706		33	56		D	15		6	5	
All companies (number of domestic employees)	–	29,999	317,731		7,712	78,699		4,301	10,369		2,163	5,705	i
Micro companies[c]													
5 – 9	–	3,507	1,044	i	982	496	i	654	50	i	185	24	i
Small companies													
10 – 19	–	6,390	3,887	i	1,669	1,805		1,047	164	i	377	66	i
20 – 49	–	7,873	7,473	i	2,052	2,612		1,140	276	i	502	142	i
Medium companies													
50 – 99	–	4,519	7,728		1,131	3,120		587	410		364	144	i
100 – 249	–	3,909	11,722		1,000	4,307		437	461		368	290	i
Large companies													
250 – 499	–	1,567	11,438		325	3,466		164	222		120	162	
500 – 999	–	840	13,525		216	2,811		94	382		86	224	
1,000 – 4,999	–	926	53,305		221	13,699		111	1,533		114	755	
5,000 – 9,999	–	226	35,887		44	6,460		29	1,070	i	21	134	
10,000 – 24,999	–	146	53,384		44	21,601		24	2,021		18	2,785	i
25,000 or more	–	98	118,339		27	18,324		13	3,779		9	979	

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

NAICS = 2012 North American Industry Classification System.

[a] Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not include an adjustment to the weight to account for unit nonresponse. A company having multiple reporting parts for data collection may contribute to the statistics for multiple industries, so the detail may not add to the total for the number of companies.

[b] Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not include an adjustment to the weight to account for unit nonresponse. These company count estimates reflect a new imputation process implemented for survey year 2014. This change has affected the comparability of these company count estimates with estimates published for years prior to 2014. A company having multiple reporting parts for data collection may contribute to the statistics for multiple industries, so the detail may not add to the total for the

number of companies.

[c] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 32

Domestic R&D paid for and performed by the company as a percentage of domestic net sales, by industry and company size: 2016

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

Industry and company size	NAICS code	Domestic R&D (US$millions)		Percent of domestic sales of R&D performers or funders[a]		Percent of domestic sales of R&D performers[b]	
All industries	21–23, 31–33, 42–81	317,731		3.5		3.6	
Manufacturing industries	31–33	211,660		3.9		4.0	
Food	311	4,611		0.8		0.8	
Beverages and tobacco products	312	987		0.7		0.7	
Textiles, apparel, and leather products	313–16	1,156	i	1.2		1.2	
Wood products	321	181		0.5		0.5	
Paper	322	851		1.3		1.3	
Printing and related support activities	323	219	i	0.9		0.9	
Petroleum and coal products	324	367		0.2		0.2	
Chemicals	325	64,165		6.2		6.2	
Basic chemicals	3251	2,284		1.1		D	
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	693		1.5		1.5	
Pesticides, fertilizers, and other agricultural chemicals	3253	1,061	i	2.2		2.2	
Pharmaceuticals and medicines	3254	55,983		9.7		D	
Soaps, cleaning compounds, and toilet preparations	3256	2,660		2.8		2.8	
Paints, coatings, adhesives, and other chemicals	3255, 3259	1,484		2.2		2.2	
Plastics and rubber products	326	3,584		1.9		1.9	
Nonmetallic mineral products	327	1,274		2.3		2.5	
Primary metals	331	583		0.5		0.6	
Fabricated metal products	332	2,127		1.9		1.9	
Machinery	333	11,699		3.9		3.9	
Agricultural implements	33311	1,552		3.8		3.8	
Semiconductor machinery	333242	3,028		17.9		17.9	
Engines, turbines, and power transmission equipment	3336	1,901		6.0		6.0	
Other machinery	other 333	5,218		2.5		2.5	
Computer and electronic products	334	68,515		8.7		8.7	
Communications equipment	3342	11,293		10.8		10.8	
Semiconductors and other electronic components	3344	29,176		10.7		10.7	
Navigational, measuring, electromedical, and control instruments	3345	10,131		5.9		5.9	
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	2,466		11.1		11.1	
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	3,121		4.3		4.3	
Other measuring and controlling devices	other 3345	4,544		5.9		5.9	
Other computer and electronic products	other 334	17,914		7.6		7.6	
Electrical equipment, appliances, and components	335	4,302		2.9		2.9	
Transportation equipment	336	32,905		2.6		2.7	
Automobiles, bodies, trailers, and parts	3361–63	19,293		2.2		2.3	
Aerospace products and parts	3364	12,272		3.6		3.6	
Aircraft, aircraft engines, and aircraft parts	336411–13	11,930		3.7		3.7	
Guided missiles, space vehicles, and related parts	336414–15, 336419	342		2.0		2.0	
Military armored vehicles, tanks, and tank components	336992	3		1.3		1.3	
Other transportation	other 336	1,337		2.0		2.0	
Furniture and related products	337	366		1.0		1.0	
Miscellaneous manufacturing	339	13,768		5.4		5.4	
Medical equipment and supplies	3391	11,474		6.4		6.4	
Other miscellaneous manufacturing	3399	2,294	i	3.0		3.1	

TABLE 32

Domestic R&D paid for and performed by the company as a percentage of domestic net sales, by industry and company size: 2016

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

Industry and company size	NAICS code	Domestic R&D (US$millions)		Percent of domestic sales of R&D performers or funders[a]		Percent of domestic sales of R&D performers[b]	
Nonmanufacturing industries	21–23, 42–81	106,071		2.8		3.0	
Mining, extraction, and support activities	21	2,897		1.4		1.5	
Utilities	22	325		0.1		0.2	
Wholesale trade	42	442	i	0.3		0.3	
Electronic shopping and electronic auctions	454111–12	1,569	i	1.4		1.4	
Transportation and warehousing	48–49	486		0.2		0.2	
Information	51	70,075		6.6		6.6	
Publishing	511	33,174		8.3		8.3	
Newspaper, periodical, book, and directory publishers	5111	77	i	2.1		2.1	
Software publishers	5112	33,098		8.4		8.4	
Telecommunications	517	3,530	i	0.8		0.8	
Data processing, hosting, and related services	518	11,776		11.2		11.2	
Other information	other 51	21,594		20.6		22.9	
Finance and insurance	52	7,237		1.0		1.0	
Real estate and rental and leasing	53	475		9.0		9.0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	27		3.8		3.8	
Other real estate and rental and leasing	other 53	449		9.7		9.7	
Professional, scientific, and technical services	54	20,845		4.9		4.9	
Architectural, engineering, and related services	5413	1,816		1.8		1.8	
Computer systems design and related services	5415	13,255		7.5		7.6	
Scientific research and development services	5417	2,811		4.2		4.2	
Biotechnology research and development	541711	750	i	2.7		2.7	
Physical, engineering, and life sciences (except biotechnology) research and development	541712	2,029		5.5		5.5	
Social sciences and humanities research and development	541720	32		1.2		1.2	
Other professional, scientific, and technical services	other 54	2,962		3.8		3.8	
Health care services	621–23	782		1.0		1.0	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	939	i	0.2		0.2	
All companies (number of domestic employees)	–	317,731		3.5		3.6	
Micro companies[c]							
5 – 9	–	1,044	i	15.4		15.5	
Small companies							
10 – 19	–	3,887	i	15.1		15.1	
20 – 49	–	7,473	i	7.5		7.5	
Medium companies							
50 – 99	–	7,728		6.8		6.8	
100 – 249	–	11,722		4.3		4.3	
Large companies							
250 – 499	–	11,438		4.1		4.1	
500 – 999	–	13,525		4.1		4.3	
1,000 – 4,999	–	53,305		4.3		4.4	
5,000 – 9,999	–	35,887		3.6		3.7	
10,000 – 24,999	–	53,384		3.2		3.3	
25,000 or more	–	118,339		2.8		3.0	

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

NAICS = 2012 North American Industry Classification System.

[a] Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed or funded R&D.
[b] Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed R&D. The calculation of percentages in this column excludes R&D and sales of companies that fund R&D but do not perform R&D.
[c] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 33

Domestic R&D paid for by the company and performed by the company and others as a percentage of domestic net sales, by industry and company size: 2016

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

Industry and company size	NAICS code	Domestic R&D (US$millions)		Percent of domestic sales of R&D performers or funders[a]		Percent of domestic sales of R&D performers[b]	
All industries	21–23, 31–33, 42–81	355,230		3.9		4.0	
Manufacturing industries	31–33	245,400		4.5		D	
Food	311	4,751		0.9		0.9	
Beverages and tobacco products	312	1,170		0.8		0.8	
Textiles, apparel, and leather products	313–16	1,168	i	1.2		1.2	
Wood products	321	191		0.5		0.5	
Paper	322	854		1.3		1.3	
Printing and related support activities	323	221	i	0.9		0.9	
Petroleum and coal products	324	423		0.3		0.3	
Chemicals	325	91,357		8.8		D	
Basic chemicals	3251	2,392		1.2		D	
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	710		1.6		1.6	
Pesticides, fertilizers, and other agricultural chemicals	3253	D		D		D	
Pharmaceuticals and medicines	3254	82,611		14.3		D	
Soaps, cleaning compounds, and toilet preparations	3256	3,031		3.2		3.2	
Paints, coatings, adhesives, and other chemicals	3255, 3259	D		D		D	
Plastics and rubber products	326	3,735		2.0		2.0	
Nonmetallic mineral products	327	1,572		2.8		2.8	
Primary metals	331	619		0.6		0.6	
Fabricated metal products	332	2,207		1.9		2.0	
Machinery	333	12,135		4.1		4.1	
Agricultural implements	33311	1,735		4.3		4.3	
Semiconductor machinery	333242	3,028		17.9		17.9	
Engines, turbines, and power transmission equipment	3336	1,908		6.0		6.0	
Other machinery	other 333	5,464		2.6		2.6	
Computer and electronic products	334	69,829		8.9		8.9	
Communications equipment	3342	11,533		11.1		11.1	
Semiconductors and other electronic components	3344	29,562		10.8		10.8	
Navigational, measuring, electromedical, and control instruments	3345	10,419		6.1		6.1	
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	2,516		11.3		11.3	
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	3,246		4.4		4.4	
Other measuring and controlling devices	other 3345	4,656		6.1		6.1	
Other computer and electronic products	other 334	18,314		7.8		7.8	
Electrical equipment, appliances, and components	335	4,451		3.0		3.0	
Transportation equipment	336	35,654		2.8		2.9	
Automobiles, bodies, trailers, and parts	3361–63	21,292		2.4		2.6	
Aerospace products and parts	3364	12,980		3.9		3.9	
Aircraft, aircraft engines, and aircraft parts	336411–13	12,517		3.9		3.9	
Guided missiles, space vehicles, and related parts	336414–15, 336419	463		2.7		2.7	
Military armored vehicles, tanks, and tank components	336992	3		1.3		1.3	
Other transportation	other 336	1,379		2.1		2.1	
Furniture and related products	337	391		1.1		1.1	
Miscellaneous manufacturing	339	14,673		5.8		D	
Medical equipment and supplies	3391	12,289		6.9		6.9	
Other miscellaneous manufacturing	3399	2,383	i	3.2		D	

TABLE 33

Domestic R&D paid for by the company and performed by the company and others as a percentage of domestic net sales, by industry and company size: 2016

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

Industry and company size	NAICS code	Domestic R&D (US$millions)		Percent of domestic sales of R&D performers or funders[a]		Percent of domestic sales of R&D performers[b]	
Nonmanufacturing industries	21–23, 42–81	109,830		2.9		D	
Mining, extraction, and support activities	21	3,169		1.5		1.6	
Utilities	22	515		0.2		0.2	
Wholesale trade	42	519	i	0.3		0.3	
Electronic shopping and electronic auctions	454111–12	1,581	i	1.4		1.4	
Transportation and warehousing	48–49	501		0.3		0.3	
Information	51	72,073		6.8		6.8	
Publishing	511	34,507		8.6		8.6	
Newspaper, periodical, book, and directory publishers	5111	82	i	2.3		2.3	
Software publishers	5112	34,425		8.7		8.7	
Telecommunications	517	3,711	i	0.8		D	
Data processing, hosting, and related services	518	12,045		11.5		11.5	
Other information	other 51	21,810		20.8		D	
Finance and insurance	52	7,332		1.0		1.0	
Real estate and rental and leasing	53	478		9.0		9.0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	30		4.3		4.3	
Other real estate and rental and leasing	other 53	449		9.7		9.7	
Professional, scientific, and technical services	54	21,837		5.2		D	
Architectural, engineering, and related services	5413	1,917		1.9		1.9	
Computer systems design and related services	5415	13,361		7.6		7.6	
Scientific research and development services	5417	3,578		5.4		D	
Biotechnology research and development	541711	1,127		4.1		4.0	
Physical, engineering, and life sciences (except biotechnology) research and development	541712	2,418		6.6		D	
Social sciences and humanities research and development	541720	32		1.2		1.2	
Other professional, scientific, and technical services	other 54	2,981		3.8		3.8	
Health care services	621–23	805		1.0		1.0	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,018	i	0.2		0.3	
All companies (number of domestic employees)	–	355,230		3.9		4.0	
Micro companies[c]							
5 – 9	–	1,299	i	19.2		19.3	
Small companies							
10 – 19	–	4,455	i	17.3		17.3	
20 – 49	–	8,821		8.8		D	
Medium companies							
50 – 99	–	9,251		8.1		8.1	
100 – 249	–	13,681		5.0		5.0	
Large companies							
250 – 499	–	12,579		4.5		4.6	
500 – 999	–	15,009		4.6		4.7	
1,000 – 4,999	–	60,616		4.9		D	
5,000 – 9,999	–	38,311		3.9		3.9	
10,000 – 24,999	–	64,542		3.8		4.0	
25,000 or more	–	126,664		3.0		3.2	

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

NAICS = 2012 North American Industry Classification System.

[a] Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed or funded R&D.
[b] Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed R&D. The calculation of percentages in this column excludes R&D and sales of companies that fund R&D but do not perform R&D.
[c] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 34

Domestic R&D paid for by others and performed by the company, by type of cost, industry, and company size: 2016

(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	56,954	34,074	576	1,868	424	5,101	993	1,154	56	2,912	9,797
Manufacturing industries	31–33	38,893	23,258	372	1,300	291	4,019	621	801	43 i	1,391	6,796
Food	311	217	133	0	8	*	15	10	7	0	10	35
Beverages and tobacco products	312	D	D	0	3	4	7	4	10	0	12	D
Textiles, apparel, and leather products	313–16	9	5	0	0	0	2	0	0	0	0	3
Wood products	321	7 i	4 i	D	* i	* i	1	D	* i	* i	* i	D
Paper	322	*	D	* i	D	0	*	D	D	0	D	D
Printing and related support activities	323	* i	D	D	D	* i	D	* i	D	0	* i	D
Petroleum and coal products	324	14	9	0	0	D	D	*	D	0	D	D
Chemicals	325	9,410	4,579	348	485	57	516	251	365	22	477	2,310 i
Basic chemicals	3251	261	174	*	D	14	24	D	14	*	16	D
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	18	D	0	* i	D	D	*	D	0	0	D
Pesticides, fertilizers, and other agricultural chemicals	3253	D	D	0	D	*	18	D	D	0	0	D
Pharmaceuticals and medicines	3254	8,644	4,126	348	353 i	40	467	233	319	22	457	2,279 i
Soaps, cleaning compounds, and toilet preparations	3256	141	91	0	11	0	5	9	D	0	3	D
Paints, coatings, adhesives, and other chemicals	3255, 3259	D	17 i	0	D	D	D	* i	D	0	* i	D
Plastics and rubber products	326	169	27	0	2	83	48	1 i	2	0	1 i	4 i
Nonmetallic mineral products	327	14	10	0	0	*	3	0	*	0	0	2
Primary metals	331	10	6	0	0	0	4	0	0	0	*	*
Fabricated metal products	332	112 i	42 i	0	D	*	15 i	3 i	* i	2 i	* i	D
Machinery	333	886	609	*	11	2	174	5	25	*	9	51 i
Agricultural implements	33311	12	9	0	*	1	1	*	1	*	* i	1
Semiconductor machinery	333242	383	326	*	1	*	26	*	20	0	4	5
Engines, turbines, and power transmission equipment	3336	58 i	22 i	0	*	0	7 i	*	*	0	0	29 i
Other machinery	other 333	432	252	* i	10	1 i	141	5	4	0	5	15
Computer and electronic products	334	8,869	6,083	24	415	55	742	101	209	14 i	227	1,000
Communications equipment	3342	1,818 i	1,427 i	2 i	102 i	9 i	29 i	7	37 i	9 i	45 i	151 i
Semiconductors and other electronic components	3344	2,215	1,456	9	110	23	77	68	87	3	154	227
Navigational, measuring, electromedical, and control instruments	3345	4,753	3,137	11	197	22	633	24	83	2	23	620
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	165	112	0	6	1	12	6	3	0	0	25
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	4,412	2,924	11	174	19	606	16	74	2	21	565
Other measuring and controlling devices	other 3345	176	100	1	17	3	16	1	6	0	2	31
Other computer and electronic products	other 334	82	63	1	6	*	2	2	2	*	4	2
Electrical equipment, appliances, and components	335	469 i	344 i	0	14 i	3 i	39 i	10 i	11 i	0	3 i	45 i

TABLE 34

Domestic R&D paid for by others and performed by the company, by type of cost, industry, and company size: 2016

(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 equipment	336	18,371	11,219	0	346	78	2,422	234	169	5 i	640	3,257
Automobiles, bodies, trailers, and parts	3361–63	2,749	1,355	0	193	D	599	107	114	5 i	D	D
Aerospace products and parts	3364	14,373	9,137	0	D	41	1,634	107	40	*	527	D
Aircraft, aircraft engines, and aircraft parts	336411–13	13,291	8,663	0	111	41	1,159	107	40	*	527	2,643
Guided missiles, space vehicles, and related parts	336414–15, 336419	1,083 i	474 i	0	D	1	475	*	*	0	* i	D
Military armored vehicles, tanks, and tank components	336992	D	D	0	*	0	D	D	*	0	*	D
Other transportation	other 336	D	D	0	D	D	D	D	15 i	* i	D	D
Furniture and related products	337	*	D	0	D	D	D	D	0	0	0	* i
Miscellaneous	339	D	127	0	16	8	32	2	2	*	11	D
Medical equipment and supplies	3391	194	97	0	14	6	29	2	1	*	11	32
Other miscellaneous manufacturing	3399	D	30 i	0	2 i	2 i	2 i	*	1 i	0	*	D
Nonmanufacturing industries	21–23, 42–81	18,061	10,816	203	568	132	1,082	372	353	13	1,520 i	3,002
Mining, extraction, and support activities	21	400	225	3	23	*	30	16	11	3	D	D
Utilities	22	26	8	*	2	1	D	D	0	0	D	D
Wholesale trade	42	10 i	7 i	0	1	0	D	D	*	0	0	D
Electronic shopping and electronic auctions	454111–12	0	0	0	0	0	0	0	0	0	0	0
Transportation and warehousing	48–49	3	2	0	0	1	0	0	0	0	0	0
Information	51	674	486	42	10	3	17	12	16	*	42	44
Publishing	511	400	294	21	6	3	9	7	8	0	39	13
Newspaper, periodical, book, and directory publishers	5111	3 i	2 i	* i	* i	* i	* i	* i	* i	0	* i	* i
Software publishers	5112	397	292	21	6	3	9	7	8	0	39	13
Telecommunications	517	D	33	0	3	*	1	3	D	*	1	D
Data processing, hosting, and related services	518	138	108	D	2	*	2	2	3	0	2	D
Other information	other 51	D	52	D	1	0	6	0	D	0	0	D
Finance and insurance	52	94	94	0	0	0	0	0	0	0	0	0
Real estate and rental and leasing	53	0	0	0	0	0	0	0	0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0	0	0	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	0	0	0	0	0	0	0	0	0	0	0
Professional, scientific, and technical services	54	16,750	9,915	158	530	127	1,019	339	325	11	1,474 i	2,854
Architectural, engineering, and related services	5413	1,596	1,011	1	48	5	113	24	4	*	93	298
Computer systems design and related services	5415	2,492 i	1,671	77	16 i	46 i	33 i	97	21	0	61	470
Scientific research and development services	5417	12,031	6,721	72	455	71	862	201	295 i	10	1,311 i	2,032
Biotechnology research and development	541711	3,714	2,086	28	180	7	251	58	D	1	620	D
Physical, engineering, and life sciences (except biotechnology) research and development	541712	7,630	4,155 i	38	262 i	59	609	126	249 i	9	682 i	1,440 i

TABLE 34

Domestic R&D paid for by others and performed by the company, by type of cost, industry, and company size: 2016

(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
Social sciences and humanities research and development	541720	687	479	6	13	6	2	17	D	*	9	D
Other professional, scientific, and technical services	other 54	632	512	8 i	11	5	12	16	5	*	9	55
Health care services	621–23	66	49 i	0	*	* i	5	3	*	*	4 i	5 i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	38	30	0	1	*	3	1	1	0	1	2
All companies (number of domestic employees)	–	56,954	34,074	576	1,868	424	5,101	993	1,154	56	2,912	9,797
Micro companies[a]												
5 – 9	–	536 i	326 i	7 i	24 i	17	44 i	12 i	6 i	* i	22 i	78 i
Small companies												
10 – 19	–	1,071 i	673 i	7 i	29 i	19 i	99 i	38	13 i	2	30 i	161 i
20 – 49	–	2,189	1,303	8 i	68	42	285	55	20 i	4 i	42 i	361 i
Medium companies												
50 – 99	–	1,570	999	21	65	15 i	150	59	29	3	40	189
100 – 249	–	3,153	1,919	27	213 i	42 i	268	72	55	2	67	487
Large companies												
250 – 499	–	1,654	1,035	64 i	49	24	112	43	62 i	2	46	217
500 – 999	–	924	542	24	22	26	76	37	20	2	29	147
1,000 – 4,999	–	10,666	5,741	258	449	124	945	244	428	12	848	1,616
5,000 – 9,999	–	4,746	2,667 i	D	228	5	282 i	29	53	3 i	245	D
10,000 – 24,999	–	12,210	6,837	124	349 i	30	1,574	219	349 i	24	938 i	1,765 i
25,000 or more	–	18,232	12,032	D	371	79	1,264	184	118	2 i	605	D

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 35

Domestic R&D paid for by others and performed by the company, by industry and company size: 2016

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)											
		All companies	5 – 9[a]	10 – 19	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	56,954	536 i	1,071 i	2,189	1,570	3,153	1,654	924	10,666	4,746	12,210	18,232
Manufacturing industries	31–33	38,893	87 i	211 i	932	557	1,361	885	632	6,785	3,866	8,446	15,131
Food	311	217	0	* i	D	0	81	6	1	76	47	*	D
Beverages and tobacco products	312	D	0	0	0	0	0	D	0	0	1	0	0
Textiles, apparel, and leather products	313–16	9	2 i	0	2	2 i	0	3	0	* i	0	0	0
Wood products	321	7 i	0	0	0	0	0	0	3	4 i	0	*	0
Paper	322	*	0	0	0	0	*	0	0	0	0	0	0
Printing and related support activities	323	* i	0	0	* i	* i	* i	0	0	*	0	0	0
Petroleum and coal products	324	14	0	1	0	0	2	0	*	0	0	11	0
Chemicals	325	9,410	D	106 i	235	345	539	276	163	3,312	1,686	2,693 i	D
Basic chemicals	3251	261	0	D	0	D	45 i	33	0	D	36	*	0
Resins, synthetic rubber, fibers, and artificial synthetic fibers and filaments	3252	18	D	0	* i	D	D	D	0	D	0	D	0
Pesticides, fertilizers, and other agricultural chemicals	3253	D	0	0	D	0	0	0	0	D	0	D	0
Pharmaceuticals and medicines	3254	8,644	37	D	227	334	479	236	163	2,918	1,650	D	D
Soaps, cleaning compounds, and toilet preparation	3256	141	0	* i	D	* i	D	0	0	D	0	D	0
Paints, coatings, adhesives, and other chemicals	3255, 3259	D	0	D	D	D	D	D	0	1	0	D	*
Plastics and rubber products	326	169	0	21 i	4	11 i	28 i	*	13	87	*	4	0
Nonmetallic mineral products	327	14	0	1 i	* i	3	6	2	1	0	*	*	0
Primary metals	331	10	1 i	0	1 i	* i	* i	*	1	1	2	4	0
Fabricated metal products	332	112 i	3 i	3 i	74 i	9 i	6 i	8	0	8	1	0	0
Machinery	333	886	8 i	6 i	184 i	56	79	21	13	386	125	3	5
Agricultural implements	33311	12	1 i	0	3	0	1	1	0	8	0	0	0
Semiconductor machinery	333242	383	D	D	*	*	D	*	0	D	0	0	0
Engines, turbines, and power transmission equipment	3336	58 i	D	0	0	D	1	4	6	0	D	0	5
Other machinery	other 333	432	D	D	181 i	D	D	16	6	D	D	3	0
Computer and electronic products	334	8,869	25 i	48 i	301	70	377	293	243	1,483	978	2,884	2,168
Communications equipment	3342	1,818 i	0	4 i	1	1	110	D	27	598 i	D	D	0
Semiconductors and other electronic components	3344	2,215	0	14 i	264	33	140	160	117	545	698	214	31 i
Navigational, measuring, electromedical, and control instruments	3345	4,753	24 i	30 i	35 i	35	125	D	73	306	D	D	2,137
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	165	D	7	5 i	1 i	80	12	0	44	D	0	0
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	4,412	0	D	9	10	D	D	D	D	D	D	2,137
Other measuring and controlling devices	other 3345	176	D	D	21 i	24	D	D	D	D	0	0	0
Other computer and electronic products	other 334	82	1 i	* i	2	1	3	15	25	34	0	2	0
Electrical equipment, appliances, and components	335	469 i	2 i	5	6	2	46	4	4	32	0	367 i	0
Transportation equipment	336	18,371	0	8	94 i	51	173 i	156	124	1,352	1,026 i	2,463	12,924

TABLE 35

Domestic R&D paid for by others and performed by the company, by industry and company size: 2016

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)											
		All companies	5 – 9[a]	10 – 19	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
Automobiles, bodies, trailers, and parts	3361–63	2,749	0	1	D	42	D	D	D	1,278	106	389	D
Aerospace products and parts	3364	14,373	0	8	* i	D	27 i	0	D	72	920 i	2,074	11,215
Aircraft, aircraft engines, and aircraft parts	336411–13	13,291	0	1	* i	D	27 i	0	D	72	315	1,608	11,215
Guided missiles, space vehicles, and related parts	336414–15, 336419	1,083 i	0	7	*	5 i	0	0	0	0	605 i	465	0
Military armored vehicles, tanks, and tank components	336992	D	0	0	D	D	D	D	0	0	0	0	0
Other transportation	other 336	D	0	0	* i	0	D	D	D	2	*	0	D
Furniture and related products	337	*	0	0	0	0	* i	* i	0	*	0	0	0
Miscellaneous manufacturing	339	D	D	11 i	D	7	22	D	66	43	0	15	D
Medical equipment and supplies	3391	194	D	11 i	26	5	6	13	62	41	0	15	D
Other miscellaneous manufacturing	3399	D	D	0	D	3	16	D	4	2	0	0	0
Nonmanufacturing industries	21–23, 42–81	18,061	449 i	860 i	1,258	1,013	1,793	769	292	3,881	880 i	3,764	3,101
Mining, extraction, and support activities	21	400	*	0	D	20	D	0	0	0	0	D	*
Utilities	22	26	0	0	D	0	0	0	0	1	1	D	D
Wholesale trade	42	10 i	D	1 i	4	1 i	3	D	* i	0	0	0	0
Electronic shopping and electronic auctions	454111–12	0	0	0	0	0	0	0	0	0	0	0	0
Transportation and warehousing	48–49	3	0	0	0	0	3	0	0	0	0	0	0
Information	51	674	D	83	21	D	D	31	49 i	83	14	0	270
Publishing	511	400	0	D	6 i	1	*	0	49 i	D	0	0	D
Newspaper, periodical, book, and directory publishers	5111	3 i	0	0	3 i	0	0	0	0	0	0	0	0
Software publishers	5112	397	0	D	4 i	1	*	0	49 i	D	0	0	D
Telecommunications	517	D	0	0	13	D	0	0	0	D	0	0	0
Data processing, hosting, and related services	518	138	0	D	2	D	0	31	* i	0	14	0	D
Other information	other 51	D	D	0	0	0	D	0	0	D	0	0	0
Finance and insurance	52	94	0	0	0	8 i	*	0	0	0	0	0	86
Real estate and rental and leasing	53	0	0	0	0	0	0	0	0	0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0	0	0	0	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	0	0	0	0	0	0	0	0	0	0	0	0
Professional, scientific, and technical services	54	16,750	446 i	769 i	1,210	932	1,667	720	238	3,768	865 i	3,418	2,718
Architectural, engineering, and related services	5413	1,596	24 i	75 i	224 i	40	282 i	78	74	38 i	121	26	614
Computer systems design and related services	5415	2,492 i	42 i	38 i	304 i	97	386 i	25	1 i	150	1	1,115 i	332
Scientific research and development services	5417	12,031	336 i	514	567	664	948	528	106	3,580	742 i	2,277	1,769
Biotechnology research and development	541711	3,714	99 i	100 i	82	D	82 i	96	0	D	0	0	1,769
Physical, engineering, and life sciences (except biotechnology) research and development	541712	7,630	D	406	476	528	864	432	106	1,583	D	2,277	0
Social sciences and humanities research and development	541720	687	D	8 i	9	D	2 i	0	0	D	D	0	0
Other professional, scientific, and technical services	other 54	632	43 i	142 i	114	131	51	89	58	0	2 i	0	2

TABLE 35

Domestic R&D paid for by others and performed by the company, by industry and company size: 2016

(Millions of U.S. dollars)

Industry	NAICS code	Company size (domestic employees)											
		All companies	5 – 9[a]	10 – 19	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
Health care services	621–23	66	D	6	9	14	8 i	14	5 i	D	0	0	D
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	38	0	1	D	D	1 i	D	0	D	0	0	0

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 36

Domestic R&D paid for by others and performed by the company, by type of R&D, industry, and company size: 2016

(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	56,954		5,501	i	12,213		39,239	
Manufacturing industries	31–33	38,893		4,041	i	6,599		28,253	
Food	311	217		8		72		138	
Beverages and tobacco products	312	D		11		D		D	
Textiles, apparel, and leather products	313–16	9		*	i	3	i	6	i
Wood products	321	7	i	*		2	i	5	
Printing and related support activities	323	*	i	*	i	*	i	*	
Chemicals	325	9,410		2,089		1,481		5,840	
Pharmaceuticals and medicines	3254	8,644		1,961		1,117		5,567	
Other chemicals	other 325	766		128		364		273	
Plastics and rubber products	326	169		5		6		158	
Nonmetallic mineral products	327	14		*		4		10	
Primary metals	331	10		*	i	*	i	9	i
Fabricated metal products	332	112	i	2	i	14		96	i
Machinery	333	886		16		130		740	
Computer and electronic products	334	8,869		365	i	1,332		7,172	
Semiconductors and other electronic components	3344	2,215		25	i	276		1,914	
Navigational, measuring, electromedical, and control instruments	3345	4,753		87	i	687		3,980	
Other computer and electronic products	other 334	1,901	i	253	i	369	i	1,278	i
Electrical equipment, appliances, and components	335	469	i	3		30	i	436	i
Transportation equipment	336	18,371		1,533	i	3,446		13,392	
Aerospace products and parts	3364	14,373		1,077	i	1,908	i	11,388	
Other transportation equipment	other 336	3,997	i	456	i	1,538		2,003	i
Furniture and related products	337	*		*		*		*	
Miscellaneous manufacturing	322, 324, 339	D		8		D		D	
Nonmanufacturing industries	21–23, 42–81	18,061		1,460		5,615		10,986	i
Information	51	674		86		110		478	
Publishing	511	400		20		26		354	
Telecommunications	517	D		0		D		D	
Data processing, hosting, and related services	518	138		D		D		93	
Other information	other 51	D		D		D		D	
Professional, scientific, and technical services	54	16,750		1,339		5,420		9,992	i
Architectural, engineering, and related services	5413	1,596		99		823		674	
Computer systems design and related services	5415	2,492	i	208	i	913		1,371	
Scientific research and development services	5417	12,031		967		3,474	i	7,590	i
Biotechnology research and development	541711	3,714		472		376		2,865	i
Physical, engineering, and life sciences (except biotechnology) research and development	541712	7,630		443	i	2,653	i	4,534	i
Social sciences and humanities research and development	541720	687		52	i	445	i	191	i
Other professional, scientific, and technical services	other 54	632		65		210	i	357	
Other nonmanufacturing	21–23, 42–49, 52, 53, 55–81	637		35		85		516	
All companies (number of domestic employees)	–	56,954		5,501	i	12,213		39,239	
Micro companies[a]									
5 – 9	–	536	i	65	i	177	i	294	i
Small companies									
10 – 19	–	1,071	i	97	i	388	i	586	i
20 – 49	–	2,189		230	i	435		1,524	

TABLE 36

Domestic R&D paid for by others and performed by the company, by type of R&D, industry, and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Basic research		Applied research		Development	
Medium companies									
50 – 99	–	1,570		169	i	262		1,140	
100 – 249	–	3,153		329		719		2,105	
Large companies									
250 – 499	–	1,654		114		533		1,007	
500 – 999	–	924		28		218		678	
1,000 – 4,999	–	10,666		1,785		3,804		5,077	
5,000 – 9,999	–	4,746		83	i	1,077	i	3,586	
10,000 – 24,999	–	12,210		753	i	1,496		9,961	
25,000 or more	–	18,232		1,847	i	3,104	i	13,281	

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 37

Domestic R&D paid for by others and performed by the company, by source of funds, industry, and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Companies in the United States		Companies outside the United States: Company's parent		Companies outside the United States: Unaffiliated companies		U.S. federal government agencies		U.S. state government agencies		U.S. universities, colleges, and academic researchers		All other: In the United States		All other: Outside the United States	
All industries	21–23, 31–33, 42–81	56,954		14,239		14,766		2,926		23,772		171		127		851		100	
Manufacturing industries	31–33	38,893		4,812		12,264		1,930		19,217		14		116		453		87	
Food	311	217		7	i	205		*	i	2		*	i	0		3		0	
Beverages and tobacco products	312	D		0		D		D		0		0		0		0		0	
Textiles, apparel, and leather products	313–16	9		3		D		D		5		0		0		0		0	
Wood products	321	7	i	D		7	i	D		*	i	0		0		0		0	
Paper	322	*		*		0		*	i	*	i	0		0		0		0	
Printing and related support activities	323	*	i	D		*	i	D		*	i	*	i	0		*	i	*	i
Petroleum and coal products	324	14		3		10		1		0		0		0		0		0	
Chemicals	325	9,410		1,484	i	6,184		1,421		212		5		D		D		45	
Basic chemicals	3251	261		D		145		D		46		0		0		*	i	0	
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	18		D		D		*	i	1	i	0		0		0		0	
Pesticides, fertilizers, and other agricultural chemicals	3253	D		D		D		D		2		0		0		1	i	0	
Pharmaceuticals and medicines	3254	8,644		1,414	i	5,613		1,363		147		5		D		D		45	
Soaps, cleaning compounds, and toilet preparations	3256	141		10		131		0		*		0		0		0		0	
Paints, coatings, adhesives, and other chemicals	3255, 3259	D		D		D		0		16	i	*		0		*	i	0	
Plastics and rubber products	326	169		140		25	i	*		4		0		0		*	i	0	
Nonmetallic mineral products	327	14		D		D		0		6		D		0		0		0	
Primary metals	331	10		4		0		0		6		0		0		0		0	
Fabricated metal products	332	112	i	89	i	9	i	*	i	12		*	i	0		*	i	1	i
Machinery	333	886		159		529		16	i	152		D		1		D		*	i
Agricultural implements	33311	12		1	i	8		1		3		*	i	0		0		0	
Semiconductor machinery	333242	383		8		371		1		3		0		*		1	i	0	
Engines, turbines, and power transmission equipment	3336	58	i	5		11		*		41	i	1		0		0		0	
Other machinery	other 333	432		145		139		14	i	106		D		*		D		*	i

TABLE 37

Domestic R&D paid for by others and performed by the company, by source of funds, industry, and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Companies in the United States		Companies outside the United States: Company's parent		Companies outside the United States: Unaffiliated companies		U.S. federal government agencies		U.S. state government agencies		U.S. universities, colleges, and academic researchers		All other: In the United States		All other: Outside the United States	
Computer and electronic products	334	8,869		1,272		2,791		268		4,410		D		D		D		D	
Communications equipment	3342	1,818	i	254	i	766		9		787	i	0		0		3		0	
Semiconductors and other electronic components	3344	2,215		284		1,519		133		278		D		*		D		*	
Navigational, measuring, electromedical, and control instruments	3345	4,753		724		475		111		3,320		D		D		D		D	
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	165		13		135		D		1	i	0		D		D		0	
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	4,412		D		D		D		3,274		D		D		0		D	
Other measuring and controlling devices	other 3345	176		D		D		D		45		0		0		*	i	*	
Other computer and electronic products	other 334	82		11		31		15		26		0		0		0		0	
Electrical equipment, appliances, and components	335	469	i	9	i	348	i	45	i	46	i	0		0		D		D	
Transportation equipment	336	18,371		1,587		1,959		145		14,325		*		D		D		20	
Automobiles, bodies, trailers, and parts	3361–63	2,749		D		1,937		94	i	D		*		0		D		D	
Aerospace products and parts	3364	14,373		1,110		D		D		12,904		0		D		D		D	
Aircraft, aircraft engines, and aircraft parts	336411–13	13,291		1,100		D		D		11,839		0		0		D		D	
Guided missiles, space vehicles, and related parts	336414–15, 336419	1,083	i	11		D		*	i	1,065	i	0		D		*	i	*	i
Military armored vehicles, tanks, and tank components	336992	D		D		0		*		D		0		0		0		0	
Other transportation	other 336	D		D		D		D		D		0		0		*	i	0	
Furniture and related products	337	*		0		0		0		*	i	0		0		*		0	
Miscellaneous	339	D		53		91		31		36		*	i	2		D		0	
Medical equipment and supplies	3391	194		48		88		12		27		0		2		17		0	
Other miscellaneous manufacturing	3399	D		5		3		19	i	10	i	*	i	*		D		0	

TABLE 37

Domestic R&D paid for by others and performed by the company, by source of funds, industry, and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Companies in the United States		Companies outside the United States: Company's parent		Companies outside the United States: Unaffiliated companies		U.S. federal government agencies		U.S. state government agencies		U.S. universities, colleges, and academic researchers		All other: In the United States		All other: Outside the United States	
Nonmanufacturing industries	21–23, 42–81	18,061		9,427	i	2,502		996		4,555		157		12		399		13	
Mining, extraction, and support activities	21	400		54	i	*		337		2		0		0		0		5	
Utilities	22	26		0		2		0		D		D		0		D		D	
Wholesale trade	42	10	i	3	i	5		1		0		0		0		1	i	0	
Electronic shopping and electronic auctions	454111–12	0		0		0		0		0		0		0		0		0	
Transportation and warehousing	48–49	3		0		0		0		3		0		0		0		0	
Information	51	674		142		375		128		25		3		0		1		0	
Publishing	511	400		50		216		127		7		0		0		0		0	
Newspaper, periodical, book, and directory publishers	5111	3	i	*	i	0		3	i	*	i	0		0		0		0	
Software publishers	5112	397		50		216		125		7		0		0		0		0	
Telecommunications	517	D		*	i	D		*	i	*		0		0		0		0	
Data processing, hosting, and related services	518	138		D		D		1		16		3		0		1		0	
Other information	other 51	D		D		D		0		2		0		0		0		0	
Finance and insurance	52	94		*		8	i	0		0		0		0		86		0	
Real estate and rental and leasing	53	0		0		0		0		0		0		0		0		0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0		0		0		0		0		0		0		0		0	
Other real estate and rental and leasing	other 53	0		0		0		0		0		0		0		0		0	
Professional, scientific, and technical services	54	16,750		9,174	i	2,093		526		4,496		137		12		D		D	
Architectural, engineering, and related services	5413	1,596		275		137	i	4		964		13		0		203	i	*	
Computer systems design and related services	5415	2,492	i	432		1,433		1		583		43	i	0		*		0	
Scientific research and development services	5417	12,031		8,374	i	362		501		2,675		17		12		85		5	
Biotechnology research and development	541711	3,714		3,253		43		297		93		*		3		22		3	
Physical, engineering, and life sciences (except	541712	7,630		5,099	i	316		204	i	1,956		6		8		38		2	

TABLE 37

Domestic R&D paid for by others and performed by the company, by source of funds, industry, and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Companies in the United States		Companies outside the United States: Company's parent		Companies outside the United States: Unaffiliated companies		U.S. federal government agencies		U.S. state government agencies		U.S. universities, colleges, and academic researchers		All other: In the United States		All other: Outside the United States	
biotechnology) research and development																			
Social sciences and humanities research and development	541720	687		22	i	3	i	*	i	626		11		0		26		*	
Other professional, scientific, and technical services	other 54	632		93		161	i	20		274		65		*		D		D	
Health care services	621–23	66		46		8	i	4		2		0		*		6		0	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	38		8		10		0		D		D		*		0		0	
All companies (number of domestic employees)	–	56,954		14,239		14,766		2,926		23,772		171		127		851		100	
Micro companies[a]																			
5–9	–	536	i	D		44		D		263	i	10	i	2		D		D	
Small companies																			
10–19	–	1,071	i	394	i	203	i	32	i	393	i	8	i	3		32	i	6	
20–49	–	2,189		598	i	417	i	73	i	899		63		3		127		9	
Medium companies																			
50–99	–	1,570		427		580		87		451		7		3		15		2	i
100–249	–	3,153		716		1,378		103		839		28	i	4		85	i	1	i
Large companies																			
250–499	–	1,654		390		476		290		462		18		D		D		*	i
500–999	–	924		100		383		181		258		*	i	0		2		1	i
1,000–4,999	–	10,666		3,076		5,414		933		1,134		26		D		D		D	
5,000–9,999	–	4,746		D		2,186		D		1,132	i	*		0		151		4	
10,000–24,999	–	12,210		3,767	i	3,434		881		3,994		7		D		D		18	i
25,000 or more	–	18,232		3,570		252		73	i	13,948	i	5		6		D		D	

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 38

Companies with domestic R&D paid for by others and performed by the company in energy and environmental protection application areas, by industry and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D			Energy				Environmental protection			
		Companies[a] (number)	Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
All industries	21–23, 31–33, 42–81	4,790	56,954		703	i	2,296		655	i	1,792	
Manufacturing industries	31–33	2,545	38,893		307	i	1,252		226	i	784	
Food	311	123	217		D		1		27	i	10	
Chemicals	325	657	9,410		102	i	146	i	74	i	51	i
Basic chemicals	3251	101	261		87	i	112	i	61	i	49	i
Pharmaceuticals and medicines	3254	363	8,644		D		D		0		0	
Other chemicals	other 325	193	505		D		D		13	i	1	i
Plastics and rubber products	326	97	169		23	i	15	i	15	i	12	i
Nonmetallic mineral products	327	84	14		D		*		D		3	
Fabricated metal products	332	269	112	i	4		1		3		1	
Machinery	333	239	886		14		70		6		31	i
Agricultural implements	33311	12	12		0		0		0		0	
Semiconductor machinery	333242	10	383		D		3		0		0	
Engines, turbines, and power transmission equipment	3336	8	58	i	5		29	i	D		20	i
Other machinery	other 333	209	432		D		38		D		11	
Computer and electronic products	334	540	8,869		90	i	282		59	i	509	
Semiconductors and other electronic components	3344	185	2,215		40	i	133		4		2	i
Other electronic products	other 334	355	6,654		50	i	149		55	i	508	
Electrical equipment, appliances, and components	335	66	469	i	30	i	89	i	10	i	23	i
Transportation equipment	336	189	18,371		29		633	i	23		142	i
Automobiles, bodies, trailers, and parts	3361–63	116	2,749		21		470	i	D		134	i
Other transportation	other 336	73	15,622		8		163		D		8	
Miscellaneous manufacturing	339	D	D		5	i	8	i	0		0	
Other manufacturing	312–16, 321–24, 331, 337	D	D		D		6		D		2	
Nonmanufacturing industries	21–23, 42–81	2,246	18,061		395	i	1,044		429	i	1,008	
Mining, extraction, and support activities	21	11	400		6		370		4		6	
Utilities	22	6	26		5		23		D		D	
Wholesale trade	42	30	10	i	0		0		0		0	
Information	51	103	674		D		D		D		3	
Publishing	511	61	400		D		D		D		2	
Telecommunications	517	D	D		0		0		0		0	
Data processing, hosting, and related services	518	32	138		D		D		D		1	
Other information	other 51	D	D		0		0		0		0	
Professional, scientific, and technical services	54	2,017	16,750		378	i	484	i	417	i	956	
Architectural, engineering, and related services	5413	464	1,596		180	i	252	i	163	i	849	
Scientific research and development services	5417	982	12,031		170	i	213	i	210	i	87	i
Biotechnology research and development	541711	205	3,714		D		1		D		1	

TABLE 38

Companies with domestic R&D paid for by others and performed by the company in energy and environmental protection application areas, by industry and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D			Energy				Environmental protection			
		Companies[a] (number)	Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
Other scientific research and development	other 5417	777	8,317		D		212	i	D		85	i
Other professional, scientific, and technical services	other 54	571	3,124	i	29	i	20		43	i	21	i
Health care services	621–23	63	66		0		0		0		0	
Other nonmanufacturing	23, 44–45, 48–49, 52–53, 55–56, 624, 71–72, 81	15	135		D		D		D		D	
All companies (number of domestic employees)	–	4,790	56,954		703	i	2,296		655	i	1,792	
Micro companies[c]												
5–9	–	964	536	i	118	i	23	i	126	i	21	i
Small companies												
10–19	–	1,085	1,071	i	209	i	94	i	198	i	76	i
20–49	–	1,239	2,189		138	i	122	i	160	i	120	i
Medium companies												
50–99	–	439	1,570		50	i	52	i	31	i	22	i
100–249	–	505	3,153		64	i	181	i	59	i	148	i
Large companies												
250–499	–	184	1,654		29		72		18	i	39	
500–999	–	100	924		14		33		14		64	i
1,000–4,999	–	144	10,666		29		354	i	18		85	i
5,000–9,999	–	42	4,746		20		141	i	8		44	i
10,000–24,999	–	54	12,210		16		551		12		96	
25,000 or more	–	34	18,232		14		673		11		1,076	

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

NAICS = 2012 North American Industry Classification System.

[a] Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not include an adjustment to the weight to account for unit nonresponse. A company having multiple reporting parts for data collection may contribute to the statistics for multiple industries, so the detail may not add to the total for the number of companies.

[b] Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not include an adjustment to the weight to account for unit nonresponse. These company count estimates reflect a new imputation process implemented for survey year 2014. This change has affected the comparability of these company count estimates with estimates published for years prior to 2014. A company having multiple reporting parts for data collection may contribute to the statistics for multiple industries, so the detail may not add to the total for the number of companies.

[c] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 39

Companies with domestic R&D paid for by others and performed by the company in health or medical, defense, and agricultural application areas, by industry and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D		Health or medical		Defense		Agriculture	
		Companies[a] (number)	Amount	Companies[b] (number)	Amount	Companies[b] (number)	Amount	Companies[b] (number)	Amount
All industries	21–23, 31–33, 42–81	4,790	56,954	1,526 i	17,989 i	1,316 i	17,680	376 i	686
Manufacturing industries	31–33	2,545	38,893	681 i	8,799	398 i	13,943	271 i	625
Food	311	123	217	18 i	22	0	0	50 i	36
Chemicals	325	657	9,410	280	8,342	69 i	158 i	157 i	509
Basic chemicals	3251	101	261	3	1	32 i	10 i	D	D
Pharmaceuticals and medicines	3254	363	8,644	268	8,340	16	133 i	119 i	300 i
Other chemicals	other 325	193	505	9 i	1	21 i	14	D	D
Plastics and rubber products	326	97	169	25 i	27 i	10 i	12 i	10 i	8 i
Nonmetallic mineral products	327	84	14	D	1	4	4	0	0
Fabricated metal products	332	269	112 i	6	2	4	8	4	*
Machinery	333	239	886	4	2	8	98	8	15
Agricultural implements	33311	12	12	0	0	0	0	5	12
Semiconductor machinery	333242	10	383	0	0	D	2 i	0	0
Engines, turbines, and power transmission equipment	3336	8	58 i	0	0	D	5	D	*
Other machinery	other 333	209	432	4	2	4	91	D	3
Computer and electronic products	334	540	8,869	176 i	164	218 i	2,785	27 i	39
Semiconductors and other electronic components	3344	185	2,215	106 i	56	103 i	301	4	13
Other electronic products	other 334	355	6,654	70 i	108	115 i	2,484	23 i	25
Electrical equipment, appliances, and components	335	66	469 i	26 i	19 i	22 i	70 i	6 i	14 i
Transportation equipment	336	189	18,371	7	51	34	10,782	5	4
Automobiles, bodies, trailers, and parts	3361–63	116	2,749	3	7	D	D	D	4
Other transportation	other 336	73	15,622	4	45	D	D	D	*
Miscellaneous manufacturing	339	D	D	134 i	167	23 i	21 i	D	*
Other manufacturing	312–16, 321–24, 331, 337	D	D	D	1 i	6	6	D	*
Nonmanufacturing industries	21–23, 42–81	2,246	18,061	845 i	9,191 i	918 i	3,737 i	105 i	61
Mining, extraction, and support activities	21	11	400	0	0	0	0	D	* i
Utilities	22	6	26	0	0	0	0	0	0
Wholesale trade	42	30	10 i	D	3	0	0	D	2
Information	51	103	674	7	3	D	14	D	1
Publishing	511	61	400	D	2	3	4	0	0
Telecommunications	517	D	D	D	*	D	*	D	*
Data processing, hosting, and related services	518	32	138	D	1	D	9	D	*
Other information	other 51	D	D	D	*	D	1	0	0

TABLE 39

Companies with domestic R&D paid for by others and performed by the company in health or medical, defense, and agricultural application areas, by industry and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D			Health or medical				Defense				Agriculture			
		Companies[a] (number)	Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount		Companies[b] (number)		Amount	
Professional, scientific, and technical services	54	2,017	16,750		817	i	9,135	i	910	i	3,720	i	100	i	58	
Architectural, engineering, and related services	5413	464	1,596		50	i	31	i	142	i	394	i	D		*	
Scientific research and development services	5417	982	12,031		660	i	8,835	i	441	i	2,535		96	i	57	
Biotechnology research and development	541711	205	3,714		180	i	3,317	i	30	i	61	i	6		6	
Other scientific research and development	other 5417	777	8,317		480	i	5,518	i	410	i	2,474		90	i	52	
Other professional, scientific, and technical services	other 54	571	3,124	i	108	i	270	i	328	i	791	i	D		*	
Health care services	621–23	63	66		D		47		0		0		0		0	
Other nonmanufacturing	23, 44–45, 48–49, 52–53, 55–56, 624, 71–72, 81	15	135		D		2		D		3		0		0	
All companies (number of domestic employees)	–	4,790	56,954		1,526	i	17,989	i	1,316	i	17,680		376	i	686	
Micro companies[c]																
5–9	–	964	536	i	371	i	263	i	306	i	163	i	D		D	
Small companies																
10–19	–	1,085	1,071	i	368	i	419	i	347	i	340	i	93	i	23	
20–49	–	1,239	2,189		395		628		337	i	830		72	i	30	
Medium companies																
50–99	–	439	1,570		121		588		102	i	394		81		95	
100–249	–	505	3,153		110		943		86	i	987	i	44	i	44	
Large companies																
250–499	–	184	1,654		53	i	517	i	48	i	355		13		14	i
500–999	–	100	924		27		278		23		203		5	i	6	
1,000–4,999	–	144	10,666		46		6,110		34		631		20		289	
5,000–9,999	–	42	4,746		12		2,001		9		843	i	9		89	i
10,000–24,999	–	54	12,210		12		4,737	i	14		2,032		4		71	i
25,000 or more	–	34	18,232		12		1,506	i	10		10,901		D		D	

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

NAICS = 2012 North American Industry Classification System.

[a] Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not include an adjustment to the weight to account for unit nonresponse. A company having multiple reporting parts for data collection may contribute to the statistics for multiple industries, so the detail may not add to the total for the number of companies.

[b] Statistics for the number of companies are based only on companies in the United States that reported to the survey. These statistics do not include an adjustment to the weight to account for unit nonresponse. These company count estimates reflect a new imputation process implemented for survey year 2014. This change has affected the comparability of these company count estimates with estimates published for years prior to 2014. A company having multiple reporting parts for data collection may contribute to the statistics for multiple industries, so the detail may not add to the total for the number of companies.

[c] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 40

Domestic R&D paid for by others and performed by the company as a percentage of domestic net sales, by industry and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D (US$millions)		Percent of domestic sales of R&D performers or funders[a]		Percent of domestic sales of R&D performers[b]	
All industries	21–23, 31–33, 42–81	56,954		0.6		0.6	
Manufacturing industries	31–33	38,893		0.7		0.7	
Food	311	217		*		*	
Beverages and tobacco products	312	D		D		D	
Textiles, apparel, and leather products	313–16	9		*		*	
Wood products	321	7	i	*		*	
Paper	322	*		*		*	
Printing and related support activities	323	*	i	*		*	
Petroleum and coal products	324	14		*		*	
Chemicals	325	9,410		0.9		0.9	
Basic chemicals	3251	261		0.1		D	
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	18		*		*	
Pesticides, fertilizers, and other agricultural chemicals	3253	D		D		D	
Pharmaceuticals and medicines	3254	8,644		1.5		D	
Soaps, cleaning compounds, and toilet preparations	3256	141		0.1		0.1	
Paints, coatings, adhesives, and other chemicals	3255, 3259	D		D		D	
Plastics and rubber products	326	169		0.1		0.1	
Nonmetallic mineral products	327	14		*		*	
Primary metals	331	10		*		*	
Fabricated metal products	332	112	i	0.1		0.1	
Machinery	333	886		0.3		0.3	
Agricultural implements	33311	12		*		*	
Semiconductor machinery	333242	383		2.3		2.3	
Engines, turbines, and power transmission equipment	3336	58	i	0.2		0.2	
Other machinery	other 333	432		0.2		0.2	
Computer and electronic products	334	8,869		1.1		1.1	
Communications equipment	3342	1,818	i	1.7		1.7	
Semiconductors and other electronic components	3344	2,215		0.8		0.8	
Navigational, measuring, electromedical, and control instruments	3345	4,753		2.8		2.8	
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	165		0.7		0.7	
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	4,412		6.0		6.0	
Other measuring and controlling devices	other 3345	176		0.2		0.2	
Other computer and electronic products	other 334	82		*		*	
Electrical equipment, appliances, and components	335	469	i	0.3		0.3	
Transportation equipment	336	18,371		1.4		1.5	
Automobiles, bodies, trailers, and parts	3361–63	2,749		0.3		0.3	
Aerospace products and parts	3364	14,373		4.3		4.3	
Aircraft, aircraft engines, and aircraft parts	336411–13	13,291		4.2		4.2	
Guided missiles, space vehicles, and related parts	336414–15, 336419	1,083	i	6.3		6.3	
Military armored vehicles, tanks, and tank components	336992	D		D		D	
Other transportation	other 336	D		D		D	
Furniture and related products	337	*		*		*	
Miscellaneous manufacturing	339	D		D		D	
Medical equipment and supplies	3391	194		0.1		0.1	
Other miscellaneous manufacturing	3399	D		D		D	

TABLE 40

Domestic R&D paid for by others and performed by the company as a percentage of domestic net sales, by industry and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Domestic R&D (US$millions)		Percent of domestic sales of R&D performers or funders[a]		Percent of domestic sales of R&D performers[b]	
Nonmanufacturing industries	21–23, 42–81	18,061		0.5		0.5	
Mining, extraction, and support activities	21	400		0.2		0.2	
Utilities	22	26		*		*	
Wholesale trade	42	10	i	*		*	
Electronic shopping and electronic auctions	454111–12	0		0.0		0.0	
Transportation and warehousing	48–49	3		*		*	
Information	51	674		0.1		0.1	
Publishing	511	400		0.1		0.1	
Newspaper, periodical, book, and directory publishers	5111	3	i	0.1		0.1	
Software publishers	5112	397		0.1		0.1	
Telecommunications	517	D		D		D	
Data processing, hosting, and related services	518	138		0.1		0.1	
Other information	other 51	D		D		D	
Finance and insurance	52	94		*		*	
Real estate and rental and leasing	53	0		0.0		0.0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0		0.0		0.0	
Other real estate and rental and leasing	other 53	0		0.0		0.0	
Professional, scientific, and technical services	54	16,750		4.0		4.0	
Architectural, engineering, and related services	5413	1,596		1.6		1.6	
Computer systems design and related services	5415	2,492	i	1.4		1.4	
Scientific research and development services	5417	12,031		18.1		18.1	
Biotechnology research and development	541711	3,714		13.6		13.6	
Physical, engineering, and life sciences (except biotechnology) research and development	541712	7,630		20.8		20.9	
Social sciences and humanities research and development	541720	687		26.7		26.7	
Other professional, scientific, and technical services	other 54	632		0.8		0.8	
Health care services	621–23	66		0.1		0.1	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	38		*		*	
All companies (number of domestic employees)	–	56,954		0.6		0.6	
Micro companies[c]							
5–9	–	536	i	7.9		7.9	
Small companies							
10–19	–	1,071	i	4.2		4.2	
20–49	–	2,189		2.2		2.2	
Medium companies							
50–99	–	1,570		1.4		1.4	
100–249	–	3,153		1.2		1.2	
Large companies							
250–499	–	1,654		0.6		0.6	
500–999	–	924		0.3		0.3	
1,000–4,999	–	10,666		0.9		0.9	
5,000–9,999	–	4,746		0.5		0.5	
10,000–24,999	–	12,210		0.7		0.8	
25,000 or more	–	18,232		0.4		0.5	

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

NAICS = 2012 North American Industry Classification System.

[a] Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed or funded R&D.
[b] Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed R&D. The calculation of percentages in this column excludes R&D and sales of companies that fund R&D but do not perform R&D.
[c] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 41

Domestic R&D paid for by others and performed by the company and others as a percentage of domestic net sales, by industry and company size: 2016

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

Industry and company size	NAICS code	Domestic R&D (US$millions)		Percent of domestic sales of R&D performers or funders[a]		Percent of domestic sales of R&D performers[b]	
All industries	21–23, 31–33, 42–81	66,309		0.7		0.7	
Manufacturing industries	31–33	46,285		0.9		D	
Food	311	217		*		*	
Beverages and tobacco products	312	D		D		D	
Textiles, apparel, and leather products	313–16	10		*		*	
Wood products	321	D		D		D	
Paper	322	*		*		*	
Printing and related support activities	323	D		D		D	
Petroleum and coal products	324	D		D		D	
Chemicals	325	13,592		1.3		D	
Basic chemicals	3251	263		0.1		D	
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	18		*		*	
Pesticides, fertilizers, and other agricultural chemicals	3253	D		D		D	
Pharmaceuticals and medicines	3254	12,793		2.2		D	
Soaps, cleaning compounds, and toilet preparations	3256	168		0.2		0.2	
Paints, coatings, adhesives, and other chemicals	3255, 3259	D		D		D	
Plastics and rubber products	326	172		0.1		0.1	
Nonmetallic mineral products	327	15		*		*	
Primary metals	331	D		D		D	
Fabricated metal products	332	144	i	0.1		0.1	
Machinery	333	919		0.3		0.3	
Agricultural implements	33311	13		*		*	
Semiconductor machinery	333242	404		2.4		2.4	
Engines, turbines, and power transmission equipment	3336	60	i	0.2		0.2	
Other machinery	other 333	441		0.2		0.2	
Computer and electronic products	334	9,123		1.2		1.2	
Communications equipment	3342	1,861	i	1.8		1.8	
Semiconductors and other electronic components	3344	2,261		0.8		0.8	
Navigational, measuring, electromedical, and control instruments	3345	4,916		2.9		2.9	
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	167		0.8		0.8	
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	4,569		6.2		6.2	
Other measuring and controlling devices	other 3345	180		0.2		0.2	
Other computer and electronic products	other 334	85		*		*	
Electrical equipment, appliances, and components	335	479	i	0.3		0.3	
Transportation equipment	336	21,213		1.6		1.7	
Automobiles, bodies, trailers, and parts	3361–63	2,886		0.3		0.3	
Aerospace products and parts	3364	17,076		5.1		5.1	
Aircraft, aircraft engines, and aircraft parts	336411–13	15,993		5.0		5.0	
Guided missiles, space vehicles, and related parts	336414–15, 336419	1,083	i	6.3		6.3	
Military armored vehicles, tanks, and tank components	336992	D		D		D	
Other transportation	other 336	D		D		D	
Furniture and related products	337	*		*		*	
Miscellaneous manufacturing	339	264		0.1		0.1	
Medical equipment and supplies	3391	219		0.1		0.1	
Other miscellaneous manufacturing	3399	45		0.1		0.1	

TABLE 41

Domestic R&D paid for by others and performed by the company and others as a percentage of domestic net sales, by industry and company size: 2016

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

Industry and company size	NAICS code	Domestic R&D (US$millions)		Percent of domestic sales of R&D performers or funders[a]		Percent of domestic sales of R&D performers[b]	
Nonmanufacturing industries	21–23, 42–81	20,024		0.5		D	
Mining, extraction, and support activities	21	400		0.2		0.2	
Utilities	22	40		*		*	
Wholesale trade	42	13	i	*		*	
Electronic shopping and electronic auctions	454111–12	0		0.0		0.0	
Transportation and warehousing	48–49	3		*		*	
Information	51	747		0.1		0.1	
Publishing	511	468		0.1		0.1	
Newspaper, periodical, book, and directory publishers	5111	3	i	0.1		0.1	
Software publishers	5112	465		0.1		0.1	
Telecommunications	517	D		D		D	
Data processing, hosting, and related services	518	143		0.1		0.1	
Other information	other 51	D		D		D	
Finance and insurance	52	94		*		*	
Real estate and rental and leasing	53	0		0.0		0.0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0		0.0		0.0	
Other real estate and rental and leasing	other 53	0		0.0		0.0	
Professional, scientific, and technical services	54	18,601		4.4		D	
Architectural, engineering, and related services	5413	1,958		1.9		1.9	
Computer systems design and related services	5415	2,588		1.5		1.5	
Scientific research and development services	5417	13,319		20.0		D	
Biotechnology research and development	541711	3,819		14.0		14.0	
Physical, engineering, and life sciences (except biotechnology) research and development	541712	8,695		23.7		D	
Social sciences and humanities research and development	541720	805		31.2		31.2	
Other professional, scientific, and technical services	other 54	737		0.9		0.9	
Health care services	621–23	68		0.1		0.1	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	59		*		*	
All companies (number of domestic employees)	–	66,309		0.7		0.7	
Micro companies[c]							
5–9	–	626	i	9.2		9.3	
Small companies							
10–19	–	1,234	i	4.8		4.8	
20–49	–	2,499		2.5		D	
Medium companies							
50–99	–	1,963		1.7		1.7	
100–249	–	3,895		1.4		1.4	
Large companies							
250–499	–	1,951		0.7		0.7	
500–999	–	1,209		0.4		0.4	
1,000–4,999	–	12,607		1.0		D	
5,000–9,999	–	5,784		0.6		0.6	
10,000–24,999	–	13,429		0.8		0.8	
25,000 or more	–	21,112		0.5		0.5	

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

NAICS = 2012 North American Industry Classification System.

[a] Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed or funded R&D.
[b] Statistics used for both the numerator and denominator in the calculation of these percentages are representative of companies located in the United States that performed R&D. The calculation of percentages in this column excludes R&D and sales of companies that fund R&D but do not perform R&D.
[c] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 42

Domestic R&D paid for by other companies and performed by the company, by funders' business activity: 2016

(Millions of U.S. dollars)

Funders' business activity[a]	Business code[b]	Amount	
All business activities	21100–81000	31,932	
Oil and gas extraction	21100	9	
Mining	21200	*	
Support activities for mining, including oil and gas	21300	395	
Utilities	22100	3	
Construction	23000	*	i
Food manufacturing	31100	189	
Beverages manufacturing	31210	113	i
Tobacco manufacturing	31220	1	
Textiles, apparel, and leather products manufacturing	31990	*	i
Wood products manufacturing	32100	7	i
Paper manufacturing	32200	0	
Printing and related support activities	32300	*	i
Petroleum refineries	32401	12	
Asphalt paving, roofing, and saturated materials manufacturing	32402	*	
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	11	
Basic chemicals manufacturing	32510	95	
Resins, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	8	
Pesticides, fertilizers, and other agricultural chemicals manufacturing	32530	D	
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing	32541	12,196	
In vitro diagnostic substances manufacturing	32542	D	
Biotechnology-based pharmaceutical and biological products (except diagnostic substances) manufacturing	32543	3,924	
Soaps, cleaning compounds, and toilet preparations manufacturing	32591	192	
Paints, adhesives, and other chemical manufacturing	32592	23	
Plastics and rubber products manufacturing	32600	67	i
Clay and glass products manufacturing	32710	2	
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	13	
Primary metal manufacturing	33100	0	
Fabricated metal products manufacturing	33200	22	
Agricultural machinery and equipment manufacturing	33311	13	
Construction machinery manufacturing	33312	7	
Mining, oil, and gas field machinery and equipment manufacturing	33319	48	i
Semiconductor machinery manufacturing	33321	D	
Industrial machinery manufacturing (except semiconductor machinery)	33322	53	
Photographic and photocopying equipment manufacturing	33331	3	
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	279	i
Digital cameras manufacturing	33333	0	
Engine, turbine, and power transmission equipment manufacturing	33360	165	
Metalworking and other general purpose machinery manufacturing	33390	102	i
Computers and peripheral equipment manufacturing and magnetic and optical media	33412	42	
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	8	
Radio, television, and wireless communication equipment manufacturing	33422	823	i
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	172	
Audio and video equipment manufacturing	33430	3	
Semiconductor and other electronic components manufacturing	33440	2,010	
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	124	
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments manufacturing	33452	716	
Measuring and control instruments manufacturing (not listed elsewhere)	33459	43	
Electrical equipment, appliances, and components manufacturing	33500	771	
Motor vehicles manufacturing	33610	1,984	
Motor vehicle body and trailer manufacturing	33620	*	

TABLE 42

Domestic R&D paid for by other companies and performed by the company, by funders' business activity: 2016

(Millions of U.S. dollars)

Funders' business activity[a]	Business code[b]	Amount	
Motor vehicle parts manufacturing	33630	325	
Aircraft manufacturing	33641	D	
Aircraft engine and engine parts manufacturing	33642	189	
Other aircraft parts and auxiliary equipment manufacturing	33643	374	
Guided missiles, space vehicles, and related parts manufacturing	33644	D	
Railroad rolling stock manufacturing	33651	1	i
Ship and boat building	33660	1	
Motorcycle, bicycle, and parts manufacturing	33691	D	
Military armored vehicles, tanks, and tank components manufacturing	33692	1	
All other transportation equipment manufacturing	33699	20	
Furniture and related products manufacturing	33700	*	
Medical equipment and supplies manufacturing	33910	323	
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	20	
Merchant wholesalers, durable goods	42300	40	
Merchant wholesalers, nondurable goods	42400	4	
Wholesale electronic markets and agents and brokers (business to business)	42500	0	
Retail trade (except electronic shopping and electronic auctions)	44000	1	
Electronic shopping and electronic auctions	45411	0	
Transportation	48000	*	
Couriers, messengers, and express delivery services	49200	3	
Warehousing and storage	49300	*	
Newspaper, periodical, book, and directory publishers (except Internet)	51110	0	
Software publishers (except Internet)	51120	155	
Motion picture and sound recording (except Internet)	51200	0	
Broadcasting (except Internet)	51500	0	
Wired telecommunications carriers	51710	8	i
Wireless telecommunications carriers (except satellite)	51720	26	
Satellite telecommunications	51740	*	
Other telecommunications (not listed elsewhere)	51790	21	
Data processing, hosting, and related services	51800	14	
Cloud computing applications and Internet-based software services	51801	31	
Other information services, including Internet publishing, broadcasting, and Web search portals	51910	D	
Finance: banking and credit intermediation	52200	9	i
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	3	
Insurance carriers and related activities	52400	4	
Real estate	53100	12	
Rental and leasing services	53200	0	
Lessors of nonfinancial intangible assets, including patent licensing	53300	*	
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	4	
Architectural, engineering, and related services	54130	284	i
Specialized design services	54140	41	
Computer systems design and related services	54150	1,937	
Management, scientific, and technical consulting services	54160	100	i
Research and development services in social sciences and humanities	54172	24	i
Research and development services in biotechnology	54173	880	
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	496	
Advertising and related services	54180	0	
Professional, scientific, and technical services (not listed elsewhere)	54190	185	
Management of companies and enterprises	55100	9	
Administrative and support services	56100	*	
Waste management and remediation services	56200	0	

TABLE 42

Domestic R&D paid for by other companies and performed by the company, by funders' business activity: 2016

(Millions of U.S. dollars)

Funders' business activity[a]	Business code[b]	Amount	
Offices of physicians	62110	12	i
Medical and diagnostic laboratories	62150	6	i
Other ambulatory health care services (ambulance, dental, home health care)	62199	*	
Hospitals and nursing care facilities	62200	*	
Social assistance services	62400	*	
Arts, entertainment, and recreation	71000	8	
Accommodation and food services	72000	1	
Other services (not listed elsewhere)	81000	97	
Undistributed	–	584	i

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

NAICS = 2012 North American Industry Classification System.

[a] Data are tabulated independent of the industry classification and business activities of the company that performs R&D.
[b] Business codes and descriptions are based on 2012 NAICS industry definitions.

Note(s)

Detail may not add to total because of rounding. For an R&D performer that did not report the R&D funders' business activities, no systematic imputation of these business activities was conducted. The business activities of the R&D funders may not be assumed to be the same as those of the R&D performer. Statistics are representative of companies located in the United States that performed or funded R&D.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 43

Domestic R&D paid for by the U.S. federal government and performed by the company, by type of R&D, industry, and company size: 2016

(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	23,772		2,005	i	5,181	i	16,586	
Manufacturing industries	31–33	19,217		1,596	i	2,920	i	14,701	
Food	311	2		*	i	*		1	
Beverages and tobacco products	312	0		0		0		0	
Textiles, apparel, and leather products	313–16	5		*	i	2	i	3	i
Wood products	321	*	i	0		*	i	*	
Printing and related support activities	323	*	i	*	i	*	i	*	i
Chemicals	325	212		16		58		137	
Pharmaceuticals and medicines	3254	147		9		41		97	
Other chemicals	other 325	65		7	i	18	i	40	i
Plastics and rubber products	326	4		1		*	i	3	
Nonmetallic mineral products	327	6		*	i	2		4	
Primary metals	331	6		*	i	*	i	6	i
Fabricated metal products	332	12		*	i	7	i	5	i
Machinery	333	152		1		9		142	
Computer and electronic products	334	4,410		192	i	685	i	3,533	i
Semiconductors and other electronic components	3344	278		*	i	4	i	274	
Navigational, measuring, electromedical, and control instruments	3345	3,320		52	i	527	i	2,740	
Other computer and electronic products	other 334	812	i	140	i	154	i	519	i
Electrical equipment, appliances, and components	335	46	i	*	i	4	i	42	i
Transportation equipment	336	14,325		1,382	i	2,144	i	10,800	
Aerospace products and parts	3364	12,904		D		D		10,055	
Other transportation equipment	other 336	1,421	i	D		D		745	i
Furniture and related products	337	*	i	0		0		*	i
Miscellaneous manufacturing	322, 324, 339	36		4		9		24	
Nonmanufacturing industries	21–23, 42–81	4,555		409		2,261		1,885	
Information	51	25		8		11		6	
Publishing	511	7		1		2		4	
Telecommunications	517	*		0		0		*	
Data processing, hosting, and related services	518	16		6		9		*	
Other information	other 51	2		*		*		1	
Professional, scientific, and technical services	54	4,496		401	i	2,247		1,849	
Architectural, engineering, and related services	5413	964		68		664		231	
Computer systems design and related services	5415	583		28	i	175		380	
Scientific research and development services	5417	2,675		248	i	1,328	i	1,099	
Biotechnology research and development	541711	93		13		28		52	
Physical, engineering, and life sciences (except biotechnology) research and development	541712	1,956		D		D		875	
Social sciences and humanities research and development	541720	626		D		D		171	i
Other professional, scientific, and technical services	other 54	274		56		79		138	
Other nonmanufacturing	21–23, 42–49, 52, 53, 55–81	34		*		3		31	
All companies (number of domestic employees)	–	23,772		2,005	i	5,181	i	16,586	
Micro companies[a]									
5–9	–	263	i	35	i	93	i	134	i
Small companies									
10–19	–	393	i	45	i	115	i	232	
20–49	–	899		38		172		690	
Medium companies									
50–99	–	451		90		126		235	

TABLE 43

Domestic R&D paid for by the U.S. federal government and performed by the company, by type of R&D, industry, and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Basic research		Applied research		Development	
100–249	–	839		82		263		494	
Large companies									
250–499	–	462		30		215		217	
500–999	–	258		13		75		170	
1,000–4,999	–	1,134		52	i	733	i	350	i
5,000–9,999	–	1,132	i	2		131	i	999	i
10,000–24,999	–	3,994		195	i	567	i	3,232	
25,000 or more	–	13,948	i	1,423	i	2,692	i	9,834	

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 44

Domestic R&D paid for by the U.S. federal government and performed by the company, by funding agency, industry, and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	DOD	DOE	NASA	NIH	DHS	DOT	EPA	NSF	All other agencies
All industries	21–23, 31–33, 42–81	23,772	16,458	1,011 i	4,037 i	652	D	46	2	23	D
Manufacturing industries	31–33	19,217	14,106	476 i	3,556 i	78	D	9	*	3	D
Food	311	2	* i	1	* i	0	0	0	0	0	*
Beverages and tobacco products	312	0	0	0	0	0	0	0	0	0	0
Textiles, apparel, and leather products	313–16	5	3	0	2 i	0	0	0	0	0	0
Wood products	321	* i	0	*	0	* i	0	0	0	0	0
Paper	322	* i	* i	* i	0	* i	0	0	0	0	0
Printing and related support activities	323	* i	0	* i	0	* i	0	0	0	0	0
Petroleum and coal products	324	0	0	0	0	0	0	0	0	0	0
Chemicals	325	212	51	D	0	49	6	0	0	2	D
Basic chemicals	3251	46	0	46	0	0	0	0	0	0	1
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	1 i	* i	1	0	* i	0	0	0	0	0
Pesticides, fertilizers, and other agricultural chemicals	3253	2	D	0	0	0	0	0	0	D	0
Pharmaceuticals and medicines	3254	147	44	D	0	49	6	0	0	D	D
Soaps, cleaning compounds, and toilet preparations	3256	*	*	0	0	0	0	0	0	0	0
Paints, coating, adhesives, and other chemicals	3255, 3259	16 i	D	10 i	0	0	0	0	0	0	D
Plastics and rubber products	326	4	0	4	0	0	0	0	0	*	*
Nonmetallic mineral products	327	6	2	3	0	0	0	1	0	0	*
Primary metals	331	6	3	4	0	0	0	0	0	0	0
Fabricated metal products	332	12	* i	1 i	11	* i	0	0	*	0	*
Machinery	333	152	97	52 i	1	0	0	2	0	*	1
Agricultural implements	33311	3	* i	2	0	0	0	0	0	*	*
Semiconductor machinery	333242	3	D	D	*	0	0	0	0	0	1
Engines, turbines, and power transmission equipment	3336	41 i	D	D	* i	0	0	*	0	0	0
Other machinery	other 333	106	91	13 i	*	0	0	2	0	0	0
Computer and electronic products	334	4,410	3,889	D	363 i	7 i	2	6	0	1	D
Communications equipment	3342	787 i	579 i	4 i	203 i	1 i	0	0	0	0	0
Semiconductors and other electronic components	3344	278	228	D	12 i	0	*	0	0	1	D
Navigational, measuring, electromedical, and control instruments	3345	3,320	3,056	22 i	148	6 i	1	6	0	*	80
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	1 i	* i	0	* i	*	0	0	0	0	0
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	3,274	3,043	0	144	*	1	5	0	*	80
Other measuring and controlling devices	other 3345	45	13	22 i	3 i	6 i	0	1	0	0	*
Other computer and electronic products	other 334	26	25	1	* i	0	0	0	0	0	0
Electrical equipment, appliances, and components	335	46 i	5	27 i	7 i	7 i	*	0	0	0	0
Transportation equipment	336	14,325	10,043	D	3,171 i	3	D	*	0	0	D

TABLE 44

Domestic R&D paid for by the U.S. federal government and performed by the company, by funding agency, industry, and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	DOD	DOE	NASA	NIH	DHS	DOT	EPA	NSF	All other agencies
Automobiles, bodies, trailers, and parts	3361–63	D	9	D	0	0	D	*	0	0	0
Aerospace products and parts	3364	12,904	D	D	3,171 i	3	D	0	0	0	D
Aircraft, aircraft engines, and aircraft parts	336411–13	11,839	8,136	8	D	3	D	0	0	0	D
Guided missiles, space vehicles, and related parts	336414–15, 336419	1,065 i	D	D	D	0	0	0	0	0	0
Military armored vehicles, tanks, and tank components	336992	D	D	0	0	0	1	0	0	0	0
Other transportation	other 336	D	D	* i	* i	0	0	0	0	0	0
Furniture and related products	337	* i	* i	0	0	0	0	0	0	0	0
Miscellaneous	339	36	13	D	0	11 i	0	0	*	*	D
Medical equipment and supplies	3391	27	8	D	0	7	0	0	*	0	D
Other miscellaneous manufacturing	3399	10 i	5	0	0	4 i	0	0	0	*	0
Nonmanufacturing industries	21–23, 42–81	4,555	2,351	535 i	481 i	575	15	37	2	20	539
Mining, extraction, and support activities	21	2	0	2	0	0	0	0	0	0	0
Utilities	22	D	0	D	0	0	0	0	0	0	0
Wholesale trade	42	0	0	0	0	0	0	0	0	0	0
Electronic shopping and electronic auctions	454111–12	0	0	0	0	0	0	0	0	0	0
Transportation and warehousing	48–49	3	0	0	0	0	0	0	0	0	3
Information	51	25	11	D	D	1	0	1	0	*	D
Publishing	511	7	1	4	D	D	0	D	0	0	D
Newspaper, periodical, book, and directory publishers	5111	* i	0	* i	0	0	0	0	0	0	0
Software publishers	5112	7	1	4	D	D	0	D	0	0	D
Telecommunications	517	*	*	* i	* i	* i	0	0	0	0	0
Data processing, hosting, and related services	518	16	9	D	D	D	0	D	0	*	0
Other information	other 51	2	2	0	0	0	0	0	0	*	0
Finance and insurance	52	0	0	0	0	0	0	0	0	0	0
Real estate and rental and leasing	53	0	0	0	0	0	0	0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0	0	0	0	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	0	0	0	0	0	0	0	0	0	0
Professional, scientific, and technical services	54	4,496	2,338	501 i	479 i	571	15	36	2	20	534
Architectural, engineering, and related services	5413	964	634	278 i	4 i	0	*	D	1	*	D
Computer systems design and related services	5415	583	392	110 i	21 i	56 i	1	3	0	*	*
Scientific research and development services	5417	2,675	1,216	105 i	339 i	479	13	D	1	18	D
Biotechnology research and development	541711	93	D	1	*	53	0	0	0	*	D
Physical, engineering, and life sciences (except biotechnology) research and development	541712	1,956	1,142	103 i	D	272 i	13	4	*	17	D
Social sciences and humanities research and development	541720	626	D	1	D	154	1	D	*	1	D

TABLE 44

Domestic R&D paid for by the U.S. federal government and performed by the company, by funding agency, industry, and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		DOD		DOE		NASA		NIH		DHS		DOT		EPA		NSF		All other agencies	
Other professional, scientific, and technical services	other 54	274		95		8	i	116		36		1		*	i	0		1		16	
Health care services	621–23	2		0		0		0		2		0		0		0		0		*	i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	D		2		0		D		1		0		0		0		0		D	
All companies (number of domestic employees)	–	23,772		16,458		1,011	i	4,037	i	652		D		46		2		23		D	
Micro companies[a]																					
5–9	–	263	i	30		63	i	65	i	79	i	*		0		0		11		14	
Small companies																					
10–19	–	393	i	126		95	i	75	i	68	i	2		6		*		4		16	
20–49	–	899		572		131	i	D		101	i	2		6		*		2		D	
Medium companies																					
50–99	–	451		207		47	i	81	i	67	i	2		3		*		4		40	
100–249	–	839		533		76	i	80	i	104		D		3		*		*		D	
Large companies																					
250–499	–	462		246		D		128		35		2		1		0		0		D	
500–999	–	258		181		1	i	*		35		*		*		0		0		41	
1,000–4,999	–	1,134		382		D		120	i	D		D		D		1		1		D	
5,000–9,999	–	1,132	i	915	i	135	i	D		*	i	0		0		0		0		D	
10,000–24,999	–	3,994		3,182		46	i	710		12	i	0		D		1		0		D	
25,000 or more	–	13,948	i	10,084		D		2,662	i	D		D		D		0		*		D	

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

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

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 45

Domestic R&D paid for by sources located outside the United States and performed by the company, by source of funds, industry, and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Foreign companies: Subsidiaries		Foreign companies: Company's parent		Foreign companies: Unaffiliated companies		All other	
All industries	21–23, 31–33, 42–81	28,912		11,120		14,766		2,926		100	
Manufacturing industries	31–33	23,990		9,708		12,264		1,930		87	
Food	311	320		114		205		*	i	0	
Beverages and tobacco products	312	D		37		D		D		0	
Textiles, apparel, and leather products	313–16	2		1		D		D		0	
Wood products	321	D		0		7	i	D		0	
Paper	322	*		*		0		*	i	0	
Printing and related support activities	323	D		0		*	i	D		*	i
Petroleum and coal products	324	11		0		10		1		0	
Chemicals	325	9,898		2,247		6,184		1,421		45	
Basic chemicals	3251	D		4		145		D		0	
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	D		12		D		*	i	0	
Pesticides, fertilizers, and other agricultural chemicals	3253	D		0		D		D		0	
Pharmaceuticals and medicines	3254	9,240		2,218		5,613		1,363		45	
Soaps, cleaning compounds, and toilet preparations	3256	141		11		131		0		0	
Paints, coatings, adhesives, and other chemicals	3255, 3259	D		1		D		0		0	
Plastics and rubber products	326	25	i	*		25	i	*		0	
Nonmetallic mineral products	327	D		12		D		0		0	
Primary metals	331	1		1		0		0		0	
Fabricated metal products	332	28		17		9	i	*	i	1	i
Machinery	333	559		15		529		16	i	*	i
Agricultural implements	33311	9		1		8		1		0	
Semiconductor machinery	333242	372		*		371		1		0	
Engines, turbines, and power transmission equipment	3336	11		0		11		*		0	
Other machinery	other 333	166		14		139		14	i	*	i
Computer and electronic products	334	D		6,820		2,791		268		D	
Communications equipment	3342	782		7		766		9		0	
Semiconductors and other electronic components	3344	2,737		1,085		1,519		133		*	
Navigational, measuring, electromedical, and control instruments	3345	D		104		475		111		D	
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	D		5		135		D		0	
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	D		15		D		D		D	
Other measuring and controlling devices	other 3345	D		83		D		D		*	
Other computer and electronic products	other 334	5,671		5,625		31		15		0	
Electrical equipment, appliances, and components	335	D		120		348	i	45	i	D	
Transportation equipment	336	2,203		78		1,959		145		20	
Automobiles, bodies, trailers, and parts	3361–63	D		58		1,937		94	i	D	
Aerospace products and parts	3364	D		20		D		D		D	
Aircraft, aircraft engines, and aircraft parts	336411–13	D		20		D		D		D	
Guided missiles, space vehicles, and related parts	336414–15, 336419	D		0		D		*	i	*	i
Military armored vehicles, tanks, and tank components	336992	*		0		0		*		0	
Other transportation	other 336	D		0		D		D		0	
Furniture and related products	337	0		0		0		0		0	
Miscellaneous	339	367		245		91		31		0	
Medical equipment and supplies	3391	345		245		88		12		0	
Other miscellaneous manufacturing	3399	23		*		3		19	i	0	

TABLE 45

Domestic R&D paid for by sources located outside the United States and performed by the company, by source of funds, industry, and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Foreign companies						All other	
				Subsidiaries		Company's parent		Unaffiliated companies			
Nonmanufacturing industries	21–23, 42–81	4,922		1,411		2,502		996		13	
Mining, extraction, and support activities	21	720		377		*		337		5	
Utilities	22	D		0		2		0		D	
Wholesale trade	42	6		0		5		1		0	
Electronic shopping and electronic auctions	454111–12	0		0		0		0		0	
Transportation and warehousing	48–49	0		0		0		0		0	
Information	51	1,379		876		375		128		0	
Publishing	511	906		563		216		127		0	
Newspaper, periodical, book, and directory publishers	5111	3	i	0		0		3	i	0	
Software publishers	5112	903		563		216		125		0	
Telecommunications	517	D		3		D		*	i	0	
Data processing, hosting, and related services	518	D		D		D		1		0	
Other information	other 51	D		D		D		0		0	
Finance and insurance	52	25		17		8	i	0		0	
Real estate and rental and leasing	53	0		0		0		0		0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0		0		0		0		0	
Other real estate and rental and leasing	other 53	0		0		0		0		0	
Professional, scientific, and technical services	54	D		131		2,093		526		D	
Architectural, engineering, and related services	5413	167	i	26		137	i	4		*	
Computer systems design and related services	5415	1,480		47		1,433		1		0	
Scientific research and development services	5417	926		58		362		501		5	
Biotechnology research and development	541711	347		4		43		297		3	
Physical, engineering, and life sciences (except biotechnology) research and development	541712	576	i	53		316		204	i	2	
Social sciences and humanities research and development	541720	3	i	0		3	i	*	i	*	
Other professional, scientific, and technical services	other 54	D		1		161	i	20		D	
Health care services	621–23	21		9		8	i	4		0	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	11		*		10		0		0	
All companies (number of domestic employees)	–	28,912		11,120		14,766		2,926		100	
Micro companies[a]											
5–9	–	D		2		44		D		D	
Small companies											
10–19	–	250	i	9		203	i	32	i	6	
20–49	–	573	i	74		417	i	73	i	9	
Medium companies											
50–99	–	799		132		580		87		2	i
100–249	–	1,751		270		1,378		103		1	i
Large companies											
250–499	–	1,038		272		476		290		*	i
500–999	–	1,110		545		383		181		1	i
1,000–4,999	–	D		2,127		5,414		933		D	
5,000–9,999	–	D		1,094		2,186		D		4	
10,000–24,999	–	4,871		538		3,434		881		18	i
25,000 or more	–	D		6,056		252		73	i	D	

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded R&D. In all other tables, R&D costs of foreign-company subsidiaries of U.S. companies are included in company-funded U.S. domestic R&D totals. Only in this table are such R&D costs classified as being part of R&D paid for by sources located outside of the United States.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 46

Domestic R&D paid for by the company's foreign subsidiaries and performed by the company, by type of R&D, industry, and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Basic research[a]		Applied research[a]		Development[a]	
All industries	21–23, 31–33, 42–81	11,120		400		1,787		8,933	
Manufacturing industries	31–33	9,708		335		1,456		7,918	
Food	311	114		1		10		103	
Beverages and tobacco products	312	37		5		7		26	
Textiles, apparel, and leather products	313–16	1		*		*		1	
Wood products	321	0		0		0		0	
Printing and related support activities	323	0		0		0		0	
Chemicals	325	2,247		205		347		1,695	
Pharmaceuticals and medicines	3254	2,218		202		339		1,677	
Other chemicals	other 325	28		3		7		19	
Plastics and rubber products	326	*		*		*		*	
Nonmetallic mineral products	327	12		1		2		9	
Primary metals	331	1		*		*		1	
Fabricated metal products	332	17		*		7		10	
Machinery	333	15		*		1		14	
Computer and electronic products	334	6,820		84		1,026		5,710	
Semiconductors and other electronic components	3344	1,085		59		430		595	
Navigational, measuring, electromedical, and control instruments	3345	104		1		17		86	
Other computer and electronic products	other 334	5,632		24		579		5,029	
Electrical equipment, appliances, and components	335	120		28		28		65	
Transportation equipment	336	78		6		7		65	
Aerospace products and parts	3364	20		5		3		12	
Other transportation equipment	other 336	58		1		4		53	
Furniture and related products	337	0		0		0		0	
Miscellaneous manufacturing	322, 324, 339	245		4		21		220	
Nonmanufacturing industries	21–23, 42–81	1,411		65		331	i	1,015	
Information	51	876		22		234	i	620	
Publishing	511	563		6		191	i	365	
Telecommunications	517	3		0		3		0	
Data processing, hosting, and related services	518	D		D		40		D	
Other information	other 51	D		D		*		D	
Professional, scientific, and technical services	54	131		23		43		65	
Architectural, engineering, and related services	5413	26		1		4		21	
Computer systems design and related services	5415	47		8		7		32	
Scientific research and development services	5417	58		15		32		11	
Biotechnology research and development	541711	4		0		0		4	
Physical, engineering, and life sciences (except biotechnology) research and development	541712	53		15		32		6	
Social sciences and humanities research and development	541720	0		0		0		0	
Other professional, scientific, and technical services	other 54	1		0		0		1	
Other nonmanufacturing	21–23, 42–49, 52, 53, 55–81	404		19		55		330	
All companies (number of domestic employees)	–	11,120		400		1,787		8,933	
Micro companies[b]									
5–9	–	2		*	i	1	i	1	i
Small companies									
10–19	–	9		2		2		5	
20–49	–	74		14		5		54	
Medium companies									
50–99	–	132		27		8		97	

TABLE 46

Domestic R&D paid for by the company's foreign subsidiaries and performed by the company, by type of R&D, industry, and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Basic research[a]	Applied research[a]	Development[a]
100–249	–	270	15	79	176
Large companies					
250–499	–	272	10	33	229
500–999	–	545	60	92	393
1,000–4,999	–	2,127	74	718	1,336
5,000–9,999	–	1,094	5	160	929
10,000–24,999	–	538	21	68	449
25,000 or more	–	6,056	171	620	5,265

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

NAICS = 2012 North American Industry Classification System.

[a] 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.

[b] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 47

Domestic R&D paid for by the company and performed by others, by type of performer, industry, and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Companies in the United States	Companies outside the United States: Company's parent	Companies outside the United States: Other	U.S. federal government agencies	U.S. state government agencies	U.S. universities, colleges, and academic researchers	All other: In the United States	All other: Outside the United States	Undistributed[a]
All industries	21–23, 31–33, 42–81	37,499	31,239	843	3,322 i	116 i	5	275	346	163	1,190 i
Manufacturing industries	31–33	33,740	28,546	818	3,038 i	92 i	4	181	232	118	711 i
Food	311	140	105	*	8	D	0	3	8	4	D
Beverages and tobacco products	312	183	173	0	3	0	0	2	2	*	2 i
Textiles, apparel, and leather products	313–16	12 i	7	0	0	0	0	0	0	0	5 i
Wood products	321	10	6	0	*	D	0	1	1	0	D
Paper	322	3	3	0	0	*	0	*	*	0	* i
Printing and related support activities	323	2	1	0	0	0	0	0	0	0	1 i
Petroleum and coal products	324	56	26	* i	1	0	0	1	23	1	4 i
Chemicals	325	27,193	23,585	241	2,634 i	D	1 i	122	106	93 i	D
Basic chemicals	3251	109	79	* i	12	D	0	3	D	3	D
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	17	D	* i	* i	0	0	D	D	0	D
Pesticides, fertilizers, and other agricultural chemicals	3253	D	D	0	0	0	0	D	*	0	D
Pharmaceuticals and medicines	3254	26,628	23,105	238	2,612 i	D	1 i	117	90	86 i	D
Soaps, cleaning compounds, and toilet preparations	3256	372	335	1 i	9 i	* i	* i	*	9	4	14 i
Paints, coatings, adhesives, and other chemicals	3255, 3259	D	23	2	*	0	*	D	0	0	D
Plastics and rubber products	326	151	71	2	25	*	*	15	8	3	26 i
Nonmetallic mineral products	327	297	110	175	5	D	0	*	1	*	D
Primary metals	331	36 i	27 i	6 i	2 i	D	* i	1	*	0	D
Fabricated metal products	332	80	51	0	4	0	0	0	0	0	26 i
Machinery	333	435	345	9	26	0	0	*	4	3	48 i
Agricultural implements	33311	182	168	0	2	0	0	*	*	3	9 i
Semiconductor machinery	333242	*	*	0	0	0	0	0	*	0	* i
Engines, turbines, and power transmission equipment	3336	7	3	0	*	0	0	0	3	0	* i
Other machinery	other 333	246	174	9	23	0	0	*	*	*	39 i
Computer and electronic products	334	1,313	1,004	40 i	198 i	D	1 i	4	4	7	D
Communications equipment	3342	240	199	* i	25	D	* i	0	* i	* i	D
Semiconductors and other electronic components	3344	386	270	40 i	63 i	3 i	0	2	0	*	7 i
Navigational, measuring, electromedical, and control instruments	3345	288	238	*	18	* i	0	2	4	*	25 i
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	50	37	*	2	* i	0	1	3	* i	7 i
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	126	116	0	7	0	0	1	*	*	2 i
Other measuring and controlling devices	other 3345	112	85	0	10	0	0	0	*	0	17 i
Other computer and electronic products	other 334	399	297	0	92 i	D	1 i	*	* i	7	D

TABLE 47

Domestic R&D paid for by the company and performed by others, by type of performer, industry, and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total	Companies in the United States	Companies outside the United States: Company's parent	Companies outside the United States: Other	U.S. federal government agencies	U.S. state government agencies	U.S. universities, colleges, and academic researchers	All other: In the United States	All other: Outside the United States	Undistributed[a]
Electrical equipment, appliances, and components	335	149	117	13	3 i	0	0	*	3 i	0	13 i
Transportation equipment	336	2,749	2,119	318	99	D	2	10	52	4	D
Automobiles, bodies, trailers, and parts	3361–63	1,999	1,541	314	69	D	2	D	2	4	D
Aerospace products and parts	3364	708	545	4 i	D	D	* i	D	50	*	D
Aircraft, aircraft engines, and aircraft parts	336411–13	587	469	* i	D	D	0	D	D	*	D
Guided missiles, space vehicles, and related parts	336414–15, 336419	121	76	4 i	D	1 i	* i	*	D	0	D
Military armored vehicles, tanks, and tank components	336992	0	0	0	0	0	0	0	0	0	0
Other transportation	other 336	42	32	* i	D	0	0	*	0	0	D
Furniture and related products	337	25	20	0	0	0	0	0	0	0	5 i
Miscellaneous manufacturing	339	904	775	14	30	D	*	21	21	1	D
Medical equipment and supplies	3391	815	698	14	26	D	*	21	21	1	D
Other miscellaneous manufacturing	3399	89 i	77 i	0	4 i	0	0	*	*	0	8 i
Nonmanufacturing industries	21–23, 42–81	3,759	2,693	25	284	24	1	95	114	45	479 i
Mining, extraction, and support activities	21	273	116	0	39	9	0	34	69	6	* i
Utilities	22	190	138	0	5	1	1	3	22	11	9 i
Wholesale trade	42	77 i	28 i	0	*	0	0	* i	*	0	48 i
Electronic shopping and electronic auctions	454111–12	13 i	0	0	0	0	0	0	0	1	11 i
Transportation and warehousing	48–49	16	13	0	0	0	0	0	0	0	3 i
Information	51	1,999	1,681	1	150	2	0	3	15	24	122 i
Publishing	511	1,333	1,121	1	107	1 i	0	3	11	23	66 i
Newspaper, periodical, book, and directory publishers	5111	6 i	4	0	0	0	0	0	0	0	2 i
Software publishers	5112	1,327	1,118	1	107	1 i	0	3	11	23	64 i
Telecommunications	517	181	134	0	9	1	0	*	0	*	36 i
Data processing, hosting, and related services	518	270	215	0	33	0	0	0	0	1	21 i
Other information	other 51	215	211	0	*	0	0	0	4	*	* i
Finance and insurance	52	95	56	24	9	0	0	0	0	0	7 i
Real estate and rental and leasing	53	3	*	0	3	0	0	0	0	0	* i
Lessors of nonfinancial intangible assets (except copyrighted works)	533	3	0	0	3	0	0	0	0	0	0
Other real estate and rental and leasing	other 53	*	*	0	0	0	0	0	0	0	* i
Professional, scientific, and technical services	54	993	587	*	77	12	*	52	7	2	254 i
Architectural, engineering, and related services	5413	101	76	* i	2	1 i	0	0	0	0	22 i
Computer systems design and related services	5415	107	78	* i	10 i	1 i	* i	0	3	0	15 i
Scientific research and development services	5417	766 i	427	*	58	9	*	51	4	2	213 i

TABLE 47

Domestic R&D paid for by the company and performed by others, by type of performer, industry, and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Companies in the United States		Companies outside the United States: Company's parent		Companies outside the United States: Other		U.S. federal government agencies		U.S. state government agencies		U.S. universities, colleges, and academic researchers		All other: In the United States		All other: Outside the United States		Undistributed[a]	
Biotechnology research and development	541711	377	i	263		0		12		0		0		4		1		*		98	i
Physical, engineering, and life sciences (except biotechnology) research and development	541712	389		164		*		46		9		*		48		4		2		116	i
Social sciences and humanities research and development	541720	0		0		0		0		0		0		0		0		0		0	
Other professional, scientific, and technical services	other 54	19		6		*		7		*	i	0		1		0		0		4	i
Health care services	621–23	23	i	17		0		1		0		0		2		0		0		3	i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	79		57		0		0		0		0		1		0		*		21	i
All companies (number of domestic employees)	–	37,499		31,239		843		3,322	i	116	i	5		275		346		163		1,190	i
Micro companies[b]																					
5–9	–	255		151		0		9		*		0		D		*	i	1	i	D	
Small companies																					
10–19	–	569		355		*		25		1		*		5		5		3		175	i
20–49	–	1,348		931		2		107		2		*		63		2		4		237	i
Medium companies																					
50–99	–	1,523		1,141		10	i	126		2	i	*	i	22		18		11		193	i
100–249	–	1,960		1,514		14		219		9		*	i	38		13		2		150	i
Large companies																					
250–499	–	1,141		864		7		123	i	1	i	*	i	D		2		1	i	D	
500–999	–	1,484		1,013		33		285	i	*		*		5		17		29		101	i
1,000–4,999	–	7,311		6,686		251		87		2	i	1		12		133		52	i	88	i
5,000–9,999	–	2,424		2,258		44	i	64	i	1	i	*	i	5		32		3		17	i
10,000–24,999	–	11,158		9,938		231		805		2		1		36		68		44		33	i
25,000 or more	–	8,325		6,387	i	251		1,471	i	96	i	3		49		55		13		*	i

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

NAICS = 2012 North American Industry Classification System.

[a] Detailed data were not collected on the BRDI-1(S) questionnaire.
[b] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

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

Source(s)
National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 48

Domestic R&D performance by performer and source of funds, by industry and company size: 2016

(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	374,685		317,731		56,954		46,854		37,499		9,355	
Manufacturing industries	31–33	250,553		211,660		38,893		41,132		33,740		7,392	
Food	311	4,828		4,611		217		140		140		*	
Beverages and tobacco products	312	D		987		D		183		183		0	
Textiles, apparel, and leather products	313–16	1,166	i	1,156	i	9		13	i	12	i	1	
Wood products	321	188		181		7	i	D		10		D	
Paper	322	851		851		*		3		3		*	i
Printing and related support activities	323	219	i	219	i	*	i	D		2		D	
Petroleum and coal products	324	381		367		14		D		56		D	
Chemicals	325	73,575		64,165		9,410		31,375		27,193		4,182	
Basic chemicals	3251	2,545		2,284		261		111		109		2	
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	711		693		18		17		17		*	
Pesticides, fertilizers, and other agricultural chemicals	3253	D		1,061	i	D		D		D		D	
Pharmaceuticals and medicines	3254	64,628		55,983		8,644		30,777		26,628		4,149	
Soaps, cleaning compounds, and toilet preparations	3256	2,800		2,660		141		399		372		27	
Paints, coatings, adhesives, and other chemicals	3255, 3259	D		1,484		D		D		D		D	
Plastics and rubber products	326	3,752		3,584		169		154		151		3	i
Nonmetallic mineral products	327	1,289		1,274		14		298		297		1	
Primary metals	331	592		583		10		D		36	i	D	
Fabricated metal products	332	2,239		2,127		112	i	112	i	80		31	i
Machinery	333	12,585		11,699		886		468		435		33	
Agricultural implements	33311	1,565		1,552		12		183		182		*	
Semiconductor machinery	333242	3,411		3,028		383		22		*		22	
Engines, turbines, and power transmission equipment	3336	1,959		1,901		58	i	8		7		2	
Other machinery	other 333	5,650		5,218		432		255		246		9	
Computer and electronic products	334	77,385		68,515		8,869		1,567		1,313		254	
Communications equipment	3342	13,112		11,293		1,818	i	283		240		43	i
Semiconductors and other electronic components	3344	31,391		29,176		2,215		432		386		46	
Navigational, measuring, electromedical, and control instruments	3345	14,885		10,131		4,753		450		288		162	
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	2,632		2,466		165		52		50		2	
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	7,533		3,121		4,412		282		126		156	
Other measuring and controlling devices	other 3345	4,720		4,544		176		116		112		4	
Other computer and electronic products	other 334	17,997		17,914		82		402		399		3	
Electrical equipment, appliances, and components	335	4,771		4,302		469	i	160		149		10	i
Transportation equipment	336	51,275		32,905		18,371		5,592		2,749		2,843	
Automobiles, bodies, trailers, and parts	3361–63	22,042		19,293		2,749		2,136		1,999		137	
Aerospace products and parts	3364	26,645		12,272		14,373		3,411		708		2,702	
Aircraft, aircraft engines, and aircraft parts	336411–13	25,221		11,930		13,291		3,289		587		2,702	
Guided missiles, space vehicles, and related parts	336414–15, 336419	1,424	i	342		1,083	i	122		121		1	
Military armored vehicles, tanks, and tank components	336992	D		3		D		0		0		0	
Other transportation	other 336	D		1,337		D		45		42		3	

TABLE 48

Domestic R&D performance by performer and source of funds, by industry and company size: 2016

(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
Furniture and related products	337	366	366	*	25	25	0
Miscellaneous manufacturing	339	D	13,768	D	D	904	D
Medical equipment and supplies	3391	11,668	11,474	194	840	815	25
Other miscellaneous manufacturing	3399	D	2,294 i	D	D	89 i	D
Nonmanufacturing industries	21–23, 42–81	124,132	106,071	18,061	5,722	3,759	1,963
Mining, extraction, and support activities	21	3,296	2,897	400	273	273	0
Utilities	22	351	325	26	203	190	14
Wholesale trade	42	452 i	442 i	10 i	79 i	77 i	3 i
Electronic shopping and electronic auctions	454111–12	1,569 i	1,569 i	0	13 i	13 i	0
Transportation and warehousing	48–49	488	486	3	16	16	0
Information	51	70,748	70,075	674	2,072	1,999	73
Publishing	511	33,574	33,174	400	1,401	1,333	68
Newspaper, periodical, book, and directory publishers	5111	79 i	77 i	3 i	6 i	6 i	* i
Software publishers	5112	33,495	33,098	397	1,395	1,327	68
Telecommunications	517	D	3,530 i	D	181	181	0
Data processing, hosting, and related services	518	11,914	11,776	138	275	270	5
Other information	other 51	D	21,594	D	216	215	*
Finance and insurance	52	7,331	7,237	94	95	95	0
Real estate and rental and leasing	53	475	475	0	3	3	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	27	27	0	3	3	0
Other real estate and rental and leasing	other 53	449	449	0	*	*	0
Professional, scientific, and technical services	54	37,595	20,845	16,750	2,844	993	1,851
Architectural, engineering, and related services	5413	3,412	1,816	1,596	463	101	362
Computer systems design and related services	5415	15,747	13,255	2,492 i	203	107	97
Scientific research and development services	5417	14,842	2,811	12,031	2,054	766 i	1,288
Biotechnology research and development	541711	4,464	750 i	3,714	483 i	377 i	105
Physical, engineering, and life sciences (except biotechnology) research and development	541712	9,659	2,029	7,630	1,454 i	389	1,065 i
Social sciences and humanities research and development	541720	719	32	687	118	0	118
Other professional, scientific, and technical services	other 54	3,595	2,962	632	123	19	104
Health care services	621–23	848	782	66	25 i	23 i	2
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	977 i	939 i	38	100	79	21
All companies (number of domestic employees)	–	374,685	317,731	56,954	46,854	37,499	9,355
Micro companies[a]							
5–9	–	1,581 i	1,044 i	536 i	345	255	90 i
Small companies							
10–19	–	4,958 i	3,887 i	1,071 i	731	569	163 i
20–49	–	9,662 i	7,473 i	2,189	1,658	1,348	310
Medium companies							
50–99	–	9,298	7,728	1,570	1,916	1,523	393
100–249	–	14,875	11,722	3,153	2,701	1,960	741
Large companies							
250–499	–	13,092	11,438	1,654	1,437	1,141	296
500–999	–	14,450	13,525	924	1,769	1,484	285

TABLE 48

Domestic R&D performance by performer and source of funds, by industry and company size: 2016

(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
1,000–4,999	–	63,971	53,305	10,666	9,252	7,311	1,940
5,000–9,999	–	40,633	35,887	4,746	3,462	2,424	1,038
10,000–24,999	–	65,594	53,384	12,210	12,377	11,158	1,219
25,000 or more	–	136,571	118,339	18,232	11,205	8,325	2,880

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 49

Domestic R&D performance by source of funds and performer, by industry and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Paid for by the company				Paid for by others							
								R&D performed by the company					
		Total	R&D performed by others (purchased and collaborative R&D)	R&D performed by the company		Total	R&D performed by others (subcontracted or passed-through R&D costs)	Total	Paid for by the U.S. government	Paid for by non-U.S. government sources	
All industries	21–23, 31–33, 42–81	355,230	37,499	317,731		66,309	9,355	56,954	23,772	33,182	
Manufacturing industries	31–33	245,400	33,740	211,660		46,285	7,392	38,893	19,217	19,676	
Food	311	4,751	140	4,611		217	*	217	2	215	
Beverages and tobacco products	312	1,170	183	987		D	0	D	0	D	
Textiles, apparel, and leather products	313–16	1,168 i	12 i	1,156 i		10	1	9	5	4	
Wood products	321	191	10	181		D	D	7 i	* i	7 i	
Paper	322	854	3	851		*	* i	*	* i	*	
Printing and related support activities	323	221 i	2	219 i		D	D	* i	* i	* i	
Petroleum and coal products	324	423	56	367		D	D	14	0	14	
Chemicals	325	91,357	27,193	64,165		13,592	4,182	9,410	212	9,199	
Basic chemicals	3251	2,392	109	2,284		263	2	261	46	215	
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	710	17	693		18	*	18	1 i	17	
Pesticides, fertilizers, and other agricultural chemicals	3253	D	D	1,061 i		D	D	D	2	D	
Pharmaceuticals and medicines	3254	82,611	26,628	55,983		12,793	4,149	8,644	147	8,498	
Soaps, cleaning compounds, and toilet preparations	3256	3,031	372	2,660		168	27	141	*	141	
Paints, coatings, adhesives, and other chemicals	3255, 3259	D	D	1,484		D	D	D	16 i	D	
Plastics and rubber products	326	3,735	151	3,584		172	3 i	169	4	165	
Nonmetallic mineral products	327	1,572	297	1,274		15	1	14	6	9	
Primary metals	331	619	36 i	583		D	D	10	6	4	
Fabricated metal products	332	2,207	80	2,127		144 i	31 i	112 i	12	100 i	
Machinery	333	12,135	435	11,699		919	33	886	152	733	
Agricultural implements	33311	1,735	182	1,552		13	*	12	3	10	
Semiconductor machinery	333242	3,028	*	3,028		404	22	383	3	380	
Engines, turbines, and power	3336	1,908	7	1,901		60 i	2	58 i	41 i	17	

TABLE 49

Domestic R&D performance by source of funds and performer, by industry and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Paid for by the company			Paid for by others													
								R&D performed by the company										
		Total	R&D performed by others (purchased and collaborative R&D)	R&D performed by the company	Total		R&D performed by others (subcontracted or passed-through R&D costs)		Total		Paid for by the U.S. government		Paid for by non-U.S. government sources	
transmission equipment																		
Other machinery	other 333	5,464	246	5,218	441		9		432		106		326	
Computer and electronic products	334	69,829	1,313	68,515	9,123		254		8,869		4,410		4,459	
Communications equipment	3342	11,533	240	11,293	1,861	i	43	i	1,818	i	787	i	1,032	i
Semiconductors and other electronic components	3344	29,562	386	29,176	2,261		46		2,215		278		1,937	
Navigational, measuring, electromedical, and control instruments	3345	10,419	288	10,131	4,916		162		4,753		3,320		1,434	
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	2,516	50	2,466	167		2		165		1	i	164	
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	3,246	126	3,121	4,569		156		4,412		3,274		1,138	
Other measuring and controlling devices	other 3345	4,656	112	4,544	180		4		176		45		131	
Other computer and electronic products	other 334	18,314	399	17,914	85		3		82		26		57	
Electrical equipment, appliances, and components	335	4,451	149	4,302	479	i	10	i	469	i	46	i	422	i
Transportation equipment	336	35,654	2,749	32,905	21,213		2,843		18,371		14,325		4,045	
Automobiles, bodies, trailers, and parts	3361–63	21,292	1,999	19,293	2,886		137		2,749		D		D	
Aerospace products and parts	3364	12,980	708	12,272	17,076		2,702		14,373		12,904		1,469	
Aircraft, aircraft engines, and aircraft parts	336411–13	12,517	587	11,930	15,993		2,702		13,291		11,839		1,452	
Guided missiles, space vehicles, and related parts	336414–15, 336419	463	121	342	1,083	i	1		1,083	i	1,065	i	17	
Military armored vehicles, tanks, and tank components	336992	3	0	3	D		0		D		D		D	
Other transportation	other 336	1,379	42	1,337	D		3		D		D		D	
Furniture and related products	337	391	25	366	*		0		*		*	i	*	

TABLE 49

Domestic R&D performance by source of funds and performer, by industry and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Paid for by the company			Paid for by others					
							R&D performed by the company			
		Total	R&D performed by others (purchased and collaborative R&D)	R&D performed by the company	Total	R&D performed by others (subcontracted or passed-through R&D costs)	Total	Paid for by the U.S. government	Paid for by non-U.S. government sources
Miscellaneous manufacturing	339	14,673	904	13,768	264	D	D	36	D
Medical equipment and supplies	3391	12,289	815	11,474	219	25	194	27	167
Other miscellaneous manufacturing	3399	2,383 i	89 i	2,294 i	45	D	D	10 i	D
Nonmanufacturing industries	21–23, 42–81	109,830	3,759	106,071	20,024	1,963	18,061	4,555	13,506
Mining, extraction, and support activities	21	3,169	273	2,897	400	0	400	2	397
Utilities	22	515	190	325	40	14	26	D	D
Wholesale trade	42	519 i	77 i	442 i	13 i	3 i	10 i	0	10 i
Electronic shopping and electronic auctions	454111–12	1,581 i	13 i	1,569 i	0	0	0	0	0
Transportation and warehousing	48–49	501	16	486	3	0	3	3	0
Information	51	72,073	1,999	70,075	747	73	674	25	649
Publishing	511	34,507	1,333	33,174	468	68	400	7	393
Newspaper, periodical, book, and directory publishers	5111	82 i	6 i	77 i	3 i	* i	3 i	* i	3 i
Software publishers	5112	34,425	1,327	33,098	465	68	397	7	390
Telecommunications	517	3,711 i	181	3,530 i	D	0	D	*	D
Data processing, hosting, and related services	518	12,045	270	11,776	143	5	138	16	122
Other information	other 51	21,810	215	21,594	D	*	D	2	D
Finance and insurance	52	7,332	95	7,237	94	0	94	0	94
Real estate and rental and leasing	53	478	3	475	0	0	0	0	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	30	3	27	0	0	0	0	0
Other real estate and rental and leasing	other 53	449	*	449	0	0	0	0	0
Professional, scientific, and technical services	54	21,837	993	20,845	18,601	1,851	16,750	4,496	12,254
Architectural, engineering, and related services	5413	1,917	101	1,816	1,958	362	1,596	964	632 i
Computer systems design and related services	5415	13,361	107	13,255	2,588	97	2,492 i	583	1,908

TABLE 49

Domestic R&D performance by source of funds and performer, by industry and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Paid for by the company						Paid for by others									
												R&D performed by the company					
		Total		R&D performed by others (purchased and collaborative R&D)		R&D performed by the company		Total		R&D performed by others (subcontracted or passed-through R&D costs)		Total		Paid for by the U.S. government		Paid for by non-U.S. government sources	
Scientific research and development services	5417	3,578		766	i	2,811		13,319		1,288		12,031		2,675		9,356	
Biotechnology research and development	541711	1,127		377	i	750	i	3,819		105		3,714		93		3,621	
Physical, engineering, and life sciences (except biotechnology) research and development	541712	2,418		389		2,029		8,695		1,065	i	7,630		1,956		5,674	i
Social sciences and humanities research and development	541720	32		0		32		805		118		687		626		61	
Other professional, scientific, and technical services	other 54	2,981		19		2,962		737		104		632		274		358	
Health care services	621–23	805		23	i	782		68		2		66		2		64	i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	1,018	i	79		939	i	59		21		38		D		D	
All companies (number of domestic employees)	–	355,230		37,499		317,731		66,309		9,355		56,954		23,772		33,182	
Micro companies[a]																	
5–9	–	1,299	i	255		1,044	i	626	i	90	i	536	i	263	i	273	i
Small companies																	
10–19	–	4,455	i	569		3,887	i	1,234	i	163	i	1,071	i	393	i	678	i
20–49	–	8,821		1,348		7,473	i	2,499		310		2,189		899		1,290	i
Medium companies																	
50–99	–	9,251		1,523		7,728		1,963		393		1,570		451		1,120	
100–249	–	13,681		1,960		11,722		3,895		741		3,153		839		2,315	
Large companies																	
250–499	–	12,579		1,141		11,438		1,951		296		1,654		462		1,193	
500–999	–	15,009		1,484		13,525		1,209		285		924		258		666	
1,000–4,999	–	60,616		7,311		53,305		12,607		1,940		10,666		1,134		9,532	
5,000–9,999	–	38,311		2,424		35,887		5,784		1,038		4,746		1,132	i	3,614	
10,000–24,999	–	64,542		11,158		53,384		13,429		1,219		12,210		3,994		8,216	i
25,000 or more	–	126,664		8,325		118,339		21,112		2,880		18,232		13,948	i	4,284	

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 50

R&D paid for by the company and others and performed by the company outside of the United States, by selected location: 2016

(Millions of U.S. dollars)

Location	Total		Paid for by the company		Paid for by others	
All locations	77,146		70,326		6,820	
Puerto Rico[a]	159		106		53	
Canada	4,734		4,222		512	
Latin America and Other Western Hemisphere	3,908		3,591		317	i
Argentina	275		200		75	i
Brazil	1,332		1,238		93	i
Chile	100		85		15	i
Mexico	860		796		64	
Other Latin American and Western Hemisphere locations	1,342		1,272		70	i
Africa	251		178		73	i
South Africa	167		101		67	i
Other African locations	84		78		6	i
Asia and Pacific	23,581		22,001		1,580	i
Australia	1,492		1,358		134	i
China	6,273		5,945		328	i
Hong Kong	214		191		23	i
India	6,234		6,005		229	i
Indonesia	30		28		2	i
Japan	3,108		2,624		484	i
Malaysia	797		788		9	i
New Zealand	140		121		19	
Singapore	2,001		1,794		206	i
South Korea	1,212		1,126		85	i
Taiwan	1,183		1,152		32	i
Thailand	219		205		14	i
Other Asian or Pacific locations	681		664		16	i
Europe	38,500		34,291		4,209	
Austria	348		309		39	i
Belgium	1,576		1,430		146	
Czech Republic	335		292		43	i
Denmark	548		525		23	i
Finland	724		687		37	
France	2,926		2,568		358	
Germany	8,422		7,999		423	
Hungary	242		201		41	i
Ireland	2,754		2,673		80	
Italy	1,312		1,168		144	
Luxembourg	205		205		*	
Netherlands	1,362		1,188		174	i
Norway	428		420		8	
Poland	608		505		103	i
Russia	282		220		62	i
Spain	671		556		115	i
Sweden	1,196		1,122		73	
Switzerland	2,988		2,565		424	
Turkey	91		74		17	i
United Kingdom	8,600		7,018		1,582	
Other European locations	2,883		2,566		317	i
Middle East	3,886		3,816		70	i
Israel	3,724		3,663		60	i

TABLE 50

R&D paid for by the company and others and performed by the company outside of the United States, by selected location: 2016

(Millions of U.S. dollars)

Location	Total		Paid for by the company		Paid for by others	
Other Middle Eastern locations	163		153		10	i
Undistributed	2,126	i	2,121	i	6	i

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

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

Note(s)

Detail may not add to total because of rounding. Country detail was not asked for on Form BRDI-1(S). Statistics are representative of companies located in the United States that performed or funded R&D.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 51-A

R&D paid for by the company and others and performed by the company outside of the United States, by selected location, industry, and company size: 2016 (part A)

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside the United States	Puerto Rico[a]	Canada	Austria	Belgium	Czech Republic	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	77,146	159	4,734	348	1,576	335	548	724	2,926	8,422	242	2,754	1,312	205	1,362	428	608	282	671	1,196	2,988	91	8,600	2,883
Manufacturing industries	31–33	52,689	141	2,848	283	1,354	163	443	338	1,878	7,233	121	1,316	1,031	196	913	335	436	162	491	715	1,871	65	4,764	2,238
Food	311	994	*	60	2	4	1	*	*	45	62	1	*	6	0	16	11	6	4	9	3	13	1	95	58
Chemicals	325	12,313	74	544	62	995	28	138	48	476	980	24	691	230	165	399	25	67	57	204	157	924	49	1,679	912
Pharmaceuticals and medicines	3254	9,914	32	474	58	840	27	112	43	342	644	21	691	199	2	212	20	60	55	184	151	860	46	1,414	862
Other chemicals	other 325	2,399	41	71 i	4	155	1	26	5	134 i	336	4	1	31	163	188 i	6	7	2	20	6	65	3	265	50 i
Plastics and rubber products	326	831	13	25	*	23	1	2	2	42	135	3	1	21	2	25	0	4	2	20	47	5	0	23	6
Nonmetallic mineral products	327	185	0	16	0	0	*	1	0	14	18	0	*	0	0	0	0	4	3	*	0	0	0	2	3
Fabricated metal products	332	245	0	7	6	2	*	*	0	17	25	0	0	13	0	3	0	*	*	2	1	8	0	55	*
Machinery	333	3,179	1	80	55	33	8	16	81 i	185	573	1	11	63	0	63	120	10	2	25	94	95	*	248	70
Computer and electronic products	334	20,791	3	1,541	102	120	64	243	161	607	1,958	29	439	163	27	156	130	163	73	151	227	324	6	1,196	212
Electrical equipment, appliances, and components	335	1,436	0	193 i	28	9	1	2	4	56	206	2	2	116	0	47	8	18	0	3 i	5	57	*	93	61
Transportation equipment	336	9,050	D	238	D	101	D	4	D	326	2,943	60	D	375	*	162	D	150	D	67 i	139	80	D	1,145	216 i
Miscellaneous manufacturing	339	2,792	D	90	13	38	D	31	D	80	276	*	166	31	1 i	36	D	11 i	11	6	40	115	D	148	674
Other manufacturing	312–16, 321–24, 331, 337	873	0	53	D	30	0	6	1	30	56	*	D	13	0	6	*	2	D	4	3	250	D	78	26 i
Nonmanufacturing industries	21–23, 42–81	24,457	18	1,886	65 i	222	172	104	387	1,047	1,189	120	1,437	281	9	449	92	172	120 i	180	481	1,117	25 i	3,836	645
Wholesale trade	42	12 i	0	0	0	*	0	0	0	0	5	0	0	0	0	1	0	0	0	0	0	0	0	*	0
Information	51	13,384	D	1,078	32	92	90	78	348	656 i	394	61	1,109	135	8	129	77	60	52	52	425	645	3	1,895	455
Telecommunications	517	49	0	9	0	0	0	1	0	0	5	0	1	0	0	*	*	0	0	*	1	0	0	8	0
Data processing, hosting, and related services	518	1,752	*	157	6	4	*	3	10 i	80	54	47	96	2	0	41	11	6	18	6	131	15	*	295	121
Other information	other 51	11,583	D	913	25	88	90	74	338	577 i	335	14	1,011	133	8	88	67	54	35	46	294	629	3	1,593	334
Professional, scientific, and technical services	54	9,176	D	688	33 i	110 i	81 i	23 i	38	380	647	49 i	204	146 i	*	186 i	12	107 i	64 i	124 i	42 i	447	18 i	1,651	166 i
Architectural, engineering, and related services	5413	64	0	5	0	0	0	*	0	*	1	0	0	*	0	1	0	0	0	0	*	0	0	41	*
Scientific research and development services	5417	5,412	D	291	28 i	109 i	33 i	20 i	31	277	318	39 i	61 i	113 i	*	153 i	7	80 i	61 i	83 i	33 i	401	16 i	1,344	146 i
Biotechnology research and development	541711	1,615	0	50	1	41	10	6	4	45	130	11	4	29	0	19	4	27	13	15	9	373	5	456	28
Other scientific research and development	other 5417	3,797	D	240	27 i	68 i	24 i	14 i	27	232 i	188 i	28 i	57 i	84 i	*	134 i	2 i	53 i	48 i	68 i	25 i	28 i	11 i	888	117 i
Other professional, scientific, and technical services	other 54	3,701	0	392	5	2 i	48 i	3	8	103	328	10	143	33	0	32	5	27	3	41	9	46	2	266	20
Other nonmanufacturing	21–23, 44–45, 48–49, 52–53, 55–56, 621–24, 71–72, 81	1,885	*	120	*	20	1	4 i	*	11	143	10	125	1	1 i	133	4	5	4	5	13	26	4	290	24
All companies (number of domestic employees)	–	77,146	159	4,734	348	1,576	335	548	724	2,926	8,422	242	2,754	1,312	205	1,362	428	608	282	671	1,196	2,988	91	8,600	2,883
Micro companies[b]																									
5–9	–	145	0	*	0	0	0	0	*	*	*	0	*	98	0	*	*	*	1	0	0	8	0	2	0
Small companies																									

TABLE 51-A

R&D paid for by the company and others and performed by the company outside of the United States, by selected location, industry, and company size: 2016 (part A)

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total outside the United States	Puerto Rico[a]	Canada	Austria	Belgium	Czech Republic	Denmark	Finland	France	Germany	Hungary	Ireland	Italy	Luxembourg	Netherlands	Norway	Poland	Russia	Spain	Sweden	Switzerland	Turkey	United Kingdom	Other European locations
10–19	–	101	0	4	0	2	0	0	0	14	1	0	0	0	0	*	1	0	0	0	0	1	0	18	*
20–49	–	338	0	7	*	2	*	1	D	9	11	D	18	*	0	*	*	1	0	30	D	2	0	23	6
Medium companies																									
50–99	–	364	*	29	0	1	2	1	D	16	10	D	3	13	*	4	*	D	3	2	D	14	0	24	10
100–249	–	1,319	D	48	*	2	3	14	0	20	57	1	8	17	*	79	2	23	13	1	2	281	0	65	34
Large companies																									
250–499	–	1,774	*	136	15	5	2	4	D	53	161	48	19	25	0	39	12	D	5	3	125	87	*	213	28
500–999	–	2,159	*	127	5	15	*	16	14	44	148	29	39 i	16	2	18	16	4	11	5	72	23	*	282	56
1,000–4,999	–	15,626	28	1,667	83	251	82 i	269	156 i	1,069 i	1,594	32	387	163	25	422	68	79	37	133	417	543	11	1,592	387
5,000–9,999	–	8,986	D	507	35	86	64	51	16	234	610	26	954	99	5	296	8	126	22 i	89	86	153	8 i	839	226
10,000–24,999	–	14,661	50	654	77	376	41	52	68	539	1,663	36 i	196	365	164	257 i	125	103	76 i	257	215	326	37	2,048	492
25,000 or more	–	31,672	71	1,555	132	836	140	140	454	928	4,166	69	1,129	516	8	247	195	269	115	151	277	1,551	33	3,493	1,644

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

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

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

NAICS = 2012 North American Industry Classification System.

Note(s)

Detail may not add to total because of rounding. Country detail was not asked on Form BRDI-1(S). Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded R&D.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 51-B

R&D paid for by the company and others and performed by the company outside of the United States, by selected location, industry, and company size: 2016 (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
All industries	21–23, 31–33, 42–81	77,146	275	1,332	100	860	1,342	1,492	6,273	214	6,234	30	3,108	797	140	2,001	1,212	1,183	219	681	3,724	163	167	84	2,126 i
Manufacturing industries	31–33	52,689	182	1,146	58	729	1,233	990	4,623	159	3,192	26	2,258	776	69	1,559	1,058	909	177	442	2,527	116	72	29	1,022 i
Food	311	994	3	87	0	28	11	49	161	*	5	4	6	1	3	22	4	*	8	27	*	8	7	2	158 i
Chemicals	325	12,313	112	267	35 i	124	121	247	708	38	298	6	767	9	9	189	64	73	22	45	106	52	35	12	45 i
Pharmaceuticals and medicines	3254	9,914	78	141	25	77	89	231	478	24	268	3	705	6	9	92 i	59	68	13	19	89	41	24	10	21 i
Other chemicals	other 325	2,399	34 i	126 i	11 i	47 i	32	15	230	15	30 i	3	62 i	3	*	96	6 i	5	9 i	26	17 i	11 i	11 i	1	24 i
Plastics and rubber products	326	831	23	70	*	21	4	5	107	8	5	1	66	1	2	2	52	12	3	*	0	9	*	1	31 i
Nonmetallic mineral products	327	185	0	0	0	5	0	*	16	0	1	0	31	0	0	0	44	9	0	0	20	0	0	0	* i
Fabricated metal products	332	245	1	1	*	3	*	2	40	1	5	*	40	1	0	1	0	1	3	2	*	2	*	0	2 i
Machinery	333	3,179	2	98 i	*	21	1	39	316	5	106	*	72	9	11	211	95	203	2	11	59	6	4	*	74 i
Computer and electronic products	334	20,791	24	55	1	141	991	111	2,277	64	2,483	2	861	746	36	1,009	207	563	123	257	2,192	11	12	5 i	527 i
Electrical equipment, appliances, and components	335	1,436	*	55	0	13	6	4	228	14	24	*	70	*	0	41	24	11	*	29	2	5	0	0	* i
Transportation equipment	336	9,050	D	463	D	327	8	412	422	13 i	206	1	177	4	*	8	528	27	7	14	43	D	13	D	166 i
Miscellaneous manufacturing	339	2,792	D	22	D	17	50 i	116	291	10	50	*	161	5	* i	46	24	10	*	40	105	2	D	D	D
Other manufacturing	312–16, 321–24, 331, 337	873	D	28	D	27	40	6	57	6 i	9	13	9	*	8	31	15	0	9	16	0	D	D	*	D
Nonmanufacturing industries	21–23, 42–81	24,457	93 i	186	42	131	109 i	501	1,649	55	3,042	4 i	849	20	71	442	154	274	42	239	1,197	46	95 i	55	1,104 i
Wholesale trade	42	12 i	0	0	0	0	0	0	2 i	0	*	0	0	0	0	0	*	0	0	0	0	0	0	0	4 i
Information	51	13,384	16	69	18	51	35	278	1,039	23	2,107	*	221	5	41	143	59	119	5	183	800	17	29	46	D
Telecommunications	517	49	*	*	0	*	1	1 i	3	*	12 i	0	0	0	1	*	3	0	0	0	0	0	0	0	1
Data processing, hosting, and related services	518	1,752	*	4	*	3	24	63	44	2	257	0	13	1	29	10	3	8	*	12	88	*	13	0	75 i
Other information	other 51	11,583	16	65	18	48	10	214	991	22	1,838	*	208	5	11	133	53	111	4	170	711	16	15	46	D
Professional, scientific, and technical services	54	9,176	72 i	107 i	17 i	65 i	72 i	196	550	10 i	585	3 i	518 i	8 i	14 i	262 i	82 i	154	13 i	49 i	368	6 i	65 i	9 i	D
Architectural, engineering, and related services	5413	64	0	2	0	0	0	0	7	0	3	0	2	0	0	0	0	*	0	0	0	0	0	0	* i
Scientific research and development services	5417	5,412	71 i	69 i	15 i	45 i	32 i	116 i	286 i	10 i	198 i	2 i	451 i	8 i	11 i	190 i	82 i	31 i	13 i	14 i	47 i	6 i	62 i	4 i	D
Biotechnology research and development	541711	1,615	8	11	4	19	9	60	82	3	14	*	42	2	4	16	25	9	2	2	17	1	4	*	1 i
Other scientific research and development	other 5417	3,797	63 i	58 i	11 i	26 i	23 i	56 i	204 i	7 i	184 i	2 i	409 i	6 i	7 i	173 i	57 i	23 i	10 i	12 i	30 i	5 i	58 i	4 i	D
Other professional, scientific, and technical services	other 54	3,701	1	36	2	20	39 i	80	257	*	384	1	65	*	3	72	1	123	*	36 i	321	*	3	5	727 i
Other nonmanufacturing	21–23, 44–45, 48–49, 52–53, 55–56, 621–24, 71–72, 81	1,885	5	10	8	16	2	27	58	21	350	*	110	7	16	37	12 i	*	24	7	28	24	2	*	179 i
All companies (number of domestic employees)	–	77,146	275	1,332	100	860	1,342	1,492	6,273	214	6,234	30	3,108	797	140	2,001	1,212	1,183	219	681	3,724	163	167	84	2,126 i
Micro companies[a]																									
5–9	–	145	0	0	0	0	D	*	11	*	2	0	0	0	0	0	*	2 i	0	0	D	0	0	0	D
Small companies																									
10–19	–	101	0	0	0	0	D	*	6	1	3	0	*	0	0	0	15	1	0	*	14	0	0	0	D
20–49	–	338	*	*	*	1	*	42	23	1	58	0	2	*	*	1	3	21	*	2	8	0	0	0	50 i

TABLE 51-B

R&D paid for by the company and others and performed by the company outside of the United States, by selected location, industry, and company size: 2016 (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
Medium companies																									
50–99	–	364	*	*	*	3	D	4	37	1	36	0	9	*	*	9	2	38	0	2	21	0	D	0	67 i
100–249	–	1,319	1	5	0	6	46 i	6	154	7	69	12	11	*	3	60	*	114	1	15	D	1	17	0	103 i
Large companies																									
250–499	–	1,774	9	8	*	20	1	11	157	17	119	1	54	4	12	71	101	63	1	20	30	*	1	0	88 i
500–999	–	2,159	7	8	*	42	4	21	150	15	119	*	112	152 i	3	32	12	50	3	11	139	4	2	0	329 i
1,000–4,999	–	15,626	16	132 i	7	74	119 i	325	1,486	52	1,642	5	424	78	39	297	91	210	49	234 i	508	20	22	22	277 i
5,000–9,999	–	8,986	22 i	68	13 i	89	607	92	487	16	890	1	356	222	9	444	125	239	106	187	261 i	8	D	1	D
10,000–24,999	–	14,661	156 i	415	37 i	161	383 i	236	1,060	29	789	8	1,136	21	51	828	204	175	21 i	95	220	58	80 i	14	265 i
25,000 or more	–	31,672	64	694	42	464	180	755	2,701	76	2,507	3	1,002	319	23	260	658	270	36	116	2,507	72	24	47	730 i

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

Detail may not add to total because of rounding. Country detail was not asked on Form BRDI-1(S). Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded R&D.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 52

Capital expenditures in the United States and for domestic R&D paid for and performed by the company, by type of expenditure, industry, and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Domestic R&D											
				Total		Structures		Equipment		Capitalized software		All other	
All industries	21–23, 31–33, 42–81	560,900		25,248		3,072		11,839		6,793		3,543	
Manufacturing industries	31–33	235,923		14,948		2,471		8,376		1,850		2,251	i
Food	311	20,370		313		103		188		7		16	
Beverages and tobacco products	312	4,976		109		32		70		5		2	
Textiles, apparel, and leather products	313–16	2,941	i	86	i	17	i	24	i	45	i	*	i
Wood products	321	1,472		18		2		15		*		*	
Paper	322	2,535		45		*		45		0		*	
Printing and related support activities	323	1,318		71		*		19		52		0	
Petroleum and coal products	324	7,565		63		47		15		*		1	
Chemicals	325	40,570		4,336		1,364		1,982		629		361	
Basic chemicals	3251	12,499		201		33		158		3		7	
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,960		58	i	10	i	41	i	2	i	5	i
Pesticides, fertilizers, and other agricultural chemicals	3253	1,652	i	74	i	13	i	60	i	*	i	1	i
Pharmaceuticals and medicines	3254	16,577		3,511		1,242		1,410		545		314	
Soaps, cleaning compounds, and toilet preparations	3256	4,967		236		12		164		39		22	
Paints, coatings, adhesives, and other chemicals	3255, 3259	2,915		254		55		147		40		12	
Plastics and rubber products	326	14,268		386		14		303		2		67	
Nonmetallic mineral products	327	3,291		247		7		144		*		95	
Primary metals	331	3,983	i	80	i	6	i	38	i	2	i	33	i
Fabricated metal products	332	4,616	i	140	i	12	i	101	i	3	i	24	i
Machinery	333	11,037		1,096		85		825		101		85	
Agricultural implements	33311	1,076		59		22		21		1		16	
Semiconductor machinery	333242	789		328		*		270		36		22	
Engines, turbines, and power transmission equipment	3336	920		110		20		64		19		7	
Other machinery	other 333	8,252		599		43		470		45		41	
Computer and electronic products	334	35,960		4,441		149		2,812		528		953	i
Communications equipment	3342	3,711		427	i	30	i	343	i	29	i	26	i
Semiconductors and other electronic components	3344	16,786	i	1,965	i	47	i	1,087	i	100	i	731	i
Navigational, measuring, electromedical, and control instruments	3345	4,864		653		20	i	375	i	118		139	i
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	866	i	197	i	D		118	i	22	i	D	
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	1,529		220		D		155		41		D	
Other measuring and controlling devices	other 3345	2,469		237		8		102	i	55		72	
Other computer and electronic products	other 334	10,599		1,397		52		1,008		281		56	
Electrical equipment, appliances, and components	335	3,260		179		18		103		7		51	
Transportation equipment	336	66,588		2,513		600		1,235		250		427	
Automobiles, bodies, trailers, and parts	3361–63	45,894		1,444		103		884		181		275	
Aerospace products and parts	3364	17,904		890		494		277		63		55	
Aircraft, aircraft engines, and aircraft parts	336411–13	17,141		887		494		275		63		54	

TABLE 52

Capital expenditures in the United States and for domestic R&D paid for and performed by the company, by type of expenditure, industry, and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Domestic R&D											
				Total		Structures		Equipment		Capitalized software		All other	
Guided missiles, space vehicles, and related parts	336414–15, 336419	764		4	i	*	i	2	i	0		2	i
Military armored vehicles, tanks, and tank components	336992	4		*		*	i	*		*	i	*	i
Other transportation	other 336	2,786		179	i	3		73	i	6	i	97	i
Furniture and related products	337	1,184		48	i	*		38	i	7	i	4	i
Miscellaneous	339	9,989		776		14		418		213		131	
Medical equipment and supplies	3391	7,544		647		13		358		210		66	
Other miscellaneous manufacturing	3399	2,445	i	129	i	1	i	60	i	3	i	66	i
Nonmanufacturing industries	21–23, 42–81	324,977		10,299		602		3,463	i	4,943		1,292	
Mining, extraction, and support activities	21	24,583		339		139		90		81		29	
Utilities	22	86,048		86		6		37		*		42	
Wholesale trade	42	31,670	i	9	i	*	i	9	i	*	i	*	
Electronic shopping and electronic auctions	454111–12	10,838	i	238	i	12	i	184	i	36	i	6	i
Transportation and warehousing	48–49	20,649		52		0		2		49		1	
Information	51	95,151		4,807		288		1,843		2,027		649	
Publishing	511	13,762		1,656		177		915		187		377	
Newspaper, periodical, book, and directory publishers	5111	221	i	14	i	1	i	7	i	2	i	3	i
Software publishers	5112	13,541		1,642		176		907		185		374	
Telecommunications	517	58,713		1,559		1		450	i	1,073		36	i
Data processing, hosting, and related services	518	7,577		961		38	i	215		594		115	
Other information	other 51	15,100		631	i	72	i	263	i	174	i	121	i
Finance and insurance	52	14,385	i	2,187		36		189		1,696		265	
Real estate and rental and leasing	53	799	i	50	i	*	i	1	i	49	i	*	i
Lessors of nonfinancial intangible assets (except copyrighted works)	533	12	i	1	i	*		*	i	1	i	*	
Other real estate and rental and leasing	other 53	787	i	50	i	*	i	1	i	48	i	*	i
Professional, scientific, and technical services	54	19,514		2,152	i	114	i	934	i	809	i	296	i
Architectural, engineering, and related services	5413	1,521		39		2		15		19		4	
Computer systems design and related services	5415	7,215	i	1,464	i	66	i	670	i	586	i	143	i
Scientific research and development services	5417	1,552		348		39		186		16		107	
Biotechnology research and development	541711	577		D		12		61		D		11	
Physical, engineering, and life sciences (except biotechnology) research and development	541712	959		255		27		121		11		96	
Social sciences and humanities research and development	541720	16		D		1		3		D		1	
Other professional, scientific, and technical services	other 54	9,226		301	i	7	i	63	i	188		42	i
Health care services	621–23	2,300		150	i	5	i	110	i	35	i	*	i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	19,040		228	i	1	i	64	i	160	i	3	i
All companies (number of domestic employees)	–	560,900		25,248		3,072		11,839		6,793		3,543	
Micro companies[a]													
5–9	–	556	i	75		9		44		6	i	16	
Small companies													
10–19	–	2,967	i	315		20		186		26	i	83	
20–49	–	8,005	i	542	i	41	i	283	i	119	i	99	

TABLE 52

Capital expenditures in the United States and for domestic R&D paid for and performed by the company, by type of expenditure, industry, and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Total		Domestic R&D									
				Total		Structures		Equipment		Capitalized software		All other	
Medium companies													
50–99	–	13,984	i	520		60		254		102		104	
100–249	–	20,113	i	1,212		86		489		170	i	468	
Large companies													
250–499	–	26,216	i	1,337		116		597		371		253	
500–999	–	17,807		1,110		66	i	546		279		218	
1,000–4,999	–	64,733		4,208		606		1,967		1,136		499	
5,000–9,999	–	53,985		2,849		445		1,466		587	i	351	
10,000–24,999	–	105,334		5,326		804		1,928		1,532		1,062	i
25,000 or more	–	247,200		7,754		820		4,079		2,465		390	i

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded R&D. The "undistributed" column shown in prior years is no longer necessary because of processing improvements implemented beginning in 2015.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 53

Worldwide, domestic, and foreign total and R&D employment, by industry and company size: 2016

(Thousands)

Industry and company size	NAICS code	Worldwide employees			Domestic employees			Foreign employees		
		Total	R&D	% R&D employees	Total	R&D	% R&D employees	Total	R&D	% R&D employees
All industries	21–23, 31–33, 42–81	30,667	2,195	7.2	19,293	1,522	7.9	11,374	674	5.9
Manufacturing industries	31–33	17,557	1,318	7.5	9,879	912	9.2	7,678	406	5.3
Food	311	1,769	38	2.1	1,125	24	2.1	644	14	2.2
Beverages and tobacco products	312	751	9	1.2	269	6	2.4	482	3	0.6
Textiles, apparel, and leather products	313–16	512	9	1.8	291	8	2.9	222	1	0.4
Wood products	321	128	3	2.4	100	3	2.7	28	*	1.2
Paper	322	240	8	3.3	150	6	3.8	90	2	2.3
Printing and related support activities	323	138	4	2.9	116	4	3.1	22	*	1.6
Petroleum and coal products	324	80	2	3.1	58	2	3.4	22	*	2.3
Chemicals	325	2,295	236	10.3	1,257	173	13.8	1,038	63	6.1
Basic chemicals	3251	319	19	6.0	218	14	6.5	101	5	4.9
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	164	8	4.7	82	5	5.7	82	3	3.7
Pesticides, fertilizers, and other agricultural chemicals	3253	70 i	7 i	10.4	40 i	5 i	12.8	30	2 i	7.2
Pharmaceuticals and medicines	3254	1,010	161	16.0	562	123	21.8	448	39	8.6
Soaps, cleaning compounds, and toilet preparations	3256	421	21	4.9	178	13	7.5	243	7	3.0
Paints, coatings, adhesives, and other chemicals	3255, 3259	312	20	6.5	178	13	7.4	134	7	5.3
Plastics and rubber products	326	740	37	5.0	510	29	5.8	230	8	3.4
Nonmetallic mineral products	327	281	9	3.0	194	7	3.8	87	1	1.4
Primary metals	331	277	8	2.8	195	7	3.6	82	1	1.0
Fabricated metal products	332	557	33	5.9	413	30	7.3	143	3	2.0
Machinery	333	1,475	113	7.7	824	78	9.5	650	35	5.3
Agricultural implements	33311	153	15	9.8	84	9	10.7	70	6	8.7
Semiconductor machinery	333242	78	14	17.4	28	9	31.5	50 i	5	9.5
Engines, turbines, and power transmission equipment	3336	158	12	7.4	84	7	8.9	74	4	5.6
Other machinery	other 333	1,086	73	6.7	629	53	8.4	457	20	4.3
Computer and electronic products	334	2,897	424	14.6	1,336	264	19.7	1,561	160	10.3
Communications equipment	3342	290	77	26.7	171	48	28.1	119	29	24.7
Semiconductors and other electronic components	3344	1,010	156	15.5	410	96	23.4	600	61	10.1
Navigational, measuring, electromedical, and control instruments	3345	956	100	10.4	501	69	13.8	454	30	6.6

TABLE 53

Worldwide, domestic, and foreign total and R&D employment, by industry and company size: 2016

(Thousands)

Industry and company size	NAICS code	Worldwide employees			Domestic employees			Foreign employees		
		Total	R&D	% R&D employees	Total	R&D	% R&D employees	Total	R&D	% R&D employees
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	137	19	14.0	72	12	17.0	65	7	10.6
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	298	33	11.1	208	29	14.1	91	4	4.2
Other measuring and controlling devices	other 3345	520	47	9.1	221	28	12.6	299	20	6.6
Other computer and electronic products	other 334	642	90	14.1	255	50	19.8	387	40	10.4
Electrical equipment, appliances, and components	335	766	51	6.7	306	28	9.0	460	23	5.1
Transportation equipment	336	3,286	236	7.2	1,953	168	8.6	1,333	68	5.1
Automobiles, bodies, trailers, and parts	3361–63	2,162	135	6.3	1,088	92	8.5	1,074	43	4.0
Aerospace products and parts	3364	858	85	9.8	643	61	9.5	215	24	11.0
Aircraft, aircraft engines, and aircraft parts	336411–13	810	73	9.1	607	50	8.2	203	24	11.7
Guided missiles, space vehicles, and related parts	336414–15, 336419	48	11	22.9	36	11	30.4	12	*	0.5
Military armored vehicles, tanks, and tank components	336992	1	*	13.2	1	*	13.2	0	0	0.0
Other transportation	other 336	265 i	17	6.2	221 i	15	6.6	44	2	4.5
Furniture and related products	337	172	5	2.9	147	5	3.1	25	*	1.8
Miscellaneous manufacturing	339	1,194	92	7.7	635	70	11.0	559	22	3.9
Medical equipment and supplies	3391	827	65	7.8	429	47	11.0	398	17	4.4
Other miscellaneous manufacturing	3399	367	27 i	7.5	206	23 i	11.1	161 i	5 i	2.8
Nonmanufacturing industries	21–23, 42–81	13,111	878	6.7	9,414	610	6.5	3,697	268	7.2
Mining, extraction, and support activities	21	413	14	3.4	199	12	5.9	214	2	1.1
Utilities	22	383	3	0.7	373	3	0.7	10	*	0.7
Wholesale trade	42	356	12	3.3	294	11	3.8	63	*	0.7
Electronic shopping and electronic auctions	454111–12	300	6 i	2.1	197	5 i	2.5	103	1 i	1.2
Transportation and warehousing	48–49	1,564	3 i	0.2	1,368 i	3 i	0.2	196 i	*	*
Information	51	2,572	414	16.1	1,832	277	15.1	740	137	18.5
Publishing	511	1,078	241	22.4	650	143	22.0	428	98	23.0
Newspaper, periodical, book, and directory publishers	5111	23	1	4.3	19	1	4.7	3	*	1.7
Software publishers	5112	1,055	240	22.8	630	142	22.5	425	98	23.1
Telecommunications	517	752	25	3.3	684	24	3.5	68	1 i	1.7

TABLE 53

Worldwide, domestic, and foreign total and R&D employment, by industry and company size: 2016

(Thousands)

Industry and company size	NAICS code	Worldwide employees			Domestic employees			Foreign employees		
		Total	R&D	% R&D employees	Total	R&D	% R&D employees	Total	R&D	% R&D employees
Data processing, hosting, and related services	518	556	87	15.6	355	62	17.4	200	25	12.5
Other information	other 51	186	61	32.9	143	49	34.1	44	13	28.9
Finance and insurance	52	1,420	47	3.3	1,114	37	3.4	306	10	3.2
Real estate and rental and leasing	53	19	3	13.7	18	2	14.1	1	*	6.7
Lessors of nonfinancial intangible assets (except copyrighted works)	533	2	*	15.6	2	*	12.7	*	*	87.1
Other real estate and rental and leasing	other 53	17	2	13.5	16	2	14.3	1	*	1.8
Professional, scientific, and technical services	54	2,439	355	14.5	1,373	240	17.5	1,066	114	10.7
Architectural, engineering, and related services	5413	444	52	11.7	323	46	14.3	121	6	4.8
Computer systems design and related services	5415	1,278	140	10.9	480	92	19.1	798	48	6.0
Scientific research and development services	5417	354	133	37.6	264	79	29.8	90	55	60.7
Biotechnology research and development	541711	145	35	24.4	125	21	17.0	20	14	69.9
Physical, engineering, and life sciences (except biotechnology) research and development	541712	195	92	47.3	126	52	41.2	69	40	58.5
Social sciences and humanities research and development	541720	14	6	39.4	14	6	40.7	*	*	2.1
Other professional, scientific, and technical services	other 54	362	30	8.2	306	24	7.9	56	6	9.8
Health care services	621–23	441	4	0.9	436	4	0.9	6	*	3.0
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	3,204	18	0.6	2,212	16	0.7	992	2	0.2
All companies (number of domestic employees)	–	30,667	2,195	7.2	19,293	1,522	7.9	11,374	674	5.9
Micro companies[a]										
5–9	–	38	17	44.9	34	15	43.2	4	2	60.3
Small companies										
10–19	–	122	40	33.0	111	37	33.6	10	3	27.2
20–49	–	353	82	23.3	323	75	23.2	30	7	24.1
Medium companies										
50–99	–	495	76	15.3	413	69	16.8	82	7	7.9
100–249	–	1,006	116	11.6	764	101	13.3	242	15	6.2
Large companies										
250–499	–	962	94	9.7	700	75	10.7	263	18	7.0
500–999	–	1,035	98	9.5	739	74	10.0	296	24	8.2

TABLE 53

Worldwide, domestic, and foreign total and R&D employment, by industry and company size: 2016

(Thousands)

Industry and company size	NAICS code	Worldwide employees			Domestic employees			Foreign employees		
		Total	R&D	% R&D employees	Total	R&D	% R&D employees	Total	R&D	% R&D employees
1,000–4,999	–	4,388	440	10.0	2,583	278	10.7	1,805	163	9.0
5,000–9,999	–	3,731	237	6.4	1,859	159	8.6	1,872	78	4.2
10,000–24,999	–	5,085	373	7.3	2,898	243	8.4	2,188	130	6.0
25,000 or more	–	13,452	621	4.6	8,869	395	4.5	4,583	226	4.9

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 54

Worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, R&D employment, and R&D cost per R&D employee, by industry and company size: 2016

(Millions of U.S. dollars 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	451,831	374,685	77,146	2,195	1,522	674	206	246	115
Manufacturing industries	31–33	303,241	250,553	52,689	1,318	912	406	230	275	130
Food	311	5,821	4,828	994	38	24	14	154	203	71
Beverages and tobacco products	312	D	D	543	9	6	3	D	D	198
Textiles, apparel, and leather products	313–16	1,246 i	1,166 i	81	9	8	1	134	138	93
Wood products	321	203	188	15	3	3	*	67	69	44
Paper	322	929	851	78	8	6	2	119	148	38
Printing and related support activities	323	223 i	219 i	4	4	4	*	56	61	10
Petroleum and coal products	324	425	381	44	2	2	*	174	197	88
Chemicals	325	85,888	73,575	12,313	236	173	63	364	426	195
Basic chemicals	3251	3,082	2,545	537	19	14	5	162	180	109
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,044	711	333	8	5	3	136	153	110
Pesticides, fertilizers, and other agricultural chemicals	3253	D	D	432 i	7 i	5 i	2 i	D	D	202
Pharmaceuticals and medicines	3254	74,542	64,628	9,914	161	123	39	463	527	257
Soaps, cleaning compounds, and toilet preparations	3256	3,590	2,800	789	21	13	7	174	210	108
Paints, coatings, adhesives, and other chemicals	3255, 3259	D	D	307	20	13	7	D	D	43
Plastics and rubber products	326	4,583	3,752	831	37	29	8	123	127	106
Nonmetallic mineral products	327	1,474	1,289	185	9	7	1	173	177	151
Primary metals	331	662	592	69	8	7	1	86	85	86
Fabricated metal products	332	2,484	2,239	245	33	30	3	75	74	85
Machinery	333	15,764	12,585	3,179	113	78	35	140	161	92
Agricultural implements	33311	2,189	1,565	625	15	9	6	146	175	103
Semiconductor machinery	333242	4,138	3,411	727	14	9	5	306	388	154
Engines, turbines, and power transmission equipment	3336	2,327	1,959	368	12	7	4	199	262	88
Other machinery	other 333	7,109	5,650	1,459	73	53	20	98	106	74
Computer and electronic products	334	98,175	77,385	20,791	424	264	160	232	294	130
Communications equipment	3342	16,075	13,112	2,963	77	48	29	208	273	101

TABLE 54

Worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, R&D employment, and R&D cost per R&D employee, by industry and company size: 2016

(Millions of U.S. dollars 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
Semiconductors and other electronic components	3344	41,695	31,391	10,304	156	96	61	267	328	170
Navigational, measuring, electromedical, and control instruments	3345	18,111	14,885	3,227	100	69	30	182	214	107
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	3,553	2,632	922	19	12	7	185	214	135
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	8,373	7,533	840	33	29	4	254	258	222
Other measuring and controlling devices	other 3345	6,185	4,720	1,465	47	28	20	130	170	75
Other computer and electronic products	other 334	22,294	17,997	4,297	90	50	40	246	357	107
Electrical equipment, appliances, and components	335	6,207	4,771	1,436	51	28	23	122	173	62
Transportation equipment	336	60,326	51,275	9,050	236	168	68	255	305	132
Automobiles, bodies, trailers, and parts	3361–63	29,171	22,042	7,130	135	92	43	216	238	167
Aerospace products and parts	3364	28,462	26,645	1,817	85	61	24	337	438	77
Aircraft, aircraft engines, and aircraft parts	336411–13	27,034	25,221	1,813	73	50	24	368	507	77
Guided missiles, space vehicles, and related parts	336414–15, 336419	1,428 i	1,424 i	4	11	11	*	129	129	60
Military armored vehicles, tanks, and tank components	336992	D	D	0	*	*	0	D	D	0
Other transportation	other 336	D	D	104	17	15	2	D	D	52
Furniture and related products	337	406	366	40	5	5	*	80	79	89
Miscellaneous manufacturing	339	D	D	2,792	92	70	22	D	D	127
Medical equipment and supplies	3391	14,143	11,668	2,475	65	47	17	218	247	142
Other miscellaneous manufacturing	3399	D	D	317 i	27 i	23 i	5 i	D	D	69
Nonmanufacturing industries	21–23, 42–81	148,589	124,132	24,457	878	610	268	169	203	91
Mining, extraction, and support activities	21	3,604	3,296	308	14	12	2	257	282	132

TABLE 54

Worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, R&D employment, and R&D cost per R&D employee, by industry and company size: 2016

(Millions of U.S. dollars 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
Utilities	22	353	351	1	3	3	*	136	139	20
Wholesale trade	42	465 i	452 i	12 i	12	11	*	40	40	29
Electronic shopping and electronic auctions	454111–12	D	1,569 i	D	6 i	5 i	1 i	D	319	D
Transportation and warehousing	48–49	495	488	7	3 i	3 i	*	168	166	902
Information	51	84,133	70,748	13,384	414	277	137	203	255	98
Publishing	511	42,272	33,574	8,698	241	143	98	175	235	88
Newspaper, periodical, book, and directory publishers	5111	84 i	79 i	4	1	1	*	85	86	72
Software publishers	5112	42,188	33,495	8,693	240	142	98	176	236	88
Telecommunications	517	D	D	49	25	24	1 i	D	D	43
Data processing, hosting, and related services	518	13,666	11,914	1,752	87	62	25	157	193	70
Other information	other 51	D	D	2,886	61	49	13	D	D	228
Finance and insurance	52	8,468	7,331	1,136	47	37	10	179	196	115
Real estate and rental and leasing	53	477	475	2	3	2	*	187	192	22
Lessors of nonfinancial intangible assets (except copyrighted works)	533	27	27	*	*	*	*	107	137	*
Other real estate and rental and leasing	other 53	450	449	2	2	2	*	196	197	86
Professional, scientific, and technical services	54	46,771	37,595	9,176	355	240	114	132	156	80
Architectural, engineering, and related services	5413	3,475	3,412	64	52	46	6	67	74	11
Computer systems design and related services	5415	19,168	15,747	3,421	140	92	48	137	172	71
Scientific research and development services	5417	20,254	14,842	5,412	133	79	55	152	189	99
Biotechnology research and development	541711	6,079	4,464	1,615	35	21	14	172	210	114
Physical, engineering, and life sciences (except biotechnology) research and development	541712	13,452	9,659	3,793	92	52	40	146	186	94
Social sciences and humanities research and development	541720	723	719	4	6	6	*	131	131	402
Other professional, scientific, and technical services	other 54	3,874	3,595	279	30	24	6	131	149	51

TABLE 54

Worldwide, domestic, and foreign R&D paid for by the company and others and performed by the company, R&D employment, and R&D cost per R&D employee, by industry and company size: 2016

(Millions of U.S. dollars 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
Health care services	621–23	1,002	848	154	4	4	*	252	222	913
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	D	977 i	D	18	16	2	D	63	D
All companies (number of domestic employees)	–	451,831	374,685	77,146	2,195	1,522	674	206	246	115
Micro companies[a]										
5–9	–	1,726 i	1,581 i	145	17	15	2	101	106	64
Small companies										
10–19	–	5,059 i	4,958 i	101	40	37	3	126	133	36
20–49	–	10,000 i	9,662 i	338	82	75	7	122	129	47
Medium companies										
50–99	–	9,662	9,298	364	76	69	7	127	134	56
100–249	–	16,194	14,875	1,319	116	101	15	139	147	88
Large companies										
250–499	–	14,866	13,092	1,774	94	75	18	159	174	96
500–999	–	16,609	14,450	2,159	98	74	24	169	195	88
1,000–4,999	–	79,597	63,971	15,626	440	278	163	181	230	96
5,000–9,999	–	49,620	40,633	8,986	237	159	78	209	255	115
10,000–24,999	–	80,255	65,594	14,661	373	243	130	215	270	113
25,000 or more	–	168,243	136,571	31,672	621	395	226	271	346	140

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 55

Worldwide, domestic, and foreign R&D employment, by sex, industry, and company size: 2016

(Thousands)

Industry and company size	NAICS code	Worldwide						Domestic						Foreign					
		Total		Male		Female		Total		Male		Female		Total		Male		Female	
All industries	21–23, 31–33, 42–81	2,195		1,601		594		1,522		1,122		399		674		479		194	
Manufacturing industries	31–33	1,318		992		326		912		690		222		406		302		104	
Food	311	38		21	i	17		24		14	i	10		14		7	i	7	
Beverages and tobacco products	312	9		5		4		6		4		3		3		1		1	
Textiles, apparel, and leather products	313–16	9		6	i	4	i	8		5	i	3	i	1		1	i	*	i
Wood products	321	3		2	i	1		3		2		*		*		*		*	
Paper	322	8		6		2		6		4		1		2		2		*	
Printing and related support activities	323	4		3	i	1	i	4		3	i	1	i	*		*	i	*	i
Petroleum and coal products	324	2		2		1		2		1		*		*		*		*	
Chemicals	325	236		128		108		173		95		77		63		32		31	
Basic chemicals	3251	19		13		6		14		10		4		5		3		2	
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	8		6		2		5		4	i	1	i	3		2		1	
Pesticides, fertilizers, and other agricultural chemicals	3253	7	i	5	i	3	i	5	i	3	i	2	i	2	i	1	i	1	i
Pharmaceuticals and medicines	3254	161		78		83		123		62		61		39		17		22	
Soaps, cleaning compounds, and toilet preparations	3256	21		11		10		13		7		6		7		4		4	
Paints, coatings, adhesives, and other chemicals	3255, 3259	20		15		5		13		10		3		7		5		2	
Plastics and rubber products	326	37		27		10		29		22		8		8		5		3	
Nonmetallic mineral products	327	9		7		2		7		6		1		1		1		*	
Primary metals	331	8		7		1		7		6	i	1		1		1		*	
Fabricated metal products	332	33		29	i	4	i	30		27	i	3	i	3		2		*	
Machinery	333	113		99		14	i	78		70		9	i	35		29		5	i
Agricultural implements	33311	15		14		1		9		8		1		6		5		1	
Semiconductor machinery	333242	14		12		2		9		8		1		5		4		1	
Engine, turbine, and power transmission equipment	3336	12		11		1		7		7		1		4		4		*	
Other machinery	other 333	73		63	i	10	i	53		47	i	6	i	20		16	i	4	i
Computer and electronic products	334	424		343		81		264		215		48		160		128	i	32	i
Communications equipment	3342	77		64		13		48		40		8		29		24		5	
Semiconductors and other electronic components	3344	156		127	i	29	i	96		79	i	17	i	61		49	i	12	i
Navigational, measuring, electromedical, and control instruments	3345	100		78		22	i	69		55		14		30		23	i	7	i
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	19		13	i	6	i	12		8	i	4	i	7		5	i	2	i
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	33		27		6		29		24		5		4		3		1	
Other measuring and controlling devices	other 3345	47		38		10		28		23		5		20		15	i	5	i

TABLE 55

Worldwide, domestic, and foreign R&D employment, by sex, industry, and company size: 2016

(Thousands)

Industry and company size	NAICS code	Worldwide						Domestic						Foreign					
		Total		Male		Female		Total		Male		Female		Total		Male		Female	
Other computer and electronic products	other 334	90		74		16		50		42		8		40		32	i	8	i
Electrical equipment, appliances, and components	335	51		42		9	i	28		23		4		23		18		5	i
Transportation equipment	336	236		196		41		168		138		30		68		58		11	
Automobiles, bodies, trailers, and parts	3361–63	135		114		21		92		78		14		43		36		7	
Aerospace products and parts	3364	85		69		16		61		49		12		24		20		4	
Aircraft, aircraft engines, and aircraft parts	336411–13	73		59		14		50		39		10		24		20		4	
Guided missiles, space vehicles, and related parts	336414–15, 336419	11		10		1		11		10		1		*		*		*	
Military armored vehicles, tanks, and tank components	336992	*		*		*		*		*		*		0		0		0	
Other transportation	other 336	17		12	i	4	i	15		11	i	4	i	2		2	i	*	i
Furniture and related products	337	5		4	i	1	i	5		3	i	1	i	*		*		*	
Miscellaneous manufacturing	339	92		65		27		70		50		20		22		15		7	
Medical equipment and supplies	3391	65		45		20		47		33		14		17		12		6	
Other miscellaneous manufacturing	3399	27	i	20	i	7	i	23	i	17	i	6	i	5	i	3	i	1	i
Nonmanufacturing industries	21–23, 42–81	878		610		268		610		433		177		268		177		91	
Mining, extraction, and support activities	21	14		11		3		12		9		3		2		2		*	
Utilities	22	3		2		1		3		2		1		*		*		*	
Wholesale trade	42	12		9	i	2	i	11		9	i	2	i	*		*	i	*	i
Electronic shopping and electronic auctions	454111–12	6	i	4	i	2	i	5	i	3	i	2	i	1	i	1	i	1	i
Transportation and warehousing	48–49	3	i	1		2	i	3	i	1		2	i	*		*		*	
Information	51	414		313		102		277		211		67		137		102		35	
Publishing	511	241		178		64		143		106		36		98		71		27	
Newspaper, periodical, book, and directory publishers	5111	1		1	i	*	i	1		1	i	*	i	*		*		*	
Software publishers	5112	240		177		63		142		106		36		98		71		27	
Telecommunications	517	25		19	i	6		24		18	i	5		1	i	1	i	*	i
Data processing, hosting, and related services	518	87		67		20		62		47		14		25		19		6	
Other information	other 51	61		49		12		49		39		10		13		11		2	
Finance and insurance	52	47		28		20		37		22		16		10		6		4	
Real estate and rental and leasing	53	3		2		*		2		2		*		*		*		*	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	*		*		*		*		*		*		*		*		*	
Other real estate and rental and leasing	other 53	2		2		*		2		2		*		*		*		*	
Professional, scientific, and technical services	54	355		224		130		240		160		80		114		64		50	
Architectural, engineering, and related services	5413	52		40	i	12	i	46		36	i	10	i	6		5		1	
Computer systems design and related services	5415	140		108		31		92		71	i	20		48		37		11	

TABLE 55

Worldwide, domestic, and foreign R&D employment, by sex, industry, and company size: 2016

(Thousands)

Industry and company size	NAICS code	Worldwide						Domestic						Foreign					
		Total		Male		Female		Total		Male		Female		Total		Male		Female	
Scientific research and development services	5417	133		57		76		79		38		40		55		19		36	
Biotechnology research and development	541711	35		13		23		21		8		13		14		4		10	
Physical, engineering, and life sciences (except biotechnology) research and development	541712	92		42		51		52		28		24		40		14		26	
Social sciences and humanities research and development	541720	6		3	i	3	i	6		3	i	3	i	*		*	i	*	i
Other professional, scientific, and technical services	other 54	30		19	i	11	i	24		15	i	10	i	6		4	i	1	i
Health care services	621–23	4		2		2	i	4		2		2	i	*		*	i	*	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	18		14	i	4	i	16		12	i	3	i	2		1		1	
All companies (number of domestic employees)	–	2,195		1,601		594		1,522		1,122		399		674		479		194	
Micro companies[a]																			
5–9	–	17		12	i	5	i	15		11	i	4	i	2		2		1	i
Small companies																			
10–19	–	40		30	i	10	i	37		28	i	9	i	3		2	i	1	i
20–49	–	82		64	i	18	i	75		59	i	16	i	7		5		2	
Medium companies																			
50–99	–	76		58	i	18	i	69		53	i	16	i	7		5		2	
100–249	–	116		91		26		101		79		22	i	15		12		3	
Large companies																			
250–499	–	94		73		21		75		58		17		18		14		4	
500–999	–	98		77		22		74		57		17		24		19		5	
1,000–4,999	–	440		321		119		278		204		73		163		117		46	
5,000–9,999	–	237		170		67		159		116		44		78		55		23	
10,000–24,999	–	373		250		124		243		169		74		130		81		50	
25,000 or more	–	621		457		164		395		289		106		226		168		58	

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 56

Worldwide R&D employment and level of education of researchers, by occupation, industry, and company size: 2016

(Thousands)

Industry and company size	NAICS code	Total		Researchers[a] Total		Researchers[a] With PhD		R&D technicians and equivalent staff		Other R&D supporting staff	
All industries	21–23, 31–33, 42–81	2,195		1,551		149		431		213	
Manufacturing industries	31–33	1,318		956		99		222		139	
Food	311	38		23	i	2	i	9		6	
Beverages and tobacco products	312	9		6		1		2		1	
Textiles, apparel, and leather products	313–16	9		5	i	1	i	4	i	1	i
Wood products	321	3		1	i	*		1		*	
Paper	322	8		6		*		1		*	
Printing and related support activities	323	4		2	i	*		1	i	*	i
Petroleum and coal products	324	2		1		*		1		*	
Chemicals	325	236		156		38		41		39	
Basic chemicals	3251	19		11		4		6		2	
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	8		5		1		2		*	
Pesticides, fertilizers, and other agricultural chemicals	3253	7	i	3	i	1	i	3	i	1	i
Pharmaceuticals and medicines	3254	161		107		28		22		32	
Soaps, cleaning compounds, and toilet preparations	3256	21		17		3		2		2	
Paints, coatings, adhesives, and other chemicals	3255, 3259	20		13		2		5		2	
Plastics and rubber products	326	37		18		4		12		7	
Nonmetallic mineral products	327	9		5	i	1		3		1	
Primary metals	331	8		3		*		2		2	
Fabricated metal products	332	33		15	i	*		9	i	9	i
Machinery	333	113		83		5		22		8	i
Agricultural implements	33311	15		11		*		3		1	
Semiconductor machinery	333242	14		12		2		1		1	
Engines, turbines, and power transmission equipment	3336	12		10		*		1		*	
Other machinery	other 333	73		50	i	3	i	16	i	7	i
Computer and electronic products	334	424		349		29	i	45		30	
Communications equipment	3342	77		62		2		10	i	5	
Semiconductors and other electronic components	3344	156		137	i	14	i	12		7	
Navigational, measuring, electromedical, and control instruments	3345	100		77		7	i	15	i	8	i
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	19		13	i	2	i	4	i	2	i
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	33		26		1		5		2	
Other measuring and controlling devices	other 3345	47		38		3	i	6	i	4	i
Other computer and electronic products	other 334	90		72		5	i	9		10	
Electrical equipment, appliances, and components	335	51		41		3		8		2	
Transportation equipment	336	236		176		9		40		20	
Automobiles, bodies, trailers, and parts	3361–63	135		106		4		20		9	
Aerospace products and parts	3364	85		60		4		17		7	
Aircraft, aircraft engines, and aircraft parts	336411–13	73		53		4		15		5	
Guided missiles, space vehicles, and related parts	336414–15, 336419	11		7		*		2		2	
Military armored vehicles, tanks, and tank components	336992	*		*		*		*		*	
Other transportation	other 336	17		10	i	*	i	3	i	3	i
Furniture and related products	337	5		3	i	*	i	2	i	1	i
Miscellaneous manufacturing	339	92		63		5		18		12	i
Medical equipment and supplies	3391	65		45		5		14		6	
Other miscellaneous manufacturing	3399	27	i	17	i	1	i	4	i	6	i

TABLE 56

Worldwide R&D employment and level of education of researchers, by occupation, industry, and company size: 2016

(Thousands)

Industry and company size	NAICS code	Total		Researchers[a] Total		Researchers[a] With PhD		R&D technicians and equivalent staff		Other R&D supporting staff	
Nonmanufacturing industries	21–23, 42–81	878		595		51		209		74	
Mining, extraction, and support activities	21	14		8		1		4		2	
Utilities	22	3		1		*		*		1	
Wholesale trade	42	12		5	i	*	i	4	i	2	i
Electronic shopping and electronic auctions	454111–12	6	i	3	i	*	i	1	i	1	i
Transportation and warehousing	48–49	3	i	2		*		*	i	1	i
Information	51	414		317		19		67		30	
Publishing	511	241		201		7		18		22	
Newspaper, periodical, book, and directory publishers	5111	1		1	i	*		*	i	*	i
Software publishers	5112	240		201		7		18		22	
Telecommunications	517	25		16		*	i	8	i	1	
Data processing, hosting, and related services	518	87		53		2		28		6	
Other information	other 51	61		47		9		14		1	
Finance and insurance	52	47		19		*		26		2	
Real estate and rental and leasing	53	3		2		*		*		*	i
Lessors of nonfinancial intangible assets (except copyrighted works)	533	*		*		*		*		*	
Other real estate and rental and leasing	other 53	2		2		*		*		*	i
Professional, scientific, and technical services	54	355		225		28	i	100		30	
Architectural, engineering, and related services	5413	52		39		7	i	9	i	3	i
Computer systems design and related services	5415	140		111		10	i	18		11	
Scientific research and development services	5417	133		55		10		65		13	
Biotechnology research and development	541711	35		23		3		11		1	
Physical, engineering, and life sciences (except biotechnology) research and development	541712	92		31		7		52		10	
Social sciences and humanities research and development	541720	6		1		*		2	i	2	i
Other professional, scientific, and technical services	other 54	30		19	i	2	i	8	i	3	i
Health care services	621–23	4		2		1	i	1		1	i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	18		11	i	*	i	4	i	3	i
All companies (number of domestic employees)	–	2,195		1,551		149		431		213	
Micro companies[b]											
5–9	–	17		12	i	2	i	4	i	1	i
Small companies											
10–19	–	40		28	i	3	i	8	i	4	i
20–49	–	82		55	i	8		18	i	9	i
Medium companies											
50–99	–	76		47	i	6	i	19	i	10	i
100–249	–	116		76		8		29		12	i
Large companies											
250–499	–	94		64		6		21		9	
500–999	–	98		68		6		22		9	
1,000–4,999	–	440		312		26	i	87		42	
5,000–9,999	–	237		175		19	i	40	i	22	i
10,000–24,999	–	373		240		30		94		40	
25,000 or more	–	621		476		36		89		55	

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

NAICS = 2012 North American Industry Classification System.

[a] Researchers include R&D scientists and engineers and their managers.
[b] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 57

Domestic R&D employment and level of education of researchers, by occupation, industry, and company size: 2016

(Thousands)

Industry and company size	NAICS code	Total		Researchers[a] Total		Researchers[a] With PhD		R&D technicians and equivalent staff		Other R&D supporting staff	
All industries	21–23, 31–33, 42–81	1,522		1,064		120		306		152	
Manufacturing industries	31–33	912		646		77		164		102	
Food	311	24		14	i	2	i	6		3	
Beverages and tobacco products	312	6		4		1		2		1	i
Textiles, apparel, and leather products	313–16	8		4	i	1	i	3	i	1	i
Wood products	321	3		1		*		1		*	i
Paper	322	6		4		*		1		*	
Printing and related support activities	323	4		2	i	*		1	i	*	i
Petroleum and coal products	324	2		1		*		1		*	
Chemicals	325	173		118		30		30		25	
Basic chemicals	3251	14		8		3		4		2	
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	5		3	i	1	i	1	i	*	
Pesticides, fertilizers, and other agricultural chemicals	3253	5	i	2	i	1	i	2	i	1	i
Pharmaceuticals and medicines	3254	123		85		22		18		20	
Soaps, cleaning compounds, and toilet preparations	3256	13		11		2		1		1	
Paints, coatings, adhesives, and other chemicals	3255, 3259	13		9		1		3		1	
Plastics and rubber products	326	29		14		3		10		6	
Nonmetallic mineral products	327	7		4		1		2		1	
Primary metals	331	7		3		*		2	i	2	
Fabricated metal products	332	30		13	i	*		9	i	8	i
Machinery	333	78		55		4		17		6	i
Agricultural implements	33311	9		6		*		2		1	
Semiconductor machinery	333242	9		8		1		1		*	
Engines, turbines, and power transmission equipment	3336	7		6		*		1		*	
Other machinery	other 333	53		35	i	2	i	13	i	5	i
Computer and electronic products	334	264		215		23	i	31		18	
Communications equipment	3342	48		37		2		7	i	3	
Semiconductors and other electronic components	3344	96		82	i	12	i	9		5	
Navigational, measuring, electromedical, and control instruments	3345	69		54		5	i	10		5	
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	12		9	i	1	i	2	i	1	i
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	29		23		1		4		2	
Other measuring and controlling devices	other 3345	28		21		3	i	4		3	i
Other computer and electronic products	other 334	50		41		4	i	4		5	
Electrical equipment, appliances, and components	335	28		20		2	i	6		2	
Transportation equipment	336	168		122		7		28		17	
Automobiles, bodies, trailers, and parts	3361–63	92		72		3		13		7	
Aerospace products and parts	3364	61		42		4		12		7	
Aircraft, aircraft engines, and aircraft parts	336411–13	50		35		3		10		5	
Guided missiles, space vehicles, and related parts	336414–15, 336419	11		7		*		2		2	
Military armored vehicles, tanks, and tank components	336992	*		*		*		*		*	
Other transportation	other 336	15		9	i	*	i	3	i	3	i
Furniture and related products	337	5		2	i	*	i	1	i	1	i
Miscellaneous manufacturing	339	70		47		4		13		10	i
Medical equipment and supplies	3391	47		34		3		9		4	
Other miscellaneous manufacturing	3399	23	i	14	i	*	i	4	i	5	i

TABLE 57

Domestic R&D employment and level of education of researchers, by occupation, industry, and company size: 2016

(Thousands)

Industry and company size	NAICS code	Total		Researchers[a]				R&D technicians and equivalent staff		Other R&D supporting staff	
				Total		With PhD					
Nonmanufacturing industries	21–23, 42–81	610		418		42		142		51	
Mining, extraction, and support activities	21	12		6		1		4		2	
Utilities	22	3		1		*		*		1	
Wholesale trade	42	11		5	i	*	i	4	i	2	i
Electronic shopping and electronic auctions	454111–12	5	i	3	i	*	i	1	i	1	i
Transportation and warehousing	48–49	3	i	2		*		*	i	1	i
Information	51	277		213		15		46		18	
Publishing	511	143		120		5		11		12	
Newspaper, periodical, book, and directory publishers	5111	1		1	i	*		*	i	*	i
Software publishers	5112	142		120		5		11		11	
Telecommunications	517	24		16		*	i	8	i	1	
Data processing, hosting, and related services	518	62		40		2	i	17		5	
Other information	other 51	49		38		8		10		1	
Finance and insurance	52	37		12		*		23		2	
Real estate and rental and leasing	53	2		2		*		*		*	i
Lessors of nonfinancial intangible assets (except copyrighted works)	533	*		*		*		*		*	
Other real estate and rental and leasing	other 53	2		2		*		*		*	i
Professional, scientific, and technical services	54	240		162		24	i	58	i	20	i
Architectural, engineering, and related services	5413	46		34	i	6	i	9	i	3	i
Computer systems design and related services	5415	92		71	i	8	i	14		6	i
Scientific research and development services	5417	79		42		9		28	i	9	i
Biotechnology research and development	541711	21		15		2		6		1	
Physical, engineering, and life sciences (except biotechnology) research and development	541712	52		26		6		20	i	6	
Social sciences and humanities research and development	541720	6		1		*		2	i	2	i
Other professional, scientific, and technical services	other 54	24		15	i	2	i	7	i	3	
Health care services	621–23	4		2		1	i	1		1	i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	16		10	i	*	i	3	i	2	i
All companies (number of domestic employees)	–	1,522		1,064		120		306		152	
Micro companies[b]											
5–9	–	15		11	i	2	i	3	i	1	i
Small companies											
10–19	–	37		25	i	3	i	8	i	4	i
20–49	–	75		50	i	7		17	i	9	i
Medium companies											
50–99	–	69		43	i	6		18	i	9	i
100–249	–	101		65		8		25		11	i
Large companies											
250–499	–	75		49		5		18		8	
500–999	–	74		50		5	i	17		7	
1,000–4,999	–	278		192		20	i	55		31	
5,000–9,999	–	159		119		14	i	25	i	15	i
10,000–24,999	–	243		165		23		53		24	
25,000 or more	–	395		295		27		67		33	

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

NAICS = 2012 North American Industry Classification System.

[a] Researchers include R&D scientists and engineers and their managers.
[b] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 58

Foreign R&D employment and level of education of researchers, by occupation, industry, and company size: 2016

(Thousands)

Industry and company size	NAICS code	Total		Researchers[a] Total		Researchers[a] With PhD		R&D technicians and equivalent staff		Other R&D supporting staff	
All industries	21–23, 31–33, 42–81	674		488		30		126		61	
Manufacturing industries	31–33	406		310		21		58		38	
Food	311	14		9	i	*	i	3		2	i
Beverages and tobacco products	312	3		2		*		*		*	
Textiles, apparel, and leather products	313–16	1		*	i	*	i	*	i	*	i
Wood products	321	*		*		*		*		*	
Paper	322	2		2		*		*		*	
Printing and related support activities	323	*		*	i	0		*	i	*	i
Petroleum and coal products	324	*		*		*	i	*		*	
Chemicals	325	63		38		8		11		14	
Basic chemicals	3251	5		2		1		2		1	
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	3		2		*		1		*	
Pesticides, fertilizers, and other agricultural chemicals	3253	2	i	1	i	*	i	1	i	*	i
Pharmaceuticals and medicines	3254	39		22		6		5		12	
Soaps, cleaning compounds, and toilet preparations	3256	7		6		1		1		1	
Paints, coatings, adhesives, and other chemicals	3255, 3259	7		4		*		2		1	
Plastics and rubber products	326	8		4		1		2		1	
Nonmetallic mineral products	327	1		1	i	*	i	1		*	
Primary metals	331	1		*		*		*		*	
Fabricated metal products	332	3		2		*		*		1	
Machinery	333	35		28		1	i	5	i	2	i
Agricultural implements	33311	6		5		*		1		*	
Semiconductor machinery	333242	5		4		*		*		*	
Engines, turbines, and power transmission equipment	3336	4		4		*		*		*	
Other machinery	other 333	20		15	i	1	i	3	i	1	i
Computer and electronic products	334	160		134		6	i	15	i	11	
Communications equipment	3342	29		25		*		3		2	
Semiconductors and other electronic components	3344	61		55	i	2	i	3	i	2	
Navigational, measuring, electromedical, and control instruments	3345	30		24		2	i	4	i	3	i
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	7		4	i	1	i	2	i	1	i
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	4		3		*		*		*	
Other measuring and controlling devices	other 3345	20		16		1	i	2	i	1	i
Other computer and electronic products	other 334	40		31	i	2	i	5		5	
Electrical equipment, appliances, and components	335	23		21	i	1		2		*	
Transportation equipment	336	68		54		2		12		2	
Automobiles, bodies, trailers, and parts	3361–63	43		34		1	i	7		2	
Aerospace products and parts	3364	24		18		1		5		*	
Aircraft, aircraft engines, and aircraft parts	336411–13	24		18		1		5		*	
Guided missiles, space vehicles, and related parts	336414–15, 336419	*		*		0		*		*	
Military armored vehicles, tanks, and tank components	336992	0		0		0		0		0	
Other transportation	other 336	2		1	i	*		*	i	*	
Furniture and related products	337	*		*		*		*		*	
Miscellaneous manufacturing	339	22		15		1		5		2	
Medical equipment and supplies	3391	17		12		1		5		1	
Other miscellaneous manufacturing	3399	5	i	3	i	*	i	1		1	
Nonmanufacturing industries	21–23, 42–81	268		177		8		67		23	
Mining, extraction, and support activities	21	2		2		*		*		*	

TABLE 58

Foreign R&D employment and level of education of researchers, by occupation, industry, and company size: 2016

(Thousands)

Industry and company size	NAICS code	Total		Researchers[a] Total		Researchers[a] With PhD		R&D technicians and equivalent staff		Other R&D supporting staff	
Utilities	22	*		*		*		*		*	
Wholesale trade	42	*		*	i	*	i	*	i	*	i
Electronic shopping and electronic auctions	454111–12	1	i	*	i	*	i	*	i	1	i
Transportation and warehousing	48–49	*		0		0		*		0	
Information	51	137		104		4		21		12	
Publishing	511	98		81		2		7		10	
Newspaper, periodical, book, and directory publishers	5111	*		*	i	0		*		*	
Software publishers	5112	98		81		2		7		10	
Telecommunications	517	1	i	*	i	*	i	1	i	*	i
Data processing, hosting, and related services	518	25		13		1		11		1	
Other information	other 51	13		9		2		3		*	i
Finance and insurance	52	10		7		*		3		*	i
Real estate and rental and leasing	53	*		*		*		*		0	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	*		*		*		0		0	
Other real estate and rental and leasing	other 53	*		*		*		*		0	
Professional, scientific, and technical services	54	114		64		4		42		9	
Architectural, engineering, and related services	5413	6		6		1		*		*	
Computer systems design and related services	5415	48		40		2		3		5	
Scientific research and development services	5417	55		14		1		37		4	
Biotechnology research and development	541711	14		8		1		5		*	
Physical, engineering, and life sciences (except biotechnology) research and development	541712	40		5	i	1	i	31		4	
Social sciences and humanities research and development	541720	*		*	i	0		*	i	*	i
Other professional, scientific, and technical services	other 54	6		4	i	*	i	1	i	*	i
Health care services	621–23	*		*		*		*		*	i
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	2		1		*		1		1	
All companies (number of domestic employees)	–	674		488		30		126		61	
Micro companies[b]											
5–9	–	2		1	i	*		2		*	i
Small companies											
10–19	–	3		2	i	*		*	i	*	i
20–49	–	7		5		1		1	i	*	i
Medium companies											
50–99	–	7		5		*	i	1	i	1	
100–249	–	15		11		*		3		1	
Large companies											
250–499	–	18		14		1		3		1	
500–999	–	24		17		1		5		2	
1,000–4,999	–	163		120		7	i	32		11	
5,000–9,999	–	78		56		5	i	15	i	7	
10,000–24,999	–	130		74		7		41		15	
25,000 or more	–	226		182		8		23		22	

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

NAICS = 2012 North American Industry Classification System.

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

[b] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 59

Domestic full-time equivalent R&D employees and R&D scientists and engineers, by work status, industry, and company size: 2016

(Thousands)

Industry and company size	NAICS code	FTE R&D employees[a]								FTE R&D scientists and engineers[b]							
		Total		Full-time R&D employees		Full-time employees working on R&D part-time		Part-time employees working on R&D		Total		Full-time R&D employees		Full-time employees working on R&D part-time		Part-time employees working on R&D	
All industries	21–23, 31–33, 42–81	1,393		1,226		152		15		973		879		85	i	9	
Manufacturing industries	31–33	833		738		86		9		593		541		47		5	
Food	311	21		20	i	1		*		10		9		*		*	i
Beverages and tobacco products	312	4		4		*		*		3		3		*		*	
Textiles, apparel, and leather products	313–16	8		5	i	2	i	*	i	4	i	3	i	1	i	*	
Wood products	321	2		1		*		*		1		1		*		*	
Paper	322	5		4		1		*		4		3		1	i	*	
Printing and related support activities	323	2		2	i	*	i	*		1	i	1	i	*	i	*	i
Petroleum and coal products	324	2		2		*		*		1		1		*		*	
Chemicals	325	169		160		8		1		115		111		4		1	
Basic chemicals	3251	14		13		1		*		8		7		*		*	i
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	4		4		*		*		3		3		*		*	
Pesticides, fertilizers, and other agricultural chemicals	3253	5	i	4	i	1	i	*		2	i	2		*	i	*	
Pharmaceuticals and medicines	3254	122		115		6		1		83		80		3		*	
Soaps, cleaning compounds, and toilet preparations	3256	13		13		*		*		11		11		*	i	*	
Paints, coatings, adhesives, and other chemicals	3255, 3259	12		12		*		*		8		7		*	i	*	
Plastics and rubber products	326	25		20		5		*		12		10		2	i	*	
Nonmetallic mineral products	327	6		5	i	1		*	i	3		2		*	i	*	
Primary metals	331	5		2		3		*		2		1		1	i	*	
Fabricated metal products	332	23		13	i	9	i	*		11	i	7	i	3	i	*	
Machinery	333	67		55	i	12		*		48	i	41	i	7		*	
Agricultural implements	33311	8		8		*		*		6		6		*		*	
Semiconductor machinery	333242	9	i	8	i	*		*	i	8	i	7	i	*	i	*	i
Engines, turbines, and power transmission equipment	3336	7		4		3		*		6		3		3		*	
Other machinery	other 333	43		35	i	8	i	*	i	29	i	24	i	5	i	*	i
Computer and electronic products	334	250		229		18		4		204		187		14		3	
Communications equipment	3342	45		41		4	i	*		35		32		3	i	*	
Semiconductors and other electronic components	3344	92		87	i	3	i	3		79	i	75	i	2	i	2	
Navigational, measuring, electromedical, and control instruments	3345	65		54		11		1		51		41		9		*	
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	12	i	11	i	*	i	*	i	9	i	8	i	*	i	*	i

TABLE 59

Domestic full-time equivalent R&D employees and R&D scientists and engineers, by work status, industry, and company size: 2016

(Thousands)

Industry and company size	NAICS code	FTE R&D employees[a]								FTE R&D scientists and engineers[b]							
		Total		Full-time R&D employees		Full-time employees working on R&D part-time		Part-time employees working on R&D		Total		Full-time R&D employees		Full-time employees working on R&D part-time		Part-time employees working on R&D	
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	28		18		10		*		22		14		8		*	
Other measuring and controlling devices	other 3345	26		25		1		*		20		19		1	i	*	
Other computer and electronic products	other 334	47		47		*		*		40		39		*	i	*	i
Electrical equipment, appliances, and components	335	26		24		2		*		19		18		1	i	*	
Transportation equipment	336	152		134		16		1		110		101		8		1	
Automobiles, bodies, trailers, and parts	3361–63	88		80		7		1		69		65		4	i	*	
Aerospace products and parts	3364	51		43		8		1		34		30		4		*	
Aircraft, aircraft engines, and aircraft parts	336411–13	44		36		8		1		29		24		4		*	
Guided missiles, space vehicles, and related parts	336414–15, 336419	7		7		*		*		5		5		*		*	
Military armored vehicles, tanks, and tank components	336992	*		*		*		*		*		*		*		*	
Other transportation	other 336	13		11	i	2	i	*		7	i	7	i	1	i	*	i
Furniture and related products	337	3		2	i	1	i	*		2	i	1	i	*	i	*	
Miscellaneous manufacturing	339	63		57		6	i	*		44		40		3	i	*	
Medical equipment and supplies	3391	44		41		3		*		32		30		2		*	
Other miscellaneous manufacturing	3399	19	i	16	i	3	i	*	i	12	i	10	i	2	i	*	i
Nonmanufacturing industries	21–23, 42–81	560		487		66		7		380		338		38	i	3	
Mining, extraction, and support activities	21	11		11		*		*		6		5		*		*	
Utilities	22	2		1		1		*		1		*		*		*	i
Wholesale trade	42	9		6	i	3	i	*	i	4	i	3	i	1	i	*	i
Electronic shopping and electronic auctions	454111–12	5	i	1	i	4	i	0		3	i	1	i	2	i	0	
Transportation and warehousing	48–49	3	i	2	i	*	i	0		1		1		*	i	0	
Information	51	267		243		22		2		205		192		12	i	1	
Publishing	511	137		133		3		1		115		113		2	i	*	
Newspaper, periodical, book, and directory publishers	5111	1		1	i	0		0		*	i	*	i	0		0	
Software publishers	5112	136		132		3		1		115		112		2	i	*	
Telecommunications	517	23		11		12		*		15	i	9		6	i	0	
Data processing, hosting, and related services	518	58		51		6	i	*		37	i	33		4	i	*	
Other information	other 51	48		48		*		*		38		37		*		*	
Finance and insurance	52	30	i	26	i	4		*	i	12	i	11	i	1	i	*	

TABLE 59

Domestic full-time equivalent R&D employees and R&D scientists and engineers, by work status, industry, and company size: 2016

(Thousands)

Industry and company size	NAICS code	FTE R&D employees[a]								FTE R&D scientists and engineers[b]							
		Total		Full-time R&D employees		Full-time employees working on R&D part-time		Part-time employees working on R&D		Total		Full-time R&D employees		Full-time employees working on R&D part-time		Part-time employees working on R&D	
Real estate and rental and leasing	53	2		2		*	i	*		2		2		*	i	*	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	*		*		0		0		*		*		0		0	
Other real estate and rental and leasing	other 53	2		2		*	i	*		2		2		*	i	*	
Professional, scientific, and technical services	54	215		183		28		5		138		117		19	i	2	
Architectural, engineering, and related services	5413	37		19	i	17	i	1	i	27	i	14	i	12	i	1	
Computer systems design and related services	5415	85		79		5		1		66	i	62	i	3	i	1	
Scientific research and development services	5417	71		66		3		2		31		28		2		1	
Biotechnology research and development	541711	20		20		1		*		8		7		*		*	
Physical, engineering, and life sciences (except biotechnology) research and development	541712	46		43		2		1		22		20		2		*	
Social sciences and humanities research and development	541720	5	i	3	i	*	i	1	i	1		1		*		*	
Other professional, scientific, and technical services	other 54	23		20	i	3		*		14	i	13	i	1		*	
Health care services	621–23	4		3	i	*		*	i	2	i	1	i	*	i	*	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	12		8	i	3	i	*	i	6	i	4	i	2	i	*	i
All companies (number of domestic employees)	–	1,393		1,226		152		15		973		879		85	i	9	
Micro companies[c]																	
5–9	–	12		11	i	1	i	*		9	i	9	i	1	i	*	
Small companies																	
10–19	–	32		28	i	4	i	*		22	i	20	i	2	i	*	i
20–49	–	64		53	i	10	i	1		43	i	37	i	5	i	*	
Medium companies																	
50–99	–	58		44	i	13	i	1		37	i	30	i	6	i	*	
100–249	–	84		67		16		1		56	i	47	i	8	i	*	i
Large companies																	
250–499	–	65		53		12		1		44		37		6		*	
500–999	–	66		57		9		1		46		42		4	i	*	i
1,000–4,999	–	251		226		22		3		174		160		12		1	
5,000–9,999	–	150		133		16	i	1	i	112	i	101	i	10		1	i
10,000–24,999	–	234		219		12	i	4		152		144		6	i	3	

TABLE 59

Domestic full-time equivalent R&D employees and R&D scientists and engineers, by work status, industry, and company size: 2016

(Thousands)

Industry and company size	NAICS code	FTE R&D employees[a]				FTE R&D scientists and engineers[b]			
		Total	Full-time R&D employees	Full-time employees working on R&D part-time	Part-time employees working on R&D	Total	Full-time R&D employees	Full-time employees working on R&D part-time	Part-time employees working on R&D
25,000 or more	–	376	335	38	4	278	252	24	3

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

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

[a] Includes scientists and engineers and their managers as well as technicians, technologists, and support staff.
[b] Includes scientists and engineers and their managers.
[c] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 60

U.S. patent applications and patents issued to companies located in the United States that performed or funded R&D, by industry and company size: 2016

(Number)

Industry and company size	NAICS code	Applications								Patents issued[c]	
		Total		Nonprovisional utility patents							
				Total		To foreign jurisdictions[a]		From within organized R&D activity[b]			
All industries	21–23, 31–33, 42–81	135,702		101,428		47,920		75,310		92,099	
Manufacturing industries	31–33	93,554		66,084		38,336		53,281		62,291	
Food	311	1,281		716		355		D		877	
Beverages and tobacco products	312	565		430		351		401		250	
Textiles, apparel, and leather products	313–16	326		188		124		161		115	
Wood products	321	68		42		D		D		35	
Paper	322	425		177		149		160		270	
Printing and related support activities	323	172		134		77		128		107	
Petroleum and coal products	324	1,085		121		D		121		103	
Chemicals	325	15,060		8,746		6,205		7,732		8,563	
Basic chemicals	3251	1,141		647		483		618		740	
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	313		132		D		D		152	
Pesticides, fertilizers, and other agricultural chemicals	3253	1,051	i	829	i	D		D		762	i
Pharmaceuticals and medicines	3254	9,479		5,111		4,017		4,523		5,154	
Soaps, cleaning compounds, and toilet preparations	3256	1,875		1,168		674		D		999	
Paints, coatings, adhesives, and other chemicals	3255, 3259	1,201		860		524		820		756	
Plastics and rubber products	326	3,683		2,399		1,644		2,026		1,391	
Nonmetallic mineral products	327	1,383	i	1,154	i	829	i	1,083	i	601	i
Primary metals	331	361		209		122		142		152	
Fabricated metal products	332	1,571		487		270		433		559	
Machinery	333	6,557		4,610		2,672		4,090		3,968	
Agricultural implements	33311	622		D		D		D		397	
Semiconductor machinery	333242	1,859		1,233		652		D		1,076	
Engines, turbines, and power transmission equipment	3336	1,348		D		D		D		848	
Other machinery	other 333	2,728		1,740		1,263		1,500		1,646	
Computer and electronic products	334	34,817		26,766		10,938		21,331		28,251	
Communications equipment	3342	4,898		3,634		1,629		3,269		3,921	
Semiconductors and other electronic components	3344	16,766		13,196		5,250		9,020		13,965	
Navigational, measuring, electromedical, and control instruments	3345	4,876		3,915		2,499		3,213		3,715	
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	420		336		156		312		475	
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	2,402		2,128	i	1,282	i	1,914	i	1,756	
Other measuring and controlling devices	other 3345	2,054		1,451		1,061		987		1,483	
Other computer and electronic products	other 334	8,277		6,022		1,559		5,829		6,650	
Electrical equipment, appliances, and components	335	4,047		2,677		1,699		2,526		2,395	
Transportation equipment	336	14,090		12,123		9,594		7,842		9,452	
Automobiles, bodies, trailers, and parts	3361–63	6,522		5,448		4,613		D		4,335	
Aerospace products and parts	3364	7,132		6,372		4,820		3,893		4,920	
Aircraft, aircraft engines, and aircraft parts	336411–13	7,071		6,333		4,797		D		4,872	
Guided missiles, space vehicles, and related parts	336414–15, 336419	61		39		23		D		48	
Military armored vehicles, tanks, and tank components	336992	0		0		0		0		D	

TABLE 60

U.S. patent applications and patents issued to companies located in the United States that performed or funded R&D, by industry and company size: 2016

(Number)

Industry and company size	NAICS code	Applications				Patents issued[c]
		Total	Nonprovisional utility patents			
			Total	To foreign jurisdictions[a]	From within organized R&D activity[b]	
Other transportation	other 336	436	303	161	D	D
Furniture and related products	337	295	171	78	D	168
Miscellaneous manufacturing	339	7,768	4,933	3,117	4,606	5,035
Medical equipment and supplies	3391	6,480	4,354	2,931	4,065	4,435
Other miscellaneous manufacturing	3399	1,288	579	186	541	600
Nonmanufacturing industries	21–23, 42–81	42,148	35,344	9,584	22,029	29,808
Mining, extraction, and support activities	21	3,126	2,483	2,071	2,425	2,469
Utilities	22	D	D	7	D	18
Wholesale trade	42	93	D	9	24	30
Electronic shopping and electronic auctions	454111–12	D	D	D	D	D
Transportation and warehousing	48–49	D	D	D	D	D
Information	51	18,108	14,179	5,307	10,161	13,880
Publishing	511	8,123	6,327	2,664	5,089	5,619
Newspaper, periodical, book, and directory publishers	5111	D	0	0	0	0
Software publishers	5112	D	6,327	2,664	5,089	5,619
Telecommunications	517	2,301	1,444	100	1,038	2,776
Data processing, hosting, and related services	518	2,573	2,083	477	1,280	1,549
Other information	other 51	5,111	4,325	2,066	2,754	3,936
Finance and insurance	52	2,066	1,554	56	D	525
Real estate and rental and leasing	53	D	87	D	D	D
Lessors of nonfinancial intangible assets (except copyrighted works)	533	D	D	0	D	D
Other real estate and rental and leasing	other 53	D	D	D	D	D
Professional, scientific, and technical services	54	15,975	14,488	1,813	D	10,842
Architectural, engineering, and related services	5413	448	266	157	D	215
Computer systems design and related services	5415	12,785	12,605	D	D	9,364
Scientific research and development services	5417	2,274	1,324	713	D	943
Biotechnology research and development	541711	D	198	D	D	D
Physical, engineering, and life sciences (except biotechnology) research and development	541712	1,863	1,120	551	D	838
Social sciences and humanities research and development	541720	D	6	D	D	D
Other professional, scientific, and technical services	other 54	468	293	D	286	319
Health care services	621–23	218	173	109	D	100
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	D	D	32	59	D
All companies (number of domestic employees)	–	135,702	101,428	47,920	75,310	92,099
Micro companies[d]						
5–9	–	420	217	131	197	190
Small companies						
10–19	–	1,074	500	333	449	535
20–49	–	2,701	1,580	1,057	1,402	1,109
Medium companies						

TABLE 60

U.S. patent applications and patents issued to companies located in the United States that performed or funded R&D, by industry and company size: 2016

(Number)

Industry and company size	NAICS code	Applications				Patents issued[c]
		Total	Nonprovisional utility patents			
			Total	To foreign jurisdictions[a]	From within organized R&D activity[b]	
50–99	–	2,608	1,541	888	1,405	1,278
100–249	–	4,583	2,394	1,373	2,096	2,182
Large companies						
250–499	–	4,314	2,650	1,064	2,299	2,871
500–999	–	5,276	3,241	1,816	2,794	3,083
1,000–4,999	–	19,066	12,729	6,405	10,783	12,552
5,000–9,999	–	14,171	10,938	4,792	7,685	9,624
10,000–24,999	–	27,267	19,910	12,784	19,055	16,754
25,000 or more	–	54,222	45,728	17,276	27,146	41,921

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

NAICS = 2012 North American Industry Classification System.

[a] Also includes patent applications that company planned to apply for in foreign jurisdictions.
[b] Includes patent applications in which the named inventor(s) were R&D employees.
[c] For a small number of companies issued more than 100 patents by the U.S. Patent and Trademark Office (USPTO), counts from USPTO.gov were used to supplement survey data.
[d] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

Detail may not add to total because of rounding. Industry is classification based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded R&D. Statistics are based on companies in the United States that reported to the survey. These statistics do not include an adjustment to the weight to account for unit nonresponse.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 61

Total patent licensing revenue of companies located in the United States that performed or funded R&D, by industry and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Revenue[a]	
All industries	21–23, 31–33, 42–81	18,145	
Manufacturing industries	31–33	15,956	
Food	311	103	
Beverages and tobacco products	312	1	
Textiles, apparel, and leather products	313–16	7	
Wood products	321	*	
Paper	322	7	
Printing and related support activities	323	0	
Petroleum and coal products	324	60	
Chemicals	325	5,452	
Basic chemicals	3251	79	
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	16	
Pesticides, fertilizers, and other agricultural chemicals	3253	3	
Pharmaceuticals and medicines	3254	5,334	
Soaps, cleaning compounds, and toilet preparations	3256	5	
Paints, coating, adhesives, and other chemicals	3255, 3259	16	
Plastics and rubber products	326	484	
Nonmetallic mineral products	327	39	
Primary metals	331	23	
Fabricated metal products	332	9	
Machinery	333	341	
Agricultural implements	33311	D	
Semiconductor machinery	333242	D	
Engines, turbines, and power transmission equipment	3336	2	
Other machinery	other 333	289	
Computer and electronic products	334	7,853	
Communications equipment	3342	705	
Semiconductors and other electronic components	3344	6,801	
Navigational, measuring, electromedical, and control instruments	3345	223	
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	1	
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	2	
Other measuring and controlling devices	other 3345	220	
Other computer and electronic products	other 334	124	
Electrical equipment, appliances, and components	335	411	
Transportation equipment	336	659	i
Automobiles, bodies, trailers, and parts	3361–63	643	i
Aerospace products and parts	3364	14	
Aircraft, aircraft engines, and aircraft parts	336411–13	11	
Guided missiles, space vehicles, and related parts	336414–15, 336419	3	
Military armored vehicles, tanks, and tank components	336992	0	
Other transportation	other 336	2	
Furniture and related products	337	24	
Miscellaneous manufacturing	339	481	
Medical equipment and supplies	3391	409	
Other miscellaneous manufacturing	3399	73	
Nonmanufacturing industries	21–23, 42–81	2,189	
Mining, extraction, and support activities	21	331	
Utilities	22	0	
Wholesale trade	42	14	
Electronic shopping and electronic auctions	454111–12	0	

TABLE 61

Total patent licensing revenue of companies located in the United States that performed or funded R&D, by industry and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Revenue[a]
Transportation and warehousing	48–49	0
Information	51	1,094
Publishing	511	123
Newspaper, periodical, book, and directory publishers	5111	0
Software publishers	5112	123
Telecommunications	517	51
Data processing, hosting, and related services	518	450
Other information	other 51	470
Finance and insurance	52	467
Real estate and rental and leasing	53	0
Lessors of nonfinancial intangible assets (except copyrighted works)	533	0
Other real estate and rental and leasing	other 53	0
Professional, scientific, and technical services	54	283
Architectural, engineering, and related services	5413	10
Computer systems design and related services	5415	129
Scientific research and development services	5417	89
Biotechnology research and development	541711	26
Physical, engineering, and life sciences (except biotechnology) research and development	541712	62
Social sciences and humanities research and development	541720	*
Other professional, scientific, and technical services	other 54	56
Health care services	621–23	*
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	0
All companies (number of domestic employees)	–	18,145
Micro companies[b]		
5–9	–	37
Small companies		
10–19	–	72
20–49	–	186
Medium companies		
50–99	–	214
100–249	–	467
Large companies		
250–499	–	1,180
500–999	–	559
1,000–4,999	–	2,443
5,000–9,999	–	1,541
10,000–24,999	–	8,740
25,000 or more	–	2,704

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

NAICS = 2012 North American Industry Classification System.

[a] Amounts received from all patent licensing activities during 2016.
[b] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

Statistics are representative of companies in the United States that were eligible to receive Form BRDI-1 and performed or funded R&D. Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 62

Companies located in the United States that performed or funded R&D and engaged in intellectual property transfer activities, by type of activity and industrial sector: 2016

(Number)

Type of intellectual property (IP) transfer activity	Industrial sector		
	All	Manufacturing	Nonmanufacturing
Transferred IP to others not owned by your company through participation in technical assistance or "know how" agreements	480	310	170
Received IP from others not owned by your company through participation in technical assistance or "know how" agreements	857	417	440
Transferred IP to a spin-off or spin-out of your company	148	85	63
Received IP form a parent company as part of a spin-off or spin-out	40	35	5
Acquired more than 50% ownership in another company for the primary purpose of acquiring its IP	407	89	318
Acquired any financial interest in another company in order to gain access to its IP	132	86	46
Participated in cross-licensing agreements—the agreements in which two or more parties grant a license to each other for the use of the subject matter claimed in one or more of the patents owned by each party	419	299	120
Allowed free use of patents or other IP owned by your company (e.g., allowing free use of software patents by the open-source community)	595	137	458
Made use of open-source patents or other freely available IP not owned by your company	1,349	432	917

Note(s)

Statistics are based on companies in the United States that were eligible to receive Form BRDI-1 and reported to the survey, regardless of whether they performed or funded R&D. Industrial sector based on dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 63

R&D costs paid for by the company and others projected for 2017, by industry and company size: 2016

(Millions of U.S. dollars)

Industry and company size	NAICS code	Projected worldwide R&D cost		Projected domestic R&D cost								Projected foreign R&D cost paid for by the company
				Paid for by the company			Paid for by others					
		Paid for by the company	Paid for by others	Total	Purchased and collaborative R&D	R&D performed by the company	Total	U.S. government	Non-U.S. government sources			
All industries	21–23, 31–33, 42–81	455,995	77,612	372,897	34,846	338,051	61,937	25,411	36,525		83,098	
Manufacturing industries	31–33	315,357	49,465	252,899	31,230	221,669	42,604	20,397	22,206		62,458	
Food	311	5,947	243	4,712	177	4,536	240	2	238		1,235	
Beverages and tobacco products	312	1,979	D	1,200	171	1,029	D	0	D		780	
Textiles, apparel, and leather products	313–16	1,270 i	8	1,179 i	12 i	1,167 i	8	5	3		91	
Wood products	321	205	10 i	185	11	175	9 i	* i	9 i		20	
Paper	322	922	D	837	2 i	835	D	D	D		86	
Printing and related support activities	323	203 i	D	199 i	2	198 i	D	D	D		4	
Petroleum and coal products	324	503	14	432	57	375	14	0	14		71	
Chemicals	325	112,892	16,152	93,292	24,352	68,940	11,833	290	11,543		19,600	
Basic chemicals	3251	2,887	219	2,282	130 i	2,152	216	14 i	203		605	
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	1,117	D	743	11	731	D	1 i	D		374	
Pesticides, fertilizers, and other agricultural chemicals	3253	1,500 i	D	1,066 i	31	1,035 i	D	2	D		434	i
Pharmaceuticals and medicines	3254	101,485	15,371	84,625	23,792	60,833 i	11,098	259	10,839		16,860	
Soaps, cleaning compounds, and toilet preparations	3256	3,950	180	2,998	345	2,653	145	0	145		952	
Paints, coatings, adhesives, and other chemicals	3255, 3259	1,953	31	1,577	42	1,536	26 i	15 i	10		376	
Plastics and rubber products	326	4,788	197 i	3,873	148	3,725	192 i	3 i	189 i		915	
Nonmetallic mineral products	327	1,987	18	1,773	62	1,711	17	6	11		213	
Primary metals	331	620	8	553	26 i	527	8	6	2 i		67	
Fabricated metal products	332	2,479	178 i	2,224	79	2,145	130 i	17	113 i		255	
Machinery	333	15,992	955	12,588	447	12,141	922	188	734		3,405	i
Agricultural implements	33311	2,518 i	14	1,781 i	165	1,616 i	13	D	D		737	i
Semiconductor machinery	333242	3,820	426	3,043	7	3,036	419	* i	419		777	
Engines, turbines, and power transmission equipment	3336	2,216	78 i	1,881	8	1,874	78 i	D	D		335	
Other machinery	other 333	7,438	437	5,882	267	5,615 i	413	125	288 i		1,556	

TABLE 63

R&D costs paid for by the company and others projected for 2017, by industry and company size: 2016

(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					
Computer and electronic products	334	98,650	i 9,147	76,492	1,481	i 75,010		8,716	4,100	4,616		22,158	i
Communications equipment	3342	15,128	1,829	i 11,758	360	11,398		1,790	i 794	i 996	i	3,370	
Semiconductors and other electronic components	3344	43,293	i 2,309	31,948	i 391	31,557	i	2,257	252	2,005		11,346	i
Navigational, measuring, electromedical, and control instruments	3345	13,024	4,886	10,091	209	9,882		4,549	3,026	1,523		2,933	i
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	3,016	i 180	2,250	i 57	2,193	i	179	1	i 179		766	i
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	3,515	4,507	2,989	45	2,944		4,190	2,973	1,217		526	
Other measuring and controlling devices	other 3345	6,494	i 199	4,852	i 107	i 4,744	i	179	52	127		1,642	i
Other computer and electronic products	other 334	27,204	123	22,695	522	i 22,174		120	29	92		4,509	
Electrical equipment, appliances, and components	335	5,971	503	i 4,449	97	4,352		488	i 47	i 441	i	1,522	
Transportation equipment	336	42,165	21,600	33,306	3,035	i 30,270		19,642	15,674	3,968		8,859	
Automobiles, bodies, trailers, and parts	3361–63	28,379	3,480	21,288	1,815	i 19,473		2,852	D	D		7,090	
Aerospace products and parts	3364	12,319	16,875	10,678	1,153	i 9,525		15,545	14,120	1,425		1,642	
Aircraft, aircraft engines, and aircraft parts	336411–13	11,907	15,810	10,268	1,046	i 9,222		14,485	13,069	1,416		1,639	
Guided missiles, space vehicles, and related parts	336414–15, 336419	412	1,064	i 410	106	303		1,060	i 1,051	i 9	i	2	
Military armored vehicles, tanks, and tank components	336992	3	D	3	0	3		D	D	D		0	
Other transportation	other 336	1,464	D	1,337	68	1,269		D	D	D		127	
Furniture and related products	337	394	*	i 352	12	i 340		*	i *	i 0		42	
Miscellaneous manufacturing	339	18,390	329	15,253	1,060	14,193		280	58	223	i	3,136	i
Medical equipment and supplies	3391	15,339	283	12,626	951	11,675		241	48	192	i	2,712	i

TABLE 63

R&D costs paid for by the company and others projected for 2017, by industry and company size: 2016

(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			
Other miscellaneous manufacturing	3399	3,051	i 46	2,627	i	109	i	2,518	i	40	i	9	i	30	i	424	i
Nonmanufacturing industries	21–23, 42–81	140,638	i 28,147	119,998	i	3,616		116,382	i	19,333		5,014		14,319		20,641	i
Mining, extraction, and support activities	21	4,435	563	4,199		62		4,137		394		2		391		236	
Utilities	22	509	40	502		180		322		39		D		D		7	
Wholesale trade	42	580	i 12	i D		58	i	D		10	i	0		10	i	D	
Electronic shopping and electronic auctions	454111–12	2,390	i 0	D		15	i	D		0		0		0		D	
Transportation and warehousing	48–49	597	i 3	i 589	i	22		568	i	3	i	3	i	0		8	
Information	51	91,921	i 880	76,894	i	1,924		74,970	i	812		38		774		15,027	
Publishing	511	44,396	547	34,801		1,113		33,687		496		15		482		9,596	
Newspaper, periodical, book, and directory publishers	5111	92	i 3	i 88	i	6	i	82	i	3	i	*	i	3	i	5	
Software publishers	5112	44,304	544	34,713		1,108		33,605		494		15		479		9,591	
Telecommunications	517	3,858	i D	3,761	i	195		3,565	i	D		1		D		97	
Data processing, hosting, and related services	518	15,112	145	13,140		394		12,747	i	130		20		110		1,972	
Other information	other 51	28,554	i D	25,192	i	221		24,970	i	D		2		D		3,362	i
Finance and insurance	52	9,694	62	8,080		94		7,986		62	i	0		62	i	1,615	i
Real estate and rental and leasing	53	552	0	550		*	i	550		0		0		0		3	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	30	0	30		0		30		0		0		0		*	
Other real estate and rental and leasing	other 53	522	0	520		*	i	519		0		0		0		3	
Professional, scientific, and technical services	54	23,096	i 26,419	i 20,249	i	1,130	i	19,119	i	17,873		4,930		12,943		2,848	i
Architectural, engineering, and related services	5413	1,952	i 1,601	1,925	i	108		1,816	i	1,532		1,034		498	i	28	
Computer systems design and related services	5415	12,971	i 2,766	10,851	i	89	i	10,762	i	2,588		649		1,939		2,120	i
Scientific research and development services	5417	4,660	i 21,431	i 4,454	i	917	i	3,537	i	13,160		2,949		10,211	i	205	
Biotechnology research and development	541711	1,587	i 6,854	1,488	i	423	i	1,065	i	3,885		107		3,778		99	

TABLE 63

R&D costs paid for by the company and others projected for 2017, by industry and company size: 2016

(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			
Physical, engineering, and life sciences (except biotechnology) research and development	541712	3,039		13,691	i	2,933		494		2,439		8,484	i	2,166		6,318	i	106	
Social sciences and humanities research and development	541720	34		886		34		*		34		791		676		115		*	
Other professional, scientific, and technical services	other 54	3,513	i	620		3,018	i	16		3,003	i	593		298		295		495	
Health care services	621–23	1,101	i	87	i	855	i	47	i	809	i	87	i	D		D		245	
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	5,764	i	81		5,537	i	85	i	5,451	i	54		5		50		227	
All companies (number of domestic employees)	–	455,995		77,612		372,897		34,846		338,051		61,937		25,411		36,525		83,098	
Micro companies[a]																			
5–9	–	1,662	i	1,828		1,475	i	275	i	1,200	i	568	i	274	i	295	i	187	
Small companies																			
10–19	–	5,125	i	1,182	i	4,915	i	667		4,248	i	1,063	i	419	i	644	i	210	
20–49	–	11,697		2,386	i	11,075		1,485		9,590	i	2,151	i	923		1,227	i	623	
Medium companies																			
50–99	–	10,637		2,024		9,993		1,715		8,278		1,898		532		1,366		644	
100–249	–	16,342		4,209		14,545		2,055		12,490		3,649		1,017		2,632		1,797	
Large companies																			
250–499	–	15,827		2,040		13,715		1,209	i	12,506		1,732		600		1,131		2,112	
500–999	–	18,486		1,394		15,815		1,404		14,411		1,135		279		856		2,671	
1,000–4,999	–	83,938		14,850		66,188		5,537		60,652		11,457		1,275		10,182		17,750	i
5,000–9,999	–	55,302	i	6,989		43,825		1,700		42,125	i	4,980		1,239	i	3,741		11,477	
10,000–24,999	–	81,941		18,648	i	67,033		10,276		56,757	i	14,229		4,090		10,139	i	14,908	
25,000 or more	–	155,038		22,061		124,318		8,522	i	115,795	i	19,075		14,763		4,311		30,720	

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TABLE 64

Companies that introduced new or significantly improved products, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products or processes			New or significantly improved products						
						Any good or service		Goods		Services	
		Companies (number)	Yes[a]	No[b]	Companies (number)	Yes[c]	No[d]	Yes	No	Yes	No
Industry (number)											
All industries	21–23, 31–33, 42–81	1,138,671	190,077	948,594	1,138,671	108,376	1,030,296	68,992	1,069,679	80,030	1,058,641
Manufacturing industries	31–33	113,066	36,989	76,078	113,066	24,937	88,129	22,514	90,552	12,092	100,975
Food	311	9,763	2,764	6,999	9,763	1,791	7,972	1,592	8,171	668	9,094
Beverages and tobacco products	312	2,863	1,052	1,811	2,863	644	2,220	644	2,220	293	2,570
Textiles, apparel, and leather products	313–16	4,689	1,250	3,440	4,689	942	3,747	800	3,889	360	4,330
Wood products	321	5,526	1,148	4,378	5,526	487	5,039	436	5,090	252	5,274
Paper	322	1,447	447	1,000	1,447	265	1,182	210	1,237	115	1,332
Printing and related support activities	323	8,604	2,258	6,346	8,604	1,378	7,226	1,033	7,572	1,168	7,437
Petroleum and coal products	324	412	98	314	412	81	331	67	345	33	379
Chemicals	325	5,259	2,384	2,875	5,259	1,881	3,378	1,816	3,443	834	4,426
Basic chemicals	3251	692	348	345	692	268	424	263	430	137	556
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	633	220	413	633	162	471	162	471	71	562
Pesticides, fertilizers, and other agricultural chemicals	3253	261	103	159	261	76	186	75	187	40	222
Pharmaceuticals and medicines	3254	1,384	565	819	1,384	460	924	433	951	182	1,202
Soaps, cleaning compounds, and toilet preparations	3256	929	475	454	929	359	570	349	580	134	795
Paints, coatings, adhesives, and other chemicals	3255, 3259	1,360	675	685	1,360	557	803	536	824	271	1,089
Plastics and rubber products	326	5,555	1,990	3,565	5,555	1,419	4,136	1,384	4,171	645	4,909
Nonmetallic mineral products	327	4,758	1,131	3,627	4,758	842	3,916	792	3,967	466	4,292
Primary metals	331	2,033	706	1,327	2,033	280	1,752	243	1,790	108	1,925
Fabricated metal products	332	24,182	7,143	17,039	24,182	4,173	20,009	3,553	20,630	2,557	21,625
Machinery	333	10,843	4,261	6,582	10,843	3,132	7,710	2,933	7,909	1,223	9,620
Agricultural implements	33311	530	224	306	530	196	335	196	335	36	494
Semiconductor machinery	333242	78	42	37	78	37	41	37	41	13	65
Engines, turbines, and power transmission equipment	3336	446	167	279	446	136	310	136	310	32	414
Other machinery	other 333	9,788	3,828	5,960	9,788	2,764	7,025	2,565	7,224	1,141	8,647

TABLE 64

Companies that introduced new or significantly improved products, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products or processes			New or significantly improved products						
						Any good or service		Goods		Services	
		Companies (number)	Yes[a]	No[b]	Companies (number)	Yes[c]	No[d]	Yes	No	Yes	No
Computer and electronic products	334	5,477	2,894	2,583	5,477	2,528	2,949	2,395	3,081	988	4,489
Communications equipment	3342	736	437	299	736	416	321	415	322	149	587
Semiconductors and other electronic components	3344	2,008	894	1,114	2,008	708	1,299	661	1,347	226	1,781
Navigational, measuring, electromedical, and control instruments	3345	1,932	1,153	779	1,932	1,048	885	988	945	453	1,479
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	335	193	142	335	169	166	161	173	106	229
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	270	167	103	270	142	128	138	132	64	206
Other measuring and controlling devices	other 3345	1,328	793	534	1,328	737	591	688	640	283	1,045
Other computer and electronic products	other 334	800	410	391	800	356	444	332	468	159	641
Electrical equipment, appliances, and components	335	2,364	1,086	1,277	2,364	859	1,505	836	1,528	273	2,091
Transportation equipment	336	5,058	1,912	3,146	5,058	1,448	3,610	1,310	3,748	704	4,354
Automobiles, bodies, trailers, and parts	3361–63	3,134	1,181	1,952	3,134	884	2,249	823	2,311	470	2,664
Aerospace products and parts	3364	861	268	593	861	239	622	215	646	73	788
Aircraft, aircraft engines, and aircraft parts	336411–13	828	253	575	828	225	603	204	624	65	762
Guided missiles, space vehicles, and related parts	336414–15, 336419	33	16	18	33	14	20	12	22	8	26
Military armored vehicles, tanks, and tank components	336992	23	9	14	23	6	17	6	17	3	20
Other transportation	other 336	1,041	454	587	1,041	319	722	266	775	159	882
Furniture and related products	337	5,660	1,274	4,386	5,660	588	5,072	510	5,150	295	5,365
Miscellaneous manufacturing	339	8,573	3,190	5,383	8,573	2,199	6,374	1,960	6,613	1,110	7,463
Medical equipment and supplies	3391	3,057	1,338	1,719	3,057	942	2,115	843	2,215	402	2,655
Other miscellaneous manufacturing	3399	5,516	1,852	3,664	5,516	1,257	4,259	1,117	4,399	708	4,808

TABLE 64

Companies that introduced new or significantly improved products, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products or processes			New or significantly improved products						
						Any good or service		Goods		Services	
		Companies (number)	Yes[a]	No[b]	Companies (number)	Yes[c]	No[d]	Yes	No	Yes	No
Nonmanufacturing industries	21–23, 42–81	1,025,605	153,088	872,516	1,025,605	83,439	942,166	46,478	979,127	67,938	957,667
Mining, extraction, and support activities	21	6,761	997	5,764	6,761	389	6,372	132	6,629	271	6,490
Utilities	22	1,200	79	1,122	1,200	58	1,143	6	1,194	56	1,145
Wholesale trade	42	91,941	21,397	70,543	91,941	13,596	78,344	11,260	80,681	7,100	84,840
Electronic shopping and electronic auctions	454111–12	4,147	1,291	2,855	4,147	955	3,191	840	3,306	507	3,640
Transportation and warehousing	48–49	39,906	6,053	33,853	39,906	2,132	37,775	955	38,951	2,129	37,778
Information	51	17,113	4,823	12,290	17,113	4,062	13,051	2,411	14,702	3,462	13,650
Publishing	511	5,801	1,951	3,850	5,801	1,570	4,231	1,317	4,484	1,152	4,648
Newspaper, periodical, book, and directory publishers	5111	3,407	498	2,909	3,407	257	3,151	204	3,204	189	3,218
Software publishers	5112	2,393	1,453	941	2,393	1,313	1,080	1,113	1,280	963	1,430
Telecommunications	517	2,568	487	2,081	2,568	384	2,184	56	2,511	378	2,190
Data processing, hosting, and related services	518	3,105	1,471	1,634	3,105	1,335	1,770	828	2,277	1,179	1,926
Other information	other 51	5,640	915	4,725	5,640	773	4,867	209	5,430	753	4,887
Finance and insurance	52	45,282	6,182	39,100	45,282	2,532	42,750	337	44,945	2,474	42,808
Real estate and rental and leasing	53	36,032	3,431	32,601	36,032	1,959	34,073	1,065	34,967	1,493	34,539
Lessors of nonfinancial intangible assets (except copyrighted works)	533	110	15	95	110	8	102	4	106	5	105
Other real estate and rental and leasing	other 53	35,922	3,416	32,506	35,922	1,951	33,971	1,061	34,861	1,488	34,434
Professional, scientific, and technical services	54	154,446	28,583	125,863	154,446	18,841	135,605	9,588	144,858	16,266	138,180
Architectural, engineering, and related services	5413	25,214	5,267	19,947	25,214	3,262	21,952	1,427	23,787	2,822	22,392
Computer systems design and related services	5415	19,695	8,544	11,150	19,695	7,179	12,515	4,207	15,488	6,167	13,528
Scientific research and development services	5417	2,790	1,192	1,599	2,790	1,002	1,789	798	1,992	621	2,169
Biotechnology research and development	541711	543	215	328	543	183	360	127	416	136	407
Physical, engineering, and life sciences	541712	2,055	932	1,123	2,055	784	1,270	658	1,397	460	1,595

TABLE 64

Companies that introduced new or significantly improved products, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products or processes			New or significantly improved products						
						Any good or service		Goods		Services	
		Companies (number)	Yes[a]	No[b]	Companies (number)	Yes[c]	No[d]	Yes	No	Yes	No
(except biotechnology) research and development											
Social sciences and humanities research and development	541720	192	45	148	192	35	158	13	179	26	167
Other professional, scientific, and technical services	other 54	106,747	13,581	93,166	106,747	7,397	99,350	3,157	103,590	6,656	100,091
Health care services	621–23	167,465	26,131	141,334	167,465	15,018	152,447	5,418	162,047	14,988	152,477
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	461,312	54,120	407,192	461,312	23,897	437,415	14,466	446,847	19,192	442,120
All companies (number of domestic employees)	–	1,138,671	190,077	948,594	1,138,671	108,376	1,030,296	68,992	1,069,679	80,030	1,058,641
Micro companies[e]											
5–9	–	307,934	47,350	260,583	307,934	28,229	279,705	16,748	291,186	22,230	285,704
Small companies											
10–19	–	387,796	62,196	325,600	387,796	36,273	351,522	22,860	364,936	27,987	359,808
20–49	–	290,964	49,297	241,667	290,964	26,191	264,773	16,859	274,106	18,884	272,080
Medium companies											
50–99	–	83,527	17,298	66,229	83,527	9,520	74,008	6,572	76,955	6,377	77,150
100–249	–	43,846	8,960	34,886	43,846	4,791	39,055	3,348	40,498	2,635	41,210
Large companies											
250–499	–	11,925	2,145	9,781	11,925	1,360	10,565	1,067	10,858	728	11,197
500–999	–	5,669	1,152	4,517	5,669	929	4,739	589	5,080	537	5,132
1,000–4,999	–	5,125	995	4,130	5,125	731	4,394	638	4,487	401	4,724
5,000–9,999	–	721	206	516	721	170	551	157	564	110	611
10,000–24,999	–	838	396	442	838	118	720	106	732	88	750
25,000 or more	–	326	83	243	326	64	262	49	277	53	273
Industry proportions (percent)											
All industries	21–23, 31–33, 42–81	1,138,671	16.7	83.3	1,138,671	9.5	90.5	6.1	93.9	7.0	93.0
Manufacturing industries	31–33	113,066	32.7	67.3	113,066	22.1	77.9	19.9	80.1	10.7	89.3
Food	311	9,763	28.3	71.7	9,763	18.3	81.7	16.3	83.7	6.8	93.2
Beverages and tobacco products	312	2,863	36.7	63.3	2,863	22.5	77.5	22.5	77.5	10.2	89.8
Textiles, apparel, and leather products	313–16	4,689	26.7	73.3	4,689	20.1	79.9	17.1	82.9	7.7	92.3
Wood products	321	5,526	20.8	79.2	5,526	8.8	91.2	7.9	92.1	4.6	95.4
Paper	322	1,447	30.9	69.1	1,447	18.3	81.7	14.5	85.5	7.9	92.1
Printing and related support activities	323	8,604	26.2	73.8	8,604	16.0	84.0	12.0	88.0	13.6	86.4

TABLE 64

Companies that introduced new or significantly improved products, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products or processes			New or significantly improved products						
						Any good or service		Goods		Services	
		Companies (number)	Yes[a]	No[b]	Companies (number)	Yes[c]	No[d]	Yes	No	Yes	No
Petroleum and coal products	324	412	23.8	76.2	412	19.7	80.3	16.3	83.7	7.9	92.1
Chemicals	325	5,259	45.3	54.7	5,259	35.8	64.2	34.5	65.5	15.9	84.1
Basic chemicals	3251	692	50.2	49.8	692	38.7	61.3	37.9	62.1	19.7	80.3
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	633	34.7	65.3	633	25.6	74.4	25.6	74.4	11.2	88.8
Pesticides, fertilizers, and other agricultural chemicals	3253	261	39.3	60.7	261	28.9	71.1	28.5	71.5	15.2	84.8
Pharmaceuticals and medicines	3254	1,384	40.8	59.2	1,384	33.2	66.8	31.3	68.7	13.1	86.9
Soaps, cleaning compounds, and toilet preparations	3256	929	51.1	48.9	929	38.7	61.3	37.5	62.5	14.4	85.6
Paints, coatings, adhesives, and other chemicals	3255, 3259	1,360	49.6	50.4	1,360	40.9	59.1	39.4	60.6	19.9	80.1
Plastics and rubber products	326	5,555	35.8	64.2	5,555	25.5	74.5	24.9	75.1	11.6	88.4
Nonmetallic mineral products	327	4,758	23.8	76.2	4,758	17.7	82.3	16.6	83.4	9.8	90.2
Primary metals	331	2,033	34.7	65.3	2,033	13.8	86.2	12.0	88.0	5.3	94.7
Fabricated metal products	332	24,182	29.5	70.5	24,182	17.3	82.7	14.7	85.3	10.6	89.4
Machinery	333	10,843	39.3	60.7	10,843	28.9	71.1	27.1	72.9	11.3	88.7
Agricultural implements	33311	530	42.3	57.7	530	36.9	63.1	36.9	63.1	6.8	93.2
Semiconductor machinery	333242	78	53.2	46.8	78	47.6	52.4	47.6	52.4	16.7	83.3
Engines, turbines, and power transmission equipment	3336	446	37.4	62.6	446	30.5	69.5	30.5	69.5	7.2	92.8
Other machinery	other 333	9,788	39.1	60.9	9,788	28.2	71.8	26.2	73.8	11.7	88.3
Computer and electronic products	334	5,477	52.8	47.2	5,477	46.2	53.8	43.7	56.3	18.0	82.0
Communications equipment	3342	736	59.4	40.6	736	56.5	43.5	56.3	43.7	20.3	79.7
Semiconductors and other electronic components	3344	2,008	44.5	55.5	2,008	35.3	64.7	32.9	67.1	11.3	88.7
Navigational, measuring, electromedical, and control instruments	3345	1,932	59.7	40.3	1,932	54.2	45.8	51.1	48.9	23.5	76.5
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	335	57.6	42.4	335	50.6	49.4	48.2	51.8	31.7	68.3

TABLE 64

Companies that introduced new or significantly improved products, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products or processes			New or significantly improved products						
						Any good or service		Goods		Services	
		Companies (number)	Yes[a]	No[b]	Companies (number)	Yes[c]	No[d]	Yes	No	Yes	No
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	270	61.8	38.2	270	52.6	47.4	51.2	48.8	23.7	76.3
Other measuring and controlling devices	other 3345	1,328	59.8	40.2	1,328	55.5	44.5	51.8	48.2	21.3	78.7
Other computer and electronic products	other 334	800	51.2	48.8	800	44.5	55.5	41.5	58.5	19.9	80.1
Electrical equipment, appliances, and components	335	2,364	46.0	54.0	2,364	36.3	63.7	35.4	64.6	11.5	88.5
Transportation equipment	336	5,058	37.8	62.2	5,058	28.6	71.4	25.9	74.1	13.9	86.1
Automobiles, bodies, trailers, and parts	3361–63	3,134	37.7	62.3	3,134	28.2	71.8	26.3	73.7	15.0	85.0
Aerospace products and parts	3364	861	31.1	68.9	861	27.7	72.3	25.0	75.0	8.5	91.5
Aircraft, aircraft engines, and aircraft parts	336411–13	828	30.5	69.5	828	27.2	72.8	24.6	75.4	7.9	92.1
Guided missiles, space vehicles, and related parts	336414–15, 336419	33	47.0	53.0	33	40.9	59.1	34.9	65.1	22.7	77.3
Military armored vehicles, tanks, and tank components	336992	23	39.1	60.9	23	26.1	73.9	26.1	73.9	13.0	87.0
Other transportation	other 336	1,041	43.6	56.4	1,041	30.7	69.3	25.6	74.4	15.2	84.8
Furniture and related products	337	5,660	22.5	77.5	5,660	10.4	89.6	9.0	91.0	5.2	94.8
Miscellaneous manufacturing	339	8,573	37.2	62.8	8,573	25.6	74.4	22.9	77.1	13.0	87.0
Medical equipment and supplies	3391	3,057	43.8	56.2	3,057	30.8	69.2	27.6	72.4	13.2	86.8
Other miscellaneous manufacturing	3399	5,516	33.6	66.4	5,516	22.8	77.2	20.2	79.8	12.8	87.2
Nonmanufacturing industries	21–23, 42–81	1,025,605	14.9	85.1	1,025,605	8.1	91.9	4.5	95.5	6.6	93.4
Mining, extraction, and support activities	21	6,761	14.8	85.2	6,761	5.8	94.2	2.0	98.0	4.0	96.0
Utilities	22	1,200	6.5	93.5	1,200	4.8	95.2	0.5	99.5	4.6	95.4
Wholesale trade	42	91,941	23.3	76.7	91,941	14.8	85.2	12.2	87.8	7.7	92.3
Electronic shopping and electronic auctions	454111–12	4,147	31.1	68.9	4,147	23.0	77.0	20.3	79.7	12.2	87.8
Transportation and warehousing	48–49	39,906	15.2	84.8	39,906	5.3	94.7	2.4	97.6	5.3	94.7
Information	51	17,113	28.2	71.8	17,113	23.7	76.3	14.1	85.9	20.2	79.8
Publishing	511	5,801	33.6	66.4	5,801	27.1	72.9	22.7	77.3	19.9	80.1

TABLE 64

Companies that introduced new or significantly improved products, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products or processes			New or significantly improved products						
						Any good or service		Goods		Services	
		Companies (number)	Yes[a]	No[b]	Companies (number)	Yes[c]	No[d]	Yes	No	Yes	No
Newspaper, periodical, book, and directory publishers	5111	3,407	14.6	85.4	3,407	7.5	92.5	6.0	94.0	5.6	94.4
Software publishers	5112	2,393	60.7	39.3	2,393	54.9	45.1	46.5	53.5	40.2	59.8
Telecommunications	517	2,568	19.0	81.0	2,568	14.9	85.1	2.2	97.8	14.7	85.3
Data processing, hosting, and related services	518	3,105	47.4	52.6	3,105	43.0	57.0	26.7	73.3	38.0	62.0
Other information	other 51	5,640	16.2	83.8	5,640	13.7	86.3	3.7	96.3	13.4	86.6
Finance and insurance	52	45,282	13.7	86.3	45,282	5.6	94.4	0.7	99.3	5.5	94.5
Real estate and rental and leasing	53	36,032	9.5	90.5	36,032	5.4	94.6	3.0	97.0	4.1	95.9
Lessors of nonfinancial intangible assets (except copyrighted works)	533	110	13.7	86.3	110	7.3	92.7	3.6	96.4	4.6	95.4
Other real estate and rental and leasing	other 53	35,922	9.5	90.5	35,922	5.4	94.6	3.0	97.0	4.1	95.9
Professional, scientific, and technical services	54	154,446	18.5	81.5	154,446	12.2	87.8	6.2	93.8	10.5	89.5
Architectural, engineering, and related services	5413	25,214	20.9	79.1	25,214	12.9	87.1	5.7	94.3	11.2	88.8
Computer systems design and related services	5415	19,695	43.4	56.6	19,695	36.5	63.5	21.4	78.6	31.3	68.7
Scientific research and development services	5417	2,790	42.7	57.3	2,790	35.9	64.1	28.6	71.4	22.3	77.7
Biotechnology research and development	541711	543	39.6	60.4	543	33.7	66.3	23.4	76.6	25.0	75.0
Physical, engineering, and life sciences (except biotechnology) research and development	541712	2,055	45.4	54.6	2,055	38.2	61.8	32.0	68.0	22.4	77.6
Social sciences and humanities research and development	541720	192	23.2	76.8	192	18.0	82.0	6.8	93.2	13.3	86.7
Other professional, scientific, and technical services	other 54	106,747	12.7	87.3	106,747	6.9	93.1	3.0	97.0	6.2	93.8
Health care services	621–23	167,465	15.6	84.4	167,465	9.0	91.0	3.2	96.8	9.0	91.0
Other nonmanufacturing	23, 44–45 (excluding	461,312	11.7	88.3	461,312	5.2	94.8	3.1	96.9	4.2	95.8

TABLE 64

Companies that introduced new or significantly improved products, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products or processes			New or significantly improved products						
						Any good or service		Goods		Services	
		Companies (number)	Yes[a]	No[b]	Companies (number)	Yes[c]	No[d]	Yes	No	Yes	No
	454111–12), 55–56, 624, 71–72, 81										
All companies (number of domestic employees)	–	1,138,671	16.7	83.3	1,138,671	9.5	90.5	6.1	93.9	7.0	93.0
Micro companies[e]											
5–9	–	307,934	15.4	84.6	307,934	9.2	90.8	5.4	94.6	7.2	92.8
Small companies											
10–19	–	387,796	16.0	84.0	387,796	9.4	90.6	5.9	94.1	7.2	92.8
20–49	–	290,964	16.9	83.1	290,964	9.0	91.0	5.8	94.2	6.5	93.5
Medium companies											
50–99	–	83,527	20.7	79.3	83,527	11.4	88.6	7.9	92.1	7.6	92.4
100–249	–	43,846	20.4	79.6	43,846	10.9	89.1	7.6	92.4	6.0	94.0
Large companies											
250–499	–	11,925	18.0	82.0	11,925	11.4	88.6	8.9	91.1	6.1	93.9
500–999	–	5,669	20.3	79.7	5,669	16.4	83.6	10.4	89.6	9.5	90.5
1,000–4,999	–	5,125	19.4	80.6	5,125	14.3	85.7	12.5	87.5	7.8	92.2
5,000–9,999	–	721	28.5	71.5	721	23.6	76.4	21.8	78.2	15.3	84.7
10,000–24,999	–	838	47.2	52.8	838	14.1	85.9	12.7	87.3	10.5	89.5
25,000 or more	–	326	25.5	74.5	326	19.5	80.5	15.0	85.0	16.1	83.9

NAICS = 2012 North American Industry Classification System.

[a] Includes companies responding "Yes" to at least one of the items on the survey relating to new or significantly improved products or processes.
[b] Includes companies responding "No" to all of the items on the survey relating to new or significantly improved products or processes.
[c] Includes companies responding "Yes" to at least one of the items on the survey relating to new or significantly improved products.
[d] Includes companies responding "No" to both of the items on the survey relating to new or significantly improved products.
[e] Business R&D and Innovation Survey does not include companies with fewer than five 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. These statistics include an adjustment to account for item nonresponse beginning in survey year 2016. This change has affected the comparability of these company count estimates with estimates published for years prior to 2016. These statistics do not include an adjustment to account for unit nonresponse. Statistics are representative of companies located in the United States, regardless of whether the company performed or funded R&D.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey.

TABLE 65

Companies that introduced new or significantly improved processes, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products or processes			New or significantly improved processes								
						Any processes		Manufacturing or production methods		Logistics, delivery, or distribution methods		Support activities	
		Companies (number)	Yes[a]	No[b]	Companies (number)	Yes[c]	No[d]	Yes	No	Yes	No	Yes	No
Industry (number)													
All industries	21–23, 31–33, 42–81	1,138,671	190,077	948,594	1,138,671	148,930	989,741	66,873	1,071,798	54,774	1,083,897	112,050	1,026,621
Manufacturing industries	31–33	113,066	36,989	76,078	113,066	28,843	84,224	22,991	90,076	8,863	104,203	16,551	96,515
Food	311	9,763	2,764	6,999	9,763	2,139	7,624	1,585	8,178	660	9,103	1,222	8,541
Beverages and tobacco products	312	2,863	1,052	1,811	2,863	851	2,013	627	2,237	385	2,478	540	2,323
Textiles, apparel, and leather products	313–16	4,689	1,250	3,440	4,689	966	3,724	710	3,979	265	4,424	596	4,093
Wood products	321	5,526	1,148	4,378	5,526	1,063	4,463	654	4,872	339	5,187	612	4,914
Paper	322	1,447	447	1000	1,447	358	1,089	281	1,166	129	1,318	221	1,226
Printing and related support activities	323	8,604	2,258	6,346	8,604	1,901	6,704	1,542	7,062	674	7,931	1,055	7,549
Petroleum and coal products	324	412	98	314	412	60	352	38	374	24	388	44	368
Chemicals	325	5,259	2,384	2,875	5,259	1,815	3,444	1,338	3,922	573	4,686	1,168	4,091
Basic chemicals	3251	692	348	345	692	285	408	241	452	66	626	199	494
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	633	220	413	633	175	458	145	487	56	577	98	535
Pesticides, fertilizers, and other agricultural chemicals	3253	261	103	159	261	87	174	37	225	38	223	53	208
Pharmaceuticals and medicines	3254	1,384	565	819	1,384	350	1,034	200	1,184	75	1,309	227	1,157
Soaps, cleaning compounds, and toilet preparations	3256	929	475	454	929	372	557	265	664	177	751	316	613
Paints, coatings, adhesives, and other chemicals	3255, 3259	1,360	675	685	1,360	545	815	450	910	161	1,199	275	1,085
Plastics and rubber products	326	5,555	1,990	3,565	5,555	1,726	3,829	1,442	4,113	467	5,088	941	4,613
Nonmetallic mineral products	327	4,758	1,131	3,627	4,758	971	3,788	746	4,012	412	4,347	574	4,184
Primary metals	331	2,033	706	1,327	2,033	613	1,420	498	1,535	137	1,896	372	1,661
Fabricated metal products	332	24,182	7,143	17,039	24,182	5,835	18,347	5,046	19,136	1,573	22,609	3,136	21,046
Machinery	333	10,843	4,261	6,582	10,843	3,001	7,842	2,424	8,419	718	10,125	1,582	9,261
Agricultural implements	33311	530	224	306	530	136	395	114	417	36	495	67	463
Semiconductor machinery	333242	78	42	37	78	21	58	17	62	7	72	11	67
Engines, turbines, and power transmission equipment	3336	446	167	279	446	129	317	117	329	26	421	71	375
Other machinery	other 333	9,788	3,828	5,960	9,788	2,716	7,072	2,176	7,612	650	9,138	1,432	8,356
Computer and electronic products	334	5,477	2,894	2,583	5,477	1,787	3,689	1,476	4,001	441	5,035	922	4,554
Communications equipment	3342	736	437	299	736	209	527	192	544	39	697	48	688
Semiconductors and other electronic components	3344	2,008	894	1,114	2,008	624	1,384	544	1,464	172	1,835	355	1,653
Navigational, measuring, electromedical, and control instruments	3345	1,932	1,153	779	1,932	698	1,235	524	1,408	153	1,779	387	1,545
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	335	193	142	335	91	243	64	271	32	303	53	282
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	270	167	103	270	109	161	69	201	30	239	45	225
Other measuring and controlling devices	other 3345	1,328	793	534	1,328	497	831	391	937	91	1,237	289	1,039

TABLE 65

Companies that introduced new or significantly improved processes, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products or processes			New or significantly improved processes								
						Any processes		Manufacturing or production methods		Logistics, delivery, or distribution methods		Support activities	
		Companies (number)	Yes[a]	No[b]	Companies (number)	Yes[c]	No[d]	Yes	No	Yes	No	Yes	No
Other computer and electronic products	other 334	800	410	391	800	257	543	216	584	77	723	132	668
Electrical equipment, appliances, and components	335	2,364	1,086	1,277	2,364	751	1,612	545	1,819	318	2,046	538	1,826
Transportation equipment	336	5,058	1,912	3,146	5,058	1,352	3,706	1,118	3,940	455	4,604	874	4,184
Automobiles, bodies, trailers, and parts	3361–63	3,134	1,181	1,952	3,134	885	2,249	766	2,368	333	2,801	622	2,512
Aerospace products and parts	3364	861	268	593	861	169	691	136	724	60	800	112	748
Aircraft, aircraft engines, and aircraft parts	336411–13	828	253	575	828	158	670	126	702	D	D	107	721
Guided missiles, space vehicles, and related parts	336414–15, 336419	33	16	18	33	12	22	11	23	D	D	6	28
Military armored vehicles, tanks, and tank components	336992	23	9	14	23	7	16	6	17	0	23	3	20
Other transportation	other 336	1,041	454	587	1,041	290	750	210	831	62	979	138	903
Furniture and related products	337	5,660	1,274	4,386	5,660	1,117	4,543	911	4,749	296	5,364	562	5,098
Miscellaneous manufacturing	339	8,573	3,190	5,383	8,573	2,537	6,036	2,011	6,562	998	7,575	1,590	6,984
Medical equipment and supplies	3391	3,057	1,338	1,719	3,057	963	2,095	772	2,285	250	2,807	611	2,446
Other miscellaneous manufacturing	3399	5,516	1,852	3,664	5,516	1,575	3,941	1,239	4,277	748	4,768	979	4,537
Nonmanufacturing industries	21–23, 42–81	1,025,605	153,088	872,516	1,025,605	120,088	905,517	43,882	981,723	45,911	979,694	95,499	930,106
Mining, extraction, and support activities	21	6,761	997	5,764	6,761	739	6,022	208	6,554	198	6,563	497	6,264
Utilities	22	1,200	79	1,122	1,200	71	1,129	9	1,191	9	1,191	70	1,130
Wholesale trade	42	91,941	21,397	70,543	91,941	15,736	76,205	5,913	86,028	7,314	84,627	11,489	80,452
Electronic shopping and electronic auctions	454111–12	4,147	1,291	2,855	4,147	881	3,266	417	3,730	498	3,649	769	3,378
Transportation and warehousing	48–49	39,906	6,053	33,853	39,906	5,573	34,334	525	39,382	3,055	36,852	4,349	35,558
Information	51	17,113	4,823	12,290	17,113	3,064	14,049	1,466	15,647	1,411	15,701	2,085	15,028
Publishing	511	5,801	1,951	3,850	5,801	1,295	4,505	522	5,279	612	5,188	871	4,929
Newspaper, periodical, book, and directory publishers	5111	3,407	498	2,909	3,407	366	3,041	67	3,341	213	3,194	186	3,221
Software publishers	5112	2,393	1,453	941	2,393	929	1,464	455	1,938	399	1,994	685	1,708
Telecommunications	517	2,568	487	2,081	2,568	222	2,345	69	2,499	101	2,467	163	2,405
Data processing, hosting, and related services	518	3,105	1,471	1,634	3,105	1002	2,103	594	2,511	427	2,678	730	2,374
Other information	other 51	5,640	915	4,725	5,640	544	5,096	281	5,359	271	5,368	320	5,319
Finance and insurance	52	45,282	6,182	39,100	45,282	5,067	40,215	1,070	44,212	1,634	43,648	4,299	40,983
Real estate and rental and leasing	53	36,032	3,431	32,601	36,032	2,240	33,792	462	35,569	745	35,287	2,079	33,952
Lessors of nonfinancial intangible assets (except copyrighted works)	533	110	15	95	110	11	99	D	D	5	105	8	102
Other real estate and rental and leasing	other 53	35,922	3,416	32,506	35,922	2,229	33,693	D	D	740	35,182	2,071	33,851
Professional, scientific, and technical services	54	154,446	28,583	125,863	154,446	21,361	133,085	9,619	144,827	7,921	146,525	17,069	137,377
Architectural, engineering, and related services	5413	25,214	5,267	19,947	25,214	4,384	20,830	2,496	22,718	1,173	24,041	3,285	21,929
Computer systems design and related services	5415	19,695	8,544	11,150	19,695	5,475	14,219	2,423	17,272	2,251	17,443	4,651	15,043

TABLE 65

Companies that introduced new or significantly improved processes, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products or processes			New or significantly improved processes								
						Any processes		Manufacturing or production methods		Logistics, delivery, or distribution methods		Support activities	
		Companies (number)	Yes[a]	No[b]	Companies (number)	Yes[c]	No[d]	Yes	No	Yes	No	Yes	No
Scientific research and development services	5417	2,790	1,192	1,599	2,790	773	2,018	598	2,192	226	2,565	386	2,405
Biotechnology research and development	541711	543	215	328	543	150	393	121	422	45	498	80	463
Physical, engineering, and life sciences (except biotechnology) research and development	541712	2,055	932	1,123	2,055	589	1,466	465	1,589	165	1,890	278	1,777
Social sciences and humanities research and development	541720	192	45	148	192	34	159	12	180	16	176	28	165
Other professional, scientific, and technical services	other 54	106,747	13,581	93,166	106,747	10,728	96,018	4,101	102,646	4,271	102,476	8,747	98,000
Health care services	621–23	167,465	26,131	141,334	167,465	19,351	148,114	7,736	159,729	6,287	161,178	14,454	153,011
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	461,312	54,120	407,192	461,312	46,006	415,307	16,458	444,854	16,840	444,473	38,340	422,973
All companies (number of domestic employees)	–	1,138,671	190,077	948,594	1,138,671	148,930	989,741	66,873	1,071,798	54,774	1,083,897	112,050	1,026,621
Micro companies[e]													
5–9	–	307,934	47,350	260,583	307,934	35,991	271,943	15,924	292,009	14,473	293,460	25,393	282,541
Small companies													
10–19	–	387,796	62,196	325,600	387,796	47,896	339,899	21,741	366,055	16,706	371,089	36,903	350,893
20–49	–	290,964	49,297	241,667	290,964	39,548	251,416	16,802	274,163	14,112	276,852	31,209	259,755
Medium companies													
50–99	–	83,527	17,298	66,229	83,527	14,375	69,152	6,940	76,587	5,659	77,868	10,457	73,070
100–249	–	43,846	8,960	34,886	43,846	7,339	36,506	3,417	40,429	2,235	41,611	5262	38,584
Large companies													
250–499	–	11,925	2,145	9,781	11,925	1,731	10,194	878	11,048	527	11,398	1,236	10,689
500–999	–	5,669	1,152	4,517	5,669	682	4,987	446	5,223	249	5420	483	5,185
1,000–4,999	–	5,125	995	4,130	5,125	760	4,365	467	4,658	325	4,800	552	4,573
5,000–9,999	–	721	206	516	721	167	554	126	596	106	615	137	584
10,000–24,999	–	838	396	442	838	365	473	84	754	330	508	349	489
25,000 or more	–	326	83	243	326	75	251	48	278	51	275	69	257
Industry proportions (percent)													
All industries	21–23, 31–33, 42–81	1,138,671	16.7	83.3	1,138,671	13.1	86.9	5.9	94.1	4.8	95.2	9.8	90.2
Manufacturing industries	31–33	113,066	32.7	67.3	113,066	25.5	74.5	20.3	79.7	7.8	92.2	14.6	85.4
Food	311	9,763	28.3	71.7	9,763	21.9	78.1	16.2	83.8	6.8	93.2	12.5	87.5
Beverages and tobacco products	312	2,863	36.7	63.3	2,863	29.7	70.3	21.9	78.1	13.5	86.5	18.9	81.1
Textiles, apparel, and leather products	313–16	4,689	26.7	73.3	4,689	20.6	79.4	15.1	84.9	5.7	94.3	12.7	87.3
Wood products	321	5,526	20.8	79.2	5,526	19.2	80.8	11.8	88.2	6.1	93.9	11.1	88.9
Paper	322	1,447	30.9	69.1	1,447	24.7	75.3	19.4	80.6	8.9	91.1	15.3	84.7
Printing and related support activities	323	8,604	26.2	73.8	8,604	22.1	77.9	17.9	82.1	7.8	92.2	12.3	87.7
Petroleum and coal products	324	412	23.8	76.2	412	14.6	85.4	9.2	90.8	5.8	94.2	10.7	89.3

TABLE 65

Companies that introduced new or significantly improved processes, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products or processes			New or significantly improved processes								
						Any processes		Manufacturing or production methods		Logistics, delivery, or distribution methods		Support activities	
		Companies (number)	Yes[a]	No[b]	Companies (number)	Yes[c]	No[d]	Yes	No	Yes	No	Yes	No
Chemicals	325	5,259	45.3	54.7	5,259	34.5	65.5	25.4	74.6	10.9	89.1	22.2	77.8
Basic chemicals	3251	692	50.2	49.8	692	41.1	58.9	34.8	65.2	9.5	90.5	28.7	71.3
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	633	34.7	65.3	633	27.6	72.4	23.0	77.0	8.8	91.2	15.5	84.5
Pesticides, fertilizers, and other agricultural chemicals	3253	261	39.3	60.7	261	33.5	66.5	14.1	85.9	14.6	85.4	20.4	79.6
Pharmaceuticals and medicines	3254	1,384	40.8	59.2	1,384	25.3	74.7	14.5	85.5	5.4	94.6	16.4	83.6
Soaps, cleaning compounds, and toilet preparations	3256	929	51.1	48.9	929	40.1	59.9	28.5	71.5	19.1	80.9	34.0	66.0
Paints, coatings, adhesives, and other chemicals	3255, 3259	1,360	49.6	50.4	1,360	40.1	59.9	33.1	66.9	11.8	88.2	20.2	79.8
Plastics and rubber products	326	5,555	35.8	64.2	5,555	31.1	68.9	26.0	74.0	8.4	91.6	16.9	83.1
Nonmetallic mineral products	327	4,758	23.8	76.2	4,758	20.4	79.6	15.7	84.3	8.7	91.3	12.1	87.9
Primary metals	331	2,033	34.7	65.3	2,033	30.2	69.8	24.5	75.5	6.7	93.3	18.3	81.7
Fabricated metal products	332	24,182	29.5	70.5	24,182	24.1	75.9	20.9	79.1	6.5	93.5	13.0	87.0
Machinery	333	10,843	39.3	60.7	10,843	27.7	72.3	22.4	77.6	6.6	93.4	14.6	85.4
Agricultural implements	33311	530	42.3	57.7	530	25.6	74.4	21.5	78.5	6.8	93.2	12.7	87.3
Semiconductor machinery	333242	78	53.2	46.8	78	26.3	73.7	21.2	78.8	8.3	91.7	14.1	85.9
Engines, turbines, and power transmission equipment	3336	446	37.4	62.6	446	28.9	71.1	26.2	73.8	5.7	94.3	16.0	84.0
Other machinery	other 333	9,788	39.1	60.9	9,788	27.7	72.3	22.2	77.8	6.6	93.4	14.6	85.4
Computer and electronic products	334	5,477	52.8	47.2	5,477	32.6	67.4	27.0	73.0	8.1	91.9	16.8	83.2
Communications equipment	3342	736	59.4	40.6	736	28.4	71.6	26.1	73.9	5.3	94.7	6.6	93.4
Semiconductors and other electronic components	3344	2,008	44.5	55.5	2,008	31.1	68.9	27.1	72.9	8.6	91.4	17.7	82.3
Navigational, measuring, electromedical, and control instruments	3345	1,932	59.7	40.3	1,932	36.1	63.9	27.1	72.9	7.9	92.1	20.0	80.0
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	335	57.6	42.4	335	27.3	72.7	19.2	80.8	9.5	90.5	15.9	84.1
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	270	61.8	38.2	270	40.4	59.6	25.6	74.4	11.3	88.7	16.8	83.2
Other measuring and controlling devices	other 3345	1,328	59.8	40.2	1,328	37.4	62.6	29.4	70.6	6.8	93.2	21.7	78.3
Other computer and electronic products	other 334	800	51.2	48.8	800	32.1	67.9	27.0	73.0	9.6	90.4	16.6	83.4
Electrical equipment, appliances, and components	335	2,364	46.0	54.0	2,364	31.8	68.2	23.0	77.0	13.5	86.5	22.8	77.2
Transportation equipment	336	5,058	37.8	62.2	5,058	26.7	73.3	22.1	77.9	9.0	91.0	17.3	82.7
Automobiles, bodies, trailers, and parts	3361–63	3,134	37.7	62.3	3,134	28.2	71.8	24.4	75.6	10.6	89.4	19.8	80.2
Aerospace products and parts	3364	861	31.1	68.9	861	19.7	80.3	15.8	84.2	7.0	93.0	13.1	86.9
Aircraft, aircraft engines, and aircraft parts	336411–13	828	30.5	69.5	828	19.1	80.9	15.2	84.8	D	D	12.9	87.1
Guided missiles, space vehicles, and related parts	336414–15, 336419	33	47.0	53.0	33	34.9	65.1	31.8	68.2	D	D	16.7	83.3
Military armored vehicles, tanks, and tank components	336992	23	39.1	60.9	23	30.4	69.6	26.1	73.9	0.0	100.0	13.0	87.0
Other transportation	other 336	1,041	43.6	56.4	1,041	27.9	72.1	20.2	79.8	5.9	94.1	13.2	86.8
Furniture and related products	337	5,660	22.5	77.5	5,660	19.7	80.3	16.1	83.9	5.2	94.8	9.9	90.1

TABLE 65

Companies that introduced new or significantly improved processes, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products or processes			New or significantly improved processes								
						Any processes		Manufacturing or production methods		Logistics, delivery, or distribution methods		Support activities	
		Companies (number)	Yes[a]	No[b]	Companies (number)	Yes[c]	No[d]	Yes	No	Yes	No	Yes	No
Miscellaneous manufacturing	339	8,573	37.2	62.8	8,573	29.6	70.4	23.5	76.5	11.6	88.4	18.5	81.5
Medical equipment and supplies	3391	3,057	43.8	56.2	3,057	31.5	68.5	25.3	74.7	8.2	91.8	20.0	80.0
Other miscellaneous manufacturing	3399	5,516	33.6	66.4	5,516	28.5	71.5	22.5	77.5	13.6	86.4	17.7	82.3
Nonmanufacturing industries	21–23, 42–81	1,025,605	14.9	85.1	1,025,605	11.7	88.3	4.3	95.7	4.5	95.5	9.3	90.7
Mining, extraction, and support activities	21	6,761	14.8	85.2	6,761	10.9	89.1	3.1	96.9	2.9	97.1	7.4	92.6
Utilities	22	1,200	6.5	93.5	1,200	5.9	94.1	0.7	99.3	0.7	99.3	5.9	94.1
Wholesale trade	42	91,941	23.3	76.7	91,941	17.1	82.9	6.4	93.6	8.0	92.0	12.5	87.5
Electronic shopping and electronic auctions	454111–12	4,147	31.1	68.9	4,147	21.2	78.8	10.1	89.9	12.0	88.0	18.5	81.5
Transportation and warehousing	48–49	39,906	15.2	84.8	39,906	14.0	86.0	1.3	98.7	7.7	92.3	10.9	89.1
Information	51	17,113	28.2	71.8	17,113	17.9	82.1	8.6	91.4	8.2	91.8	12.2	87.8
Publishing	511	5,801	33.6	66.4	5,801	22.3	77.7	9.0	91.0	10.6	89.4	15.0	85.0
Newspaper, periodical, book, and directory publishers	5111	3,407	14.6	85.4	3,407	10.7	89.3	2.0	98.0	6.3	93.7	5.5	94.5
Software publishers	5112	2,393	60.7	39.3	2,393	38.8	61.2	19.0	81.0	16.7	83.3	28.6	71.4
Telecommunications	517	2,568	19.0	81.0	2,568	8.7	91.3	2.7	97.3	3.9	96.1	6.3	93.7
Data processing, hosting, and related services	518	3,105	47.4	52.6	3,105	32.3	67.7	19.1	80.9	13.7	86.3	23.5	76.5
Other information	other 51	5,640	16.2	83.8	5,640	9.6	90.4	5.0	95.0	4.8	95.2	5.7	94.3
Finance and insurance	52	45,282	13.7	86.3	45,282	11.2	88.8	2.4	97.6	3.6	96.4	9.5	90.5
Real estate and rental and leasing	53	36,032	9.5	90.5	36,032	6.2	93.8	1.3	98.7	2.1	97.9	5.8	94.2
Lessors of nonfinancial intangible assets (except copyrighted works)	533	110	13.7	86.3	110	10.0	90.0	D	D	4.6	95.4	7.3	92.7
Other real estate and rental and leasing	other 53	35,922	9.5	90.5	35,922	6.2	93.8	D	D	2.1	97.9	5.8	94.2
Professional, scientific, and technical services	54	154,446	18.5	81.5	154,446	13.8	86.2	6.2	93.8	5.1	94.9	11.1	88.9
Architectural, engineering, and related services	5413	25,214	20.9	79.1	25,214	17.4	82.6	9.9	90.1	4.7	95.3	13.0	87.0
Computer systems design and related services	5415	19,695	43.4	56.6	19,695	27.8	72.2	12.3	87.7	11.4	88.6	23.6	76.4
Scientific research and development services	5417	2,790	42.7	57.3	2,790	27.7	72.3	21.4	78.6	8.1	91.9	13.8	86.2
Biotechnology research and development	541711	543	39.6	60.4	543	27.6	72.4	22.3	77.7	8.3	91.7	14.8	85.2
Physical, engineering, and life sciences (except biotechnology) research and development	541712	2,055	45.4	54.6	2,055	28.7	71.3	22.6	77.4	8.0	92.0	13.5	86.5
Social sciences and humanities research and development	541720	192	23.2	76.8	192	17.5	82.5	6.2	93.8	8.3	91.7	14.3	85.7
Other professional, scientific, and technical services	other 54	106,747	12.7	87.3	106,747	10.1	89.9	3.8	96.2	4.0	96.0	8.2	91.8
Health care services	621–23	167,465	15.6	84.4	167,465	11.6	88.4	4.6	95.4	3.8	96.2	8.6	91.4
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	461,312	11.7	88.3	461,312	10.0	90.0	3.6	96.4	3.7	96.3	8.3	91.7
All companies (number of domestic employees)	–	1,138,671	16.7	83.3	1,138,671	13.1	86.9	5.9	94.1	4.8	95.2	9.8	90.2
Micro companies[e]													
5–9	–	307,934	15.4	84.6	307,934	11.7	88.3	5.2	94.8	4.7	95.3	8.2	91.8

TABLE 65

Companies that introduced new or significantly improved processes, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products or processes			New or significantly improved processes								
						Any processes		Manufacturing or production methods		Logistics, delivery, or distribution methods		Support activities	
		Companies (number)	Yes[a]	No[b]	Companies (number)	Yes[c]	No[d]	Yes	No	Yes	No	Yes	No
Small companies													
10–19	–	387,796	16.0	84.0	387,796	12.4	87.6	5.6	94.4	4.3	95.7	9.5	90.5
20–49	–	290,964	16.9	83.1	290,964	13.6	86.4	5.8	94.2	4.9	95.1	10.7	89.3
Medium companies													
50–99	–	83,527	20.7	79.3	83,527	17.2	82.8	8.3	91.7	6.8	93.2	12.5	87.5
100–249	–	43,846	20.4	79.6	43,846	16.7	83.3	7.8	92.2	5.1	94.9	12.0	88.0
Large companies													
250–499	–	11,925	18.0	82.0	11,925	14.5	85.5	7.4	92.6	4.4	95.6	10.4	89.6
500–999	–	5,669	20.3	79.7	5,669	12.0	88.0	7.9	92.1	4.4	95.6	8.5	91.5
1,000–4,999	–	5,125	19.4	80.6	5,125	14.8	85.2	9.1	90.9	6.3	93.7	10.8	89.2
5,000–9,999	–	721	28.5	71.5	721	23.2	76.8	17.4	82.6	14.7	85.3	19.0	81.0
10,000–24,999	–	838	47.2	52.8	838	43.6	56.4	10.0	90.0	39.4	60.6	41.6	58.4
25,000 or more	–	326	25.5	74.5	326	23.0	77.0	14.7	85.3	15.8	84.2	21.2	78.8

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

NAICS = 2012 North American Industry Classification System.

[a] Includes companies responding "Yes" to at least one of the items on the survey relating to new or significantly improved products or processes.
[b] Includes companies responding "No" to all of the items on the survey relating to new or significantly improved products or processes.
[c] Includes companies responding "Yes" to at least one of the items on the survey relating to new or significantly improved processes.
[d] Includes companies responding "No" to all of the items on the survey relating to new or significantly improved processes.
[e] Business R&D and Innovation Survey does not include companies with fewer than five 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. These statistics include an adjustment to account for item nonresponse beginning in survey year 2016. This change has affected the comparability of these company count estimates with estimates published for years prior to 2016. These statistics do not include an adjustment to account for unit nonresponse. Statistics are representative of companies located in the United States, regardless of whether the company performed or funded R&D.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey.

TABLE 66

Companies with and without R&D activity that introduced new or significantly improved products, by size of R&D program and the proportion of companies in each R&D program size classification: 2014–16

(Number and percent)

Company type	New or significantly improved products or processes			New or significantly improved products							
					Any good or service		Goods			Services	
	Companies (number)	Yes[a]	No[b]	Companies (number)	Yes[c]	No[d]	Yes	No		Yes	No
R&D programs (number)											
All companies	1,138,671	190,077	948,594	1,138,671	108,376	1,030,296	68,992	1,069,679		80,030	1,058,641
R&D activity[e]	31,883	22,217	9,666	31,883	19,399	12,484	17,244	14,639		9,804	22,079
< $10 million	29,623	20,837	8,786	29,623	18,150	11,473	16,141	13,482		9,069	20,554
≥ $10 million but < $50 million	1,463	851	612	1,463	754	709	642	821		436	1,027
≥ $50 million but < $100 million	309	197	112	309	180	129	164	145		106	203
≥ $100 million	488	332	156	488	316	172	296	192		193	295
No R&D activity	1,106,789	167,860	938,928	1,106,789	88,977	1,017,812	51,748	1,055,040		70,226	1,036,562
R&D program size proportions (percent)											
All companies	1,138,671	16.7	83.3	1,138,671	9.5	90.5	6.1	93.9		7.0	93.0
R&D activity[e]	31,883	69.7	30.3	31,883	60.8	39.2	54.1	45.9		30.7	69.3
< $10 million	29,623	70.3	29.7	29,623	61.3	38.7	54.5	45.5		30.6	69.4
≥ $10 million but < $50 million	1,463	58.2	41.8	1,463	51.5	48.5	43.9	56.1		29.8	70.2
≥ $50 million but < $100 million	309	63.6	36.4	309	58.1	41.9	53.2	46.8		34.3	65.7
≥ $100 million	488	68.1	31.9	488	64.7	35.3	60.7	39.3		39.6	60.4
No R&D activity	1,106,789	15.2	84.8	1,106,789	8.0	92.0	4.7	95.3		6.3	93.7

[a] Includes companies responding "Yes" to at least one of the items on the survey relating to new or significantly improved products or processes.
[b] Includes companies responding "No" to all of the items on the survey relating to new or significantly improved products or processes.
[c] Includes companies responding "Yes" to at least one of the items on the survey relating to new or significantly improved products.
[d] Includes companies responding "No" to both of the items on the survey relating to new or significantly improved products.
[e] Statistics are representative of companies located in the United States that performed or funded R&D.

Note(s)

Detail may not add to total because of rounding. These statistics include an adjustment to account for item nonresponse beginning in survey year 2016. This change has affected the comparability of these company count estimates with estimates published for years prior to 2016. These statistics do not include an adjustment to account for unit nonresponse.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey.

TABLE 67

Companies with and without R&D activity that introduced new or significantly improved processes, by size of R&D program and the proportion of companies in each R&D program size classification: 2014–16

(Number and percent)

Company type	New or significantly improved products or processes			New or significantly improved processes								
	Companies (number)	Yes[a]	No[b]	Companies (number)	Any process		Manufacturing or production methods		Logistics, delivery, or distribution methods		Support activities	
					Yes[c]	No[d]	Yes	No	Yes	No	Yes	No
R&D programs (number)												
All companies	1,138,671	190,077	948,594	1,138,671	148,930	989,741	66,873	1,071,798	54,774	1,083,897	112,050	1,026,621
R&D activity[e]	31,883	22,217	9,666	31,883	15,134	16,748	11,783	20,100	4,939	26,944	9,599	22,284
< $10 million	29,623	20,837	8,786	29,623	14,211	15,412	11,105	18,518	4,470	25,153	8,904	20,719
≥ $10 million but < $50 million	1,463	851	612	1,463	555	908	388	1,075	226	1,237	394	1,069
≥ $50 million but < $100 million	309	197	112	309	138	171	102	207	79	230	110	199
≥ $100 million	488	332	156	488	230	258	189	299	165	323	191	297
No R&D activity	1,106,789	167,860	938,928	1,106,789	133,796	972,992	55,090	1,051,698	49,835	1,056,953	102,451	1,004,337
R&D program size proportions (percent)												
All companies	1,138,671	16.7	83.3	1,138,671	13.1	86.9	5.9	94.1	4.8	95.2	9.8	90.2
R&D activity[e]	31,883	69.7	30.3	31,883	47.5	52.5	37.0	63.0	15.5	84.5	30.1	69.9
< $10 million	29,623	70.3	29.7	29,623	48.0	52.0	37.5	62.5	15.1	84.9	30.1	69.9
≥ $10 million but < $50 million	1,463	58.2	41.8	1,463	38.0	62.0	26.5	73.5	15.4	84.6	26.9	73.1
≥ $50 million but < $100 million	309	63.6	36.4	309	44.7	55.3	32.9	67.1	25.5	74.5	35.5	64.5
≥ $100 million	488	68.1	31.9	488	47.1	52.9	38.7	61.3	33.8	66.2	39.0	61.0
No R&D activity	1,106,789	15.2	84.8	1,106,789	12.1	87.9	5.0	95.0	4.5	95.5	9.3	90.7

[a] Includes companies responding "Yes" to at least one of the items on the survey relating to new or significantly improved products or processes.
[b] Includes companies responding "No" to all of the items on the survey relating to new or significantly improved products or processes.
[c] Includes companies responding "Yes" to at least one of the items on the survey relating to new or significantly improved processes.
[d] Includes companies responding "No" to all of the items on the survey relating to new or significantly improved processes.
[e] Statistics are representative of companies located in the United States that performed or funded R&D.

Note(s)

Detail may not add to total because of rounding. These statistics include an adjustment to account for item nonresponse beginning in survey year 2016. This change has affected the comparability of these company count estimates with estimates published for years prior to 2016. These statistics do not include an adjustment to account for unit nonresponse.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey.

TABLE 68

Companies that introduced new or significantly improved products new to the company's market or new only to the company, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products			New or significantly improved products								
					New to company's market			New only to company					
		Companies (number)	Yes[a]	No[b]	Companies (number)[c]	Yes	No		Companies[c] (number)	Yes	No		
Industry (number)													
All industries	21–23, 31–33, 42–81	1,138,671	108,376	1,030,296	108,376	105,980	2,395		108,376	87,249	21,127		
Manufacturing industries	31–33	113,066	24,937	88,129	24,937	23,805	1,132		24,937	19,997	4,940		
Food	311	9,763	1,791	7,972	1,791	1,716	75		1,791	1,514	277		
Beverages and tobacco products	312	2,863	644	2,220	644	634	10		644	568	75		
Textiles, apparel, and leather products	313–16	4,689	942	3,747	942	930	12		942	609	333		
Wood products	321	5,526	487	5,039	487	478	9	i	487	416	71		
Paper	322	1,447	265	1,182	265	219	46	i	265	237	27		
Printing and related support activities	323	8,604	1,378	7,226	1,378	1,372	6		1,378	1,101	277		
Petroleum and coal products	324	412	81	331	81	D	D		81	77	5		
Chemicals	325	5,259	1,881	3,378	1,881	1,718	163		1,881	1,581	300		
Basic chemicals	3251	692	268	424	268	246	22		268	231	37		
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	633	162	471	162	156	6		162	147	15		
Pesticides, fertilizers, and other agricultural chemicals	3253	261	76	186	76	D	D		76	65	11		
Pharmaceuticals and medicines	3254	1,384	460	924	460	372	88		460	311	149		
Soaps, cleaning compounds, and toilet preparations	3256	929	359	570	359	343	16		359	323	37		
Paints, coatings, adhesives, and other chemicals	3255, 3259	1,360	557	803	557	D	D		557	504	52		
Plastics and rubber products	326	5,555	1,419	4,136	1,419	1,358	61		1,419	1,254	164		
Nonmetallic mineral products	327	4,758	842	3,916	842	833	9		842	609	233		
Primary metals	331	2,033	280	1,752	280	267	13		280	231	50		
Fabricated metal products	332	24,182	4,173	20,009	4,173	4,095	78		4,173	3,491	683		
Machinery	333	10,843	3,132	7,710	3,132	3,014	119		3,132	2,500	632		
Agricultural implements	33311	530	196	335	196	177	19		196	143	53		
Semiconductor machinery	333242	78	37	41	37	32	5		37	28	9		
Engines, turbines, and power transmission equipment	3336	446	136	310	136	120	16	i	136	121	15		

TABLE 68

Companies that introduced new or significantly improved products new to the company's market or new only to the company, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products			New or significantly improved products					
					New to company's market			New only to company		
		Companies (number)	Yes[a]	No[b]	Companies (number)[c]	Yes	No	Companies[c] (number)	Yes	No
Other machinery	other 333	9,788	2,764	7,025	2,764	2,685	78	2,764	2,208	555
Computer and electronic products	334	5,477	2,528	2,949	2,528	2,352	176	2,528	1,946	582
Communications equipment	3342	736	416	321	416	396	20	416	265	150
Semiconductors and other electronic components	3344	2,008	708	1,299	708	637	72	708	601	108
Navigational, measuring, electromedical, and control instruments	3345	1,932	1,048	885	1,048	985	63	1,048	804	244
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	335	169	166	169	156	13	169	135	34
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	270	142	128	142	130	12	142	130	12
Other measuring and controlling devices	other 3345	1,328	737	591	737	699	38	737	539	198
Other computer and electronic products	other 334	800	356	444	356	335	21	356	275	81
Electrical equipment, appliances, and components	335	2,364	859	1,505	859	787	72	859	594	264
Transportation equipment	336	5,058	1,448	3,610	1,448	1,311	137	1,448	1,160	288
Automobiles, bodies, trailers, and parts	3361–63	3,134	884	2,249	884	777	107	884	769	116
Aerospace products and parts	3364	861	239	622	239	226	13	239	165	74
Aircraft, aircraft engines, and aircraft parts	336411–13	828	225	603	225	D	D	225	154	71
Guided missiles, space vehicles, and related parts	336414–15, 336419	33	14	20	14	D	D	14	10	3
Military armored vehicles, tanks, and tank components	336992	23	6	17	6	D	D	6	3	3
Other transportation	other 336	1,041	319	722	319	D	D	319	224	95
Furniture and related products	337	5,660	588	5,072	588	577	10	588	484	104
Miscellaneous manufacturing	339	8,573	2,199	6,374	2,199	D	D	2,199	1,626	573
Medical equipment and supplies	3391	3,057	942	2,115	942	843	100	942	665	277

TABLE 68

Companies that introduced new or significantly improved products new to the company's market or new only to the company, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products			New or significantly improved products								
					New to company's market				New only to company				
		Companies (number)	Yes[a]	No[b]	Companies (number)[c]	Yes	No		Companies[c] (number)	Yes	No	
Other miscellaneous manufacturing	3399	5,516	1,257	4,259	1,257	1,224	32		1,257	961	296	
Nonmanufacturing industries	21–23, 42–81	1,025,605	83,439	942,166	83,439	82,175	1,263		83,439	67,251	16,187	
Mining, extraction, and support activities	21	6,761	389	6,372	389	373	16	i	389	129	260	
Utilities	22	1,200	58	1,143	58	D	D		58	D	D	
Wholesale trade	42	91,941	13,596	78,344	13,596	13,570	26	i	13,596	11,006	2,590	
Electronic shopping and electronic auctions	454111–12	4,147	955	3,191	955	955	0		955	768	188	
Transportation and warehousing	48–49	39,906	2,132	37,775	2,132	2,063	69	i	2,132	2,122	10	
Information	51	17,113	4,062	13,051	4,062	3,780	282		4,062	3,230	832	
Publishing	511	5,801	1,570	4,231	1,570	1,520	50		1,570	1,285	285	
Newspaper, periodical, book, and directory publishers	5111	3,407	257	3,151	257	257	0		257	221	36	
Software publishers	5112	2,393	1,313	1,080	1,313	1,263	50		1,313	1,064	249	
Telecommunications	517	2,568	384	2,184	384	316	i 68	i	384	298	86	
Data processing, hosting, and related services	518	3,105	1,335	1,770	1,335	1,211	124		1,335	1,027	308	
Other information	other 51	5,640	773	4,867	773	733	40		773	620	153	
Finance and insurance	52	45,282	2,532	42,750	2,532	2,285	248	i	2,532	1,489	1,043	
Real estate and rental and leasing	53	36,032	1,959	34,073	1,959	D	D		1,959	1,942	17	
Lessors of nonfinancial intangible assets (except copyrighted works)	533	110	8	102	8	D	D		8	D	D	
Other real estate and rental and leasing	other 53	35,922	1,951	33,971	1,951	D	D		1,951	D	D	
Professional, scientific, and technical services	54	154,446	18,841	135,605	18,841	18,260	581		18,841	15,985	2,855	
Architectural, engineering, and related services	5413	25,214	3,262	21,952	3,262	3,125	138		3,262	2,831	431	
Computer systems design and related services	5415	19,695	7,179	12,515	7,179	7,084	96		7,179	6,006	1,173	
Scientific research and development services	5417	2,790	1,002	1,789	1,002	941	60		1,002	659	343	
Biotechnology research and development	541711	543	183	360	183	169	14		183	127	56	

TABLE 68

Companies that introduced new or significantly improved products new to the company's market or new only to the company, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products			New or significantly improved products								
					New to company's market				New only to company				
		Companies (number)	Yes[a]	No[b]	Companies (number)[c]	Yes	No		Companies[c] (number)	Yes	No		
Physical, engineering, and life sciences (except biotechnology) research and development	541712	2,055	784	1,270	784	738	46		784	507	277		
Social sciences and humanities research and development	541720	192	35	158	35	35	0		35	24	11		
Other professional, scientific, and technical services	other 54	106,747	7,397	99,350	7,397	7,110	287		7,397	6,489	908		
Health care services	621–23	167,465	15,018	152,447	15,018	15,006	12		15,018	11,708	3,310		
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	461,312	23,897	437,415	23,897	23,876	22		23,897	D	D		
All companies (number of domestic employees)	–	1,138,671	108,376	1,030,296	108,376	105,980	2,395		108,376	87,249	21,127		
Micro companies[d]													
5–9	–	307,934	28,229	279,705	28,229	27,880	348	i	28,229	23,292	4,937		
Small companies													
10–19	–	387,796	36,273	351,522	36,273	36,193	81		36,273	27,272	9,001		
20–49	–	290,964	26,191	264,773	26,191	25,923	268		26,191	21,926	4,265		
Medium companies													
50–99	–	83,527	9,520	74,008	9,520	8,968	551	i	9,520	8,043	1,477		
100–249	–	43,846	4,791	39,055	4,791	4,318	474		4,791	3,930	862		
Large companies													
250–499	–	11,925	1,360	10,565	1,360	1,064	297		1,360	1,069	291		
500–999	–	5,669	929	4,739	929	786	144		929	816	113		
1,000–4,999	–	5,125	731	4,394	731	569	162		731	603	128		
5,000–9,999	–	721	170	551	170	136	34		170	144	26		
10,000–24,999	–	838	118	720	118	95	23		118	106	12		
25,000 or more	–	326	64	262	64	49	15		64	50	14		
Industry proportions (percent)													
All industries	21–23, 31–33, 42–81	1,138,671	9.5	90.5	108,376	97.8	2.2		108,376	80.5	19.5		
Manufacturing industries	31–33	113,066	22.1	77.9	24,937	95.5	4.5		24,937	80.2	19.8		
Food	311	9,763	18.3	81.7	1,791	95.8	4.2		1,791	84.5	15.5		
Beverages and tobacco products	312	2,863	22.5	77.5	644	98.5	1.5		644	88.3	11.7		
Textiles, apparel, and leather products	313–16	4,689	20.1	79.9	942	98.7	1.3		942	64.6	35.4		
Wood products	321	5,526	8.8	91.2	487	98.2	1.8		487	85.4	14.6		
Paper	322	1,447	18.3	81.7	265	82.8	17.2		265	89.6	10.4		

TABLE 68

Companies that introduced new or significantly improved products new to the company's market or new only to the company, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products			New or significantly improved products					
					New to company's market			New only to company		
		Companies (number)	Yes[a]	No[b]	Companies (number)[c]	Yes	No	Companies[c] (number)	Yes	No
Printing and related support activities	323	8,604	16.0	84.0	1,378	99.5	0.5	1,378	79.9	20.1
Petroleum and coal products	324	412	19.7	80.3	81	D	D	81	94.5	5.5
Chemicals	325	5,259	35.8	64.2	1,881	91.3	8.7	1,881	84.0	16.0
Basic chemicals	3251	692	38.7	61.3	268	91.9	8.1	268	86.2	13.8
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	633	25.6	74.4	162	96.3	3.7	162	90.9	9.1
Pesticides, fertilizers, and other agricultural chemicals	3253	261	28.9	71.1	76	D	D	76	85.9	14.1
Pharmaceuticals and medicines	3254	1,384	33.2	66.8	460	80.8	19.2	460	67.6	32.4
Soaps, cleaning compounds, and toilet preparations	3256	929	38.7	61.3	359	95.5	4.5	359	89.8	10.2
Paints, coatings, adhesives, and other chemicals	3255, 3259	1,360	40.9	59.1	557	D	D	557	90.6	9.4
Plastics and rubber products	326	5,555	25.5	74.5	1,419	95.7	4.3	1,419	88.4	11.6
Nonmetallic mineral products	327	4,758	17.7	82.3	842	99.0	1.0	842	72.3	27.7
Primary metals	331	2,033	13.8	86.2	280	95.3	4.7	280	82.3	17.7
Fabricated metal products	332	24,182	17.3	82.7	4,173	98.1	1.9	4,173	83.6	16.4
Machinery	333	10,843	28.9	71.1	3,132	96.2	3.8	3,132	79.8	20.2
Agricultural implements	33311	530	36.9	63.1	196	90.2	9.8	196	73.1	26.9
Semiconductor machinery	333242	78	47.6	52.4	37	86.6	13.4	37	74.7	25.3
Engines, turbines, and power transmission equipment	3336	446	30.5	69.5	136	87.9	12.1	136	89.1	10.9
Other machinery	other 333	9,788	28.2	71.8	2,764	97.2	2.8	2,764	79.9	20.1
Computer and electronic products	334	5,477	46.2	53.8	2,528	93.1	6.9	2,528	77.0	23.0
Communications equipment	3342	736	56.5	43.5	416	95.2	4.8	416	63.8	36.2
Semiconductors and other electronic components	3344	2,008	35.3	64.7	708	89.9	10.1	708	84.8	15.2
Navigational, measuring, electromedical, and control instruments	3345	1,932	54.2	45.8	1,048	94.0	6.0	1,048	76.7	23.3
Electromedical, electrotherapeutic,	334510, 334517	335	50.6	49.4	169	92.4	7.6	169	80.0	20.0

TABLE 68

Companies that introduced new or significantly improved products new to the company's market or new only to the company, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products			New or significantly improved products					
					New to company's market			New only to company		
		Companies (number)	Yes[a]	No[b]	Companies (number)[c]	Yes	No	Companies[c] (number)	Yes	No
and irradiation apparatuses										
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	270	52.6	47.4	142	91.4	8.6	142	91.5	8.5
Other measuring and controlling devices	other 3345	1,328	55.5	44.5	737	94.8	5.2	737	73.1	26.9
Other computer and electronic products	other 334	800	44.5	55.5	356	94.2	5.8	356	77.4	22.6
Electrical equipment, appliances, and components	335	2,364	36.3	63.7	859	91.6	8.4	859	69.2	30.8
Transportation equipment	336	5,058	28.6	71.4	1,448	90.6	9.4	1,448	80.1	19.9
Automobiles, bodies, trailers, and parts	3361–63	3,134	28.2	71.8	884	87.8	12.2	884	86.9	13.1
Aerospace products and parts	3364	861	27.7	72.3	239	94.6	5.4	239	69.0	31.0
Aircraft, aircraft engines, and aircraft parts	336411–13	828	27.2	72.8	225	D	D	225	68.6	31.4
Guided missiles, space vehicles, and related parts	336414–15, 336419	33	40.9	59.1	14	D	D	14	75.9	24.1
Military armored vehicles, tanks, and tank components	336992	23	26.1	73.9	6	D	D	6	50.0	50.0
Other transportation	other 336	1,041	30.7	69.3	319	D	D	319	70.2	29.8
Furniture and related products	337	5,660	10.4	89.6	588	98.2	1.8	588	82.3	17.7
Miscellaneous manufacturing	339	8,573	25.6	74.4	2,199	D	D	2,199	73.9	26.1
Medical equipment and supplies	3391	3,057	30.8	69.2	942	89.4	10.6	942	70.6	29.4
Other miscellaneous manufacturing	3399	5,516	22.8	77.2	1,257	97.4	2.6	1,257	76.5	23.5
Nonmanufacturing industries	21–23, 42–81	1,025,605	8.1	91.9	83,439	98.5	1.5	83,439	80.6	19.4
Mining, extraction, and support activities	21	6,761	5.8	94.2	389	95.8	4.2	389	33.1	66.9
Utilities	22	1,200	4.8	95.2	58	D	D	58	D	D
Wholesale trade	42	91,941	14.8	85.2	13,596	99.8	0.2	13,596	80.9	19.1
Electronic shopping and electronic auctions	454111–12	4,147	23.0	77.0	955	100.0	0.0	955	80.4	19.6
Transportation and warehousing	48–49	39,906	5.3	94.7	2,132	96.8	3.2	2,132	99.5	0.5
Information	51	17,113	23.7	76.3	4,062	93.1	6.9	4,062	79.5	20.5

TABLE 68

Companies that introduced new or significantly improved products new to the company's market or new only to the company, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products			New or significantly improved products					
					New to company's market			New only to company		
		Companies (number)	Yes[a]	No[b]	Companies (number)[c]	Yes	No	Companies[c] (number)	Yes	No
Publishing	511	5,801	27.1	72.9	1,570	96.8	3.2	1,570	81.9	18.1
Newspaper, periodical, book, and directory publishers	5111	3,407	7.5	92.5	257	100.0	0.0	257	86.0	14.0
Software publishers	5112	2,393	54.9	45.1	1,313	96.2	3.8	1,313	81.1	18.9
Telecommunications	517	2,568	14.9	85.1	384	82.3	17.7	384	77.5	22.5
Data processing, hosting, and related services	518	3,105	43.0	57.0	1,335	90.7	9.3	1,335	76.9	23.1
Other information	other 51	5,640	13.7	86.3	773	94.9	5.1	773	80.2	19.8
Finance and insurance	52	45,282	5.6	94.4	2,532	90.2	9.8	2,532	58.8	41.2
Real estate and rental and leasing	53	36,032	5.4	94.6	1,959	D	D	1,959	99.2	0.8
Lessors of nonfinancial intangible assets (except copyrighted works)	533	110	7.3	92.7	8	D	D	8	D	D
Other real estate and rental and leasing	other 53	35,922	5.4	94.6	1,951	D	D	1,951	D	D
Professional, scientific, and technical services	54	154,446	12.2	87.8	18,841	96.9	3.1	18,841	84.8	15.2
Architectural, engineering, and related services	5413	25,214	12.9	87.1	3,262	95.8	4.2	3,262	86.8	13.2
Computer systems design and related services	5415	19,695	36.5	63.5	7,179	98.7	1.3	7,179	83.7	16.3
Scientific research and development services	5417	2,790	35.9	64.1	1,002	93.9	6.0	1,002	65.8	34.2
Biotechnology research and development	541711	543	33.7	66.3	183	92.2	7.8	183	69.6	30.4
Physical, engineering, and life sciences (except biotechnology) research and development	541712	2,055	38.2	61.8	784	94.1	5.9	784	64.7	35.3
Social sciences and humanities research and development	541720	192	18.0	82.0	35	100.0	0.0	35	69.4	30.6
Other professional, scientific, and technical services	other 54	106,747	6.9	93.1	7,397	96.1	3.9	7,397	87.7	12.3
Health care services	621–23	167,465	9.0	91.0	15,018	99.9	0.1	15,018	78.0	22.0

TABLE 68

Companies that introduced new or significantly improved products new to the company's market or new only to the company, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products			New or significantly improved products					
					New to company's market			New only to company		
		Companies (number)	Yes[a]	No[b]	Companies (number)[c]	Yes	No	Companies[c] (number)	Yes	No
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	461,312	5.2	94.8	23,897	99.9	0.1	23,897	D	D
All companies (number of domestic employees)	–	1,138,671	9.5	90.5	108,376	97.8	2.2	108,376	80.5	19.5
Micro companies[d]										
5–9	–	307,934	9.2	90.8	28,229	98.8	1.2	28,229	82.5	17.5
Small companies										
10–19	–	387,796	9.4	90.6	36,273	99.8	0.2	36,273	75.2	24.8
20–49	–	290,964	9.0	91.0	26,191	99.0	1.0	26,191	83.7	16.3
Medium companies										
50–99	–	83,527	11.4	88.6	9,520	94.2	5.8	9,520	84.5	15.5
100–249	–	43,846	10.9	89.1	4,791	90.1	9.9	4,791	82.0	18.0
Large companies										
250–499	–	11,925	11.4	88.6	1,360	78.2	21.8	1,360	78.6	21.4
500–999	–	5,669	16.4	83.6	929	84.2	15.8	929	87.8	12.2
1,000–4,999	–	5,125	14.3	85.7	731	77.9	22.1	731	82.4	17.6
5,000–9,999	–	721	23.6	76.4	170	80.1	19.9	170	84.5	15.5
10,000–24,999	–	838	14.1	85.9	118	80.4	19.6	118	89.5	10.5
25,000 or more	–	326	19.5	80.5	64	77.2	22.8	64	78.0	22.0

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

NAICS = 2012 North American Industry Classification System.

[a] Includes companies responding "Yes" to at least one of the items on the survey relating to new or significantly improved products.
[b] Includes companies responding "No" to both of the items on the survey relating to new or significantly improved products.
[c] Statistics for number of companies are not based on companies responding to this survey item. Rather, they are based on companies responding "Yes" to at least one of the items on the survey relating to new or significantly improved products.
[d] Business R&D and Innovation Survey does not include companies with fewer than five 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. These statistics include an adjustment to account for item nonresponse beginning in survey year 2016. This change has affected the comparability of these company count estimates with estimates published for years prior to 2016. These statistics do not include an adjustment to account for unit nonresponse. Statistics are representative of companies located in the United States, regardless of whether the company performed or funded R&D.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey.

TABLE 69

Companies that introduced new or significantly improved products and sales from products, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products[a]			New or significantly improved products				Sales of products unchanged or marginally modified (US$millions)
					New to company's market		New only to company		
		Companies (number)	Yes[b]	No[c]	Companies (number)[d]	Sales (US$millions)	Companies (number)[d]	Sales (US$millions)	
Industry (number)									
All industries	21–23, 31–33, 42–81	1,138,671	108,376	1,030,296	69,538	810,268	76,347	791,444	35,476,169
Manufacturing industries	31–33	113,066	24,937	88,129	16,464	526,449	17,871	488,074	8,042,701
Food	311	9,763	1,791	7,972	901	38,767	1,470	47,293	883,323
Beverages and tobacco products	312	2,863	644	2,220	435	1,371	554	1,029	259,770
Textiles, apparel, and leather products	313–16	4,689	942	3,747	646	11,000	484	6,481	136,099
Wood products	321	5,526	487	5,039	288	856	354	2,534	155,538
Paper	322	1,447	265	1,182	140	9,632	220	13,342	121,599
Printing and related support activities	323	8,604	1,378	7,226	982	2,362	998	3,350	90,488
Petroleum and coal products	324	412	81	331	35	2,823	71	2,795	397,661
Chemicals	325	5,259	1,881	3,378	1,267	148,523	1,327	88,292	1,273,566
Basic chemicals	3251	692	268	424	186	5,932	198	4,878	280,327
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	633	162	471	106	9,278	141	8,433	56,838
Pesticides, fertilizers, and other agricultural chemicals	3253	261	76	186	63	4,654	60	11,459	47,534
Pharmaceuticals and medicines	3254	1,384	460	924	331	54,433	272	46,524	674,352
Soaps, cleaning compounds, and toilet preparations	3256	929	359	570	245	68,312	272	10,294	117,556
Paints, coatings, adhesives, and other chemicals	3255, 3259	1,360	557	803	336	5,913	384	6,704	96,960
Plastics and rubber products	326	5,555	1,419	4,136	954	26,577	1,110	15,134	283,497
Nonmetallic mineral products	327	4,758	842	3,916	598	1,091	598	3,130	150,275
Primary metals	331	2,033	280	1,752	164	4,484	219	11,445	216,386
Fabricated metal products	332	24,182	4,173	20,009	2,657	11,056	3,068	15,080	268,250
Machinery	333	10,843	3,132	7,710	2,087	27,392	2,195	56,319	444,939
Agricultural implements	33311	530	196	335	151	7,919	138	17,394	42,279
Semiconductor machinery	333242	78	37	41	24	1,062	D	D	D
Engines, turbines, and power transmission equipment	3336	446	136	310	97	1,520	D	D	D

TABLE 69

Companies that introduced new or significantly improved products and sales from products, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products[a]			New or significantly improved products				Sales of products unchanged or marginally modified (US$millions)
					New to company's market		New only to company		
		Companies (number)	Yes[b]	No[c]	Companies (number)[d]	Sales (US$millions)	Companies (number)[d]	Sales (US$millions)	
Other machinery	other 333	9,788	2,764	7,025	1,816	16,891	D	D	334,405
Computer and electronic products	334	5,477	2,528	2,949	1,841	109,678	1,724	107,979	1,085,715
Communications equipment	3342	736	416	321	342	24,252	230	24,304	100,959
Semiconductors and other electronic components	3344	2,008	708	1,299	531	30,324	551	10,957	390,145
Navigational, measuring, electromedical, and control instruments	3345	1,932	1,048	885	770	37,131	709	11,062	216,847
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	335	169	166	150	5,480	129	492	33,320
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	270	142	128	73	25,666	120	2,585	75,598
Other measuring and controlling devices	other 3345	1,328	737	591	547	5,985	460	7,985	107,929
Other computer and electronic products	other 334	800	356	444	198	17,971	234	61,655	377,764
Electrical equipment, appliances, and components	335	2,364	859	1,505	549	15,119	515	26,864	228,422
Transportation equipment	336	5,058	1,448	3,610	942	90,677	1,086	60,317	1,610,418
Automobiles, bodies, trailers, and parts	3361–63	3,134	884	2,249	586	42,971	734	33,161	1,158,128
Aerospace products and parts	3364	861	239	622	154	42,522	158	23,299	363,751
Aircraft, aircraft engines, and aircraft parts	336411–13	828	225	603	143	40,094	149	20,925	346,486
Guided missiles, space vehicles, and related parts	336414–15, 336419	33	14	20	11	2,428	9	2,375	17,265
Military armored vehicles, tanks, and tank components	336992	23	6	17	5	10	3	9	502
Other transportation	other 336	1,041	319	722	196	5,173	191	3,848	88,037
Furniture and related products	337	5,660	588	5,072	431	3,573	411	4,512	72,328
Miscellaneous manufacturing	339	8,573	2,199	6,374	1,547	21,468	1,467	22,178	364,428
Medical equipment and supplies	3391	3,057	942	2,115	531	15,360	556	14,589	237,355

TABLE 69

Companies that introduced new or significantly improved products and sales from products, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products[a]			New or significantly improved products				Sales of products unchanged or marginally modified (US$millions)
					New to company's market		New only to company		
		Companies (number)	Yes[b]	No[c]	Companies (number)[d]	Sales (US$millions)	Companies (number)[d]	Sales (US$millions)	
Other miscellaneous manufacturing	3399	5,516	1,257	4,259	1,016	6,108	912	7,589	127,074
Nonmanufacturing industries	21–23, 42–81	1,025,605	83,439	942,166	53,074	283,820	58,476	303,370	27,433,467
Mining, extraction, and support activities	21	6,761	389	6,372	359	4,533	128	9,959	713,759
Utilities	22	1,200	58	1,143	9	242	11	361	495,723
Wholesale trade	42	91,941	13,596	78,344	10,074	34,087	9,951	36,783	3,608,834
Electronic shopping and electronic auctions	454111–12	4,147	955	3,191	717	2,785	752	4,136	240,754
Transportation and warehousing	48–49	39,906	2,132	37,775	1,061	1,584	1,682	7,588	1,160,488
Information	51	17,113	4,062	13,051	2,486	89,613	2,959	111,538	1,587,311
Publishing	511	5,801	1,570	4,231	1,066	12,812	1,176	17,878	637,366
Newspaper, periodical, book, and directory publishers	5111	3,407	257	3,151	167	125	217	198	106,532
Software publishers	5112	2,393	1,313	1,080	899	12,687	959	17,680	530,834
Telecommunications	517	2,568	384	2,184	114	63,265	273	80,092	479,248
Data processing, hosting, and related services	518	3,105	1,335	1,770	960	12,141	959	9,438	160,846
Other information	other 51	5,640	773	4,867	346	1,395	551	4,129	309,851
Finance and insurance	52	45,282	2,532	42,750	1,400	53,457	950	31,102	3,657,659
Real estate and rental and leasing	53	36,032	1,959	34,073	777	1,026	1,481	4,578	419,313
Lessors of nonfinancial intangible assets (except copyrighted works)	533	110	8	102	4	4	4	80	11,940
Other real estate and rental and leasing	other 53	35,922	1,951	33,971	773	1,021	1,477	4,498	407,373
Professional, scientific, and technical services	54	154,446	18,841	135,605	11,442	44,593	13,321	41,201	1,681,549
Architectural, engineering, and related services	5413	25,214	3,262	21,952	1,947	4,986	2,578	6,448	312,064
Computer systems design and related services	5415	19,695	7,179	12,515	4,614	25,863	5,233	20,382	440,000
Scientific research and development services	5417	2,790	1,002	1,789	785	4,809	543	3,772	77,355
Biotechnology research and development	541711	543	183	360	131	323	99	770	30,217

TABLE 69

Companies that introduced new or significantly improved products and sales from products, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products[a]			New or significantly improved products				Sales of products unchanged or marginally modified (US$millions)
					New to company's market		New only to company		
		Companies (number)	Yes[b]	No[c]	Companies (number)[d]	Sales (US$millions)	Companies (number)[d]	Sales (US$millions)	
Physical, engineering, and life sciences (except biotechnology) research and development	541712	2,055	784	1,270	627	4,423	421	2,980	43,433
Social sciences and humanities research and development	541720	192	35	158	26	63	22	22	3,705
Other professional, scientific, and technical services	other 54	106,747	7,397	99,350	4,096	8,936	4,968	10,598	852,129
Health care services	621–23	167,465	15,018	152,447	8,231	3,952	10,113	8,255	805,648
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	461,312	23,897	437,415	16,518	47,948	17,126	47,869	13,062,429
All companies (number of domestic employees)	–	1,138,671	108,376	1,030,296	69,538	810,268	76,347	791,444	35,476,169
Micro companies[e]									
5–9	–	307,934	28,229	279,705	17,889	11,562	20,407	9,492	743,073
Small companies									
10–19	–	387,796	36,273	351,522	22,873	21,877	23,812	23,786	1,560,263
20–49	–	290,964	26,191	264,773	18,161	36,956	18,987	41,743	2,701,107
Medium companies									
50–99	–	83,527	9,520	74,008	5,905	28,092	7,319	42,987	1,637,880
100–249	–	43,846	4,791	39,055	2,873	34,008	3,567	32,479	2,089,976
Large companies									
250–499	–	11,925	1,360	10,565	740	20,744	971	32,500	1,285,651
500–999	–	5,669	929	4,739	407	26,825	513	29,365	1,653,502
1,000–4,999	–	5,125	731	4,394	461	105,378	523	113,006	4,044,506
5,000–9,999	–	721	170	551	123	60,041	132	84,908	2,362,899
10,000–24,999	–	838	118	720	73	216,909	85	175,042	4,380,061
25,000 or more	–	326	64	262	32	247,875	30	206,135	13,017,252
Industry proportions (percent)									
All industries	21–23, 31–33, 42–81	1,138,671	9.5	90.5	69,538	2.2	76,347	2.1	95.7
Manufacturing industries	31–33	113,066	22.1	77.9	16,464	5.8	17,871	5.4	88.8
Food	311	9,763	18.3	81.7	901	4.0	1,470	4.9	91.1
Beverages and tobacco products	312	2,863	22.5	77.5	435	0.5	554	0.4	99.1
Textiles, apparel, and leather products	313–16	4,689	20.1	79.9	646	7.2	484	4.2	88.6
Wood products	321	5,526	8.8	91.2	288	0.5	354	1.6	97.9

TABLE 69

Companies that introduced new or significantly improved products and sales from products, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products[a]			New or significantly improved products				Sales of products unchanged or marginally modified (US$millions)
					New to company's market		New only to company		
		Companies (number)	Yes[b]	No[c]	Companies (number)[d]	Sales (US$millions)	Companies (number)[d]	Sales (US$millions)	
Paper	322	1,447	18.3	81.7	140	6.7	220	9.2	84.1
Printing and related support activities	323	8,604	16.0	84.0	982	2.5	998	3.5	94.1
Petroleum and coal products	324	412	19.7	80.3	35	0.7	71	0.7	98.6
Chemicals	325	5,259	35.8	64.2	1,267	9.8	1,327	5.8	84.3
Basic chemicals	3251	692	38.7	61.3	186	2.0	198	1.7	96.3
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	633	25.6	74.4	106	12.4	141	11.3	76.2
Pesticides, fertilizers, and other agricultural chemicals	3253	261	28.9	71.1	63	7.3	60	18.0	74.7
Pharmaceuticals and medicines	3254	1,384	33.2	66.8	331	7.0	272	6.0	87.0
Soaps, cleaning compounds, and toilet preparations	3256	929	38.7	61.3	245	34.8	272	5.2	59.9
Paints, coatings, adhesives, and other chemicals	3255, 3259	1,360	40.9	59.1	336	5.4	384	6.1	88.5
Plastics and rubber products	326	5,555	25.5	74.5	954	8.2	1,110	4.7	87.2
Nonmetallic mineral products	327	4,758	17.7	82.3	598	0.7	598	2.0	97.3
Primary metals	331	2,033	13.8	86.2	164	1.9	219	4.9	93.1
Fabricated metal products	332	24,182	17.3	82.7	2,657	3.8	3,068	5.1	91.1
Machinery	333	10,843	28.9	71.1	2,087	5.2	2,195	10.7	84.2
Agricultural implements	33311	530	36.9	63.1	151	11.7	138	25.7	62.6
Semiconductor machinery	333242	78	47.6	52.4	24	3.4	D	D	D
Engines, turbines, and power transmission equipment	3336	446	30.5	69.5	97	2.7	D	D	D
Other machinery	other 333	9,788	28.2	71.8	1,816	4.5	D	D	89.6
Computer and electronic products	334	5,477	46.2	53.8	1,841	8.4	1,724	8.3	83.3
Communications equipment	3342	736	56.5	43.5	342	16.2	230	16.3	67.5
Semiconductors and other electronic components	3344	2,008	35.3	64.7	531	7.0	551	2.5	90.4
Navigational, measuring, electromedical, and control instruments	3345	1,932	54.2	45.8	770	14.0	709	4.2	81.8

TABLE 69

Companies that introduced new or significantly improved products and sales from products, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products[a]			New or significantly improved products				Sales of products unchanged or marginally modified (US$millions)
					New to company's market		New only to company		
		Companies (number)	Yes[b]	No[c]	Companies (number)[d]	Sales (US$millions)	Companies (number)[d]	Sales (US$millions)	
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	335	50.6	49.4	150	13.9	129	1.3	84.8
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	270	52.6	47.4	73	24.7	120	2.5	72.8
Other measuring and controlling devices	other 3345	1,328	55.5	44.5	547	4.9	460	6.6	88.5
Other computer and electronic products	other 334	800	44.5	55.5	198	3.9	234	13.5	82.6
Electrical equipment, appliances, and components	335	2,364	36.3	63.7	549	5.6	515	9.9	84.5
Transportation equipment	336	5,058	28.6	71.4	942	5.1	1,086	3.4	91.4
Automobiles, bodies, trailers, and parts	3361–63	3,134	28.2	71.8	586	3.5	734	2.7	93.8
Aerospace products and parts	3364	861	27.7	72.3	154	9.9	158	5.4	84.7
Aircraft, aircraft engines, and aircraft parts	336411–13	828	27.2	72.8	143	9.8	149	5.1	85.0
Guided missiles, space vehicles, and related parts	336414–15, 336419	33	40.9	59.1	11	11.0	9	10.8	78.2
Military armored vehicles, tanks, and tank components	336992	23	26.1	73.9	5	1.9	3	1.7	96.4
Other transportation	other 336	1,041	30.7	69.3	196	5.3	191	4.0	90.7
Furniture and related products	337	5,660	10.4	89.6	431	4.4	411	5.6	89.9
Miscellaneous manufacturing	339	8,573	25.6	74.4	1,547	5.3	1,467	5.4	89.3
Medical equipment and supplies	3391	3,057	30.8	69.2	531	5.7	556	5.5	88.8
Other miscellaneous manufacturing	3399	5,516	22.8	77.2	1,016	4.3	912	5.4	90.3
Nonmanufacturing industries	21–23, 42–81	1,025,605	8.1	91.9	53,074	1.0	58,476	1.1	97.9
Mining, extraction, and support activities	21	6,761	5.8	94.2	359	0.6	128	1.4	98.0
Utilities	22	1,200	4.8	95.2	9	*	11	0.1	99.9
Wholesale trade	42	91,941	14.8	85.2	10,074	0.9	9,951	1.0	98.1
Electronic shopping and electronic auctions	454111–12	4,147	23.0	77.0	717	1.1	752	1.7	97.2

TABLE 69

Companies that introduced new or significantly improved products and sales from products, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products[a]			New or significantly improved products				Sales of products unchanged or marginally modified (US$millions)
					New to company's market		New only to company		
		Companies (number)	Yes[b]	No[c]	Companies (number)[d]	Sales (US$millions)	Companies (number)[d]	Sales (US$millions)	
Transportation and warehousing	48–49	39,906	5.3	94.7	1,061	0.1	1,682	0.6	99.2
Information	51	17,113	23.7	76.3	2,486	5.0	2,959	6.2	88.8
Publishing	511	5,801	27.1	72.9	1,066	1.9	1,176	2.7	95.4
Newspaper, periodical, book, and directory publishers	5111	3,407	7.5	92.5	167	0.1	217	0.2	99.7
Software publishers	5112	2,393	54.9	45.1	899	2.3	959	3.2	94.6
Telecommunications	517	2,568	14.9	85.1	114	10.2	273	12.9	77.0
Data processing, hosting, and related services	518	3,105	43.0	57.0	960	6.7	959	5.2	88.2
Other information	other 51	5,640	13.7	86.3	346	0.4	551	1.3	98.2
Finance and insurance	52	45,282	5.6	94.4	1,400	1.4	950	0.8	97.7
Real estate and rental and leasing	53	36,032	5.4	94.6	777	0.2	1,481	1.1	98.7
Lessors of nonfinancial intangible assets (except copyrighted works)	533	110	7.3	92.7	4	*	4	0.7	99.3
Other real estate and rental and leasing	other 53	35,922	5.4	94.6	773	0.2	1,477	1.1	98.7
Professional, scientific, and technical services	54	154,446	12.2	87.8	11,442	2.5	13,321	2.3	95.1
Architectural, engineering, and related services	5413	25,214	12.9	87.1	1,947	1.5	2,578	2.0	96.5
Computer systems design and related services	5415	19,695	36.5	63.5	4,614	5.3	5,233	4.2	90.5
Scientific research and development services	5417	2,790	35.9	64.1	785	5.6	543	4.4	90.0
Biotechnology research and development	541711	543	33.7	66.3	131	1.0	99	2.5	96.5
Physical, engineering, and life sciences (except biotechnology) research and development	541712	2,055	38.2	61.8	627	8.7	421	5.9	85.4
Social sciences and humanities research and development	541720	192	18.0	82.0	26	1.7	22	0.6	97.7

TABLE 69

Companies that introduced new or significantly improved products and sales from products, by industry, industry proportions, and company size: 2014–16

(Number and percent)

Industry and company size	NAICS code	New or significantly improved products[a]			New or significantly improved products				Sales of products unchanged or marginally modified (US$millions)
					New to company's market		New only to company		
		Companies (number)	Yes[b]	No[c]	Companies (number)[d]	Sales (US$millions)	Companies (number)[d]	Sales (US$millions)	
Other professional, scientific, and technical services	other 54	106,747	6.9	93.1	4,096	1.0	4,968	1.2	97.8
Health care services	621–23	167,465	9.0	91.0	8,231	0.5	10,113	1.0	98.5
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	461,312	5.2	94.8	16,518	0.4	17,126	0.4	99.3
All companies (number of domestic employees)	–	1,138,671	9.5	90.5	69,538	2.2	76,347	2.1	95.7
Micro companies[e]									
5–9	–	307,934	9.2	90.8	17,889	1.5	20,407	1.2	97.2
Small companies									
10–19	–	387,796	9.4	90.6	22,873	1.4	23,812	1.5	97.2
20–49	–	290,964	9.0	91.0	18,161	1.3	18,987	1.5	97.2
Medium companies									
50–99	–	83,527	11.4	88.6	5,905	1.6	7,319	2.5	95.8
100–249	–	43,846	10.9	89.1	2,873	1.6	3,567	1.5	96.9
Large companies									
250–499	–	11,925	11.4	88.6	740	1.5	971	2.4	96.0
500–999	–	5,669	16.4	83.6	407	1.6	513	1.7	96.7
1,000–4,999	–	5,125	14.3	85.7	461	2.5	523	2.7	94.9
5,000–9,999	–	721	23.6	76.4	123	2.4	132	3.4	94.2
10,000–24,999	–	838	14.1	85.9	73	4.5	85	3.7	91.8
25,000 or more	–	326	19.5	80.5	32	1.8	30	1.5	96.6

* = amount < 0.05%; D = data withheld to avoid disclosing operations of individual companies.

NAICS = 2012 North American Industry Classification System.

[a] These statistics include an adjustment to account for item nonresponse beginning in survey year 2016. This change has affected the comparability of these company count estimates with estimates published for years prior to 2016.

[b] Includes companies that responded "Yes" to at least one of the items on the survey relating to new or significantly improved products.

[c] Includes companies that responded "No" to both of the items on the survey relating to new or significantly improved products.

[d] Statistics for number of companies are based only on companies in the United States that reported data for this survey item, regardless of whether the company performed or funded R&D.

[e] Business R&D and Innovation Survey does not include companies with fewer than five 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. These statistics include an adjustment to account for item nonresponse. These statistics do not include an adjustment to account for unit nonresponse. Statistics are representative of companies located in the United States, regardless of whether the company performed or funded R&D.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey.

TABLE 70

Worldwide R&D paid for by the company and others and performed by the company, by industry and company size: 2008–16

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008[a]	2009	2010	2011	2012	2013	2014	2015	2016
All industries	21–23, 31–33, 42–81	NA	336,571	338,451	359,490	374,916	396,352	416,343	429,174	451,831
Manufacturing industries	31–33	NA	236,858	243,611	253,821	261,697	276,110	285,661	287,895	303,241
Food	311	NA	4,916	D	5,589	5,163	6,335	6,136	6,058 i	5,821
Beverages and tobacco products	312	NA	933	D	D	D	1,358	1,423	1,529	D
Textiles, apparel, and leather products	313–16	NA	519	522	656	605	759	734	818	1,246 i
Wood products	321	NA	283	254	211	282	222	341 i	198	203
Paper	322	NA	NA	1,665	769	858	1,022	880	867	929
Printing and related support activities	323	NA	217	269	212	291 i	258 i	238	198 i	223 i
Petroleum and coal products	324	NA	NA	D	1,281	D	327	298	252	425
Chemicals	325	NA	64,442	72,610	72,068	70,218	74,551	79,428	80,961	85,888
Basic chemicals	3251	NA	NA	2,671	5,166	3,400	3,336	3,633	3,677	3,082
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	NA	NA	1,038	1,117	D	1,794	1,842	1,780	1,044
Pesticides, fertilizers, and other agricultural chemicals	3253	NA	NA	D	2,049	D	1,966 i	2,042 i	3,405	D
Pharmaceuticals and medicines	3254	NA	53,456	60,537	58,866	58,920	62,480	66,731	D	74,542
Soaps, cleaning compounds, and toilet preparations	3256	NA	NA	3,285	3,386	3,212	3,358	3,501	D	3,590
Paints, coatings, adhesives, and other chemicals	3255, 3259	NA	NA	D	1,485	D	1,617	1,679 i	1,664	D
Plastics and rubber products	326	NA	2,982	2,515	2,640	4,446	4,576	4,519	2,906	4,583
Nonmetallic mineral products	327	NA	1,153 i	1,596	1,428	1,588 i	1,578	1,599	1,487	1,474
Primary metals	331	NA	993	802	763	818	700	770	711	662
Fabricated metal products	332	NA	2,174	1,818	1,993	1,949 i	2,303 i	2,329	2,467 i	2,484
Machinery	333	NA	11,156	12,403	18,312	17,462	15,420	15,089	16,827	15,764
Agricultural implements	33311	NA	NA	D	1,570	2,142	2,243	D	2,152	2,189
Semiconductor machinery	333242	NA	NA	2,469	2,727	1,357	3,645	3,434	3,812	4,138
Engines, turbines, and power transmission equipment	3336	NA	NA	D	D	D	1,795	2,894	2,920	2,327
Other machinery	other 333	NA	NA	6,566	D	D	7,736	D	7,943	7,109
Computer and electronic products	334	NA	68,772	75,345	79,145	87,406	90,114	94,199	92,860	98,175
Communications equipment	3342	NA	NA	17,069	15,197	18,877	20,392	22,048	23,049	16,075

TABLE 70

Worldwide R&D paid for by the company and others and performed by the company, by industry and company size: 2008–16

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008[a]	2009	2010	2011	2012	2013	2014	2015	2016
Semiconductors and other electronic components	3344	NA	26,082	29,354	32,146	38,300	40,611	42,028	40,348	41,695
Navigational, measuring, electromedical, and control instruments	3345	NA	16,498	17,905	18,242	18,640	18,046	18,993	17,020	18,111
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	NA	NA	4,548	4,987	4,999	2,837	5,049	3,599	3,553
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	NA	NA	8,769	8,641	8,312	8,753	8,486	8,033	8,373
Other measuring and controlling devices	other 3345	NA	NA	4,588	4,615	5,329	6,456	5,458	5,387	6,185
Other computer and electronic products	other 334	NA	NA	11,017	13,559	11,589	11,065	11,130	12,443	22,294
Electrical equipment, appliances, and components	335	NA	4,475	4,767	5,319	4,140	5,738	5,705	5,710	6,207
Transportation equipment	336	NA	56,183	51,362	49,030	50,415	51,547	56,597	57,698	60,326
Automobiles, bodies, trailers, and parts	3361–63	NA	NA	17,764	D	D	23,610	D	25,735	29,171
Aerospace products and parts	3364	NA	36,409	31,627	26,858	D	25,684	D	29,113	28,462
Aircraft, aircraft engines, and aircraft parts	336411–13	NA	NA	D	D	D	D	D	27,463	27,034
Guided missiles, space vehicles, and related parts	336414–15, 336419	NA	NA	D	D	1,425	D	D	1,649 i	1,428 i
Military armored vehicles, tanks, and tank components	336992	NA	NA	D	52	D	9 i	D	16	D
Other transportation	other 336	NA	NA	D	D	D	2,245	D	2,834	D
Furniture and related products	337	NA	433	407	347	383	401	422	477	406
Miscellaneous manufacturing	339	NA	NA	9,528	D	D	18,900	14,951	15,869	D
Medical equipment and supplies	3391	NA	NA	7,461	D	10,311	15,938	12,091	13,166	14,143
Other miscellaneous manufacturing	3399	NA	NA	2,066	D	D	2,962	2,860	2,703 i	D
Nonmanufacturing industries	21–23, 42–81	NA	99,713	94,840	105,669	113,220	120,242	130,682	141,279	148,589
Mining, extraction, and support activities	21	NA	NA	2,785	2,597	D	4,452	D	4,348	3,604
Utilities	22	NA	NA	442	396	368	317	314	483	353
Wholesale trade	42	NA	NA	1,145	1,697 i	2,165 i	459 i	D	1,723 i	465 i

TABLE 70

Worldwide R&D paid for by the company and others and performed by the company, by industry and company size: 2008–16

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008[a]	2009	2010	2011	2012	2013	2014	2015	2016
Electronic shopping and electronic auctions	454111–12	NA	NA	D	D	D	1,845	D	D	D
Transportation and warehousing	48–49	NA	NA	124	159	186	D	692	416	495
Information	51	NA	43,197	45,099	52,341	56,815	68,375	78,013	77,965	84,133
Publishing	511	NA	33,171	33,883	36,310	36,947	43,821	46,806	42,190	42,272
Newspaper, periodical, book, and directory publishers	5111	NA	NA	826	401	221 i	348 i	92 i	107 i	84 i
Software publishers	5112	NA	NA	33,058	35,910	36,726	43,473	46,714	42,083	42,188
Telecommunications	517	NA	1,609	2,043	2,267	2,787 i	3,112	3,830	3,648	D
Data processing, hosting, and related services	518	NA	3,008	2,895	5,450	5,574	7,787	10,356	10,600	13,666
Other information	other 51	NA	5,410	6,278	8,313	11,506	13,654	17,022	21,526	D
Finance and insurance	52	NA	NA	2,568	3,943	4,159	4,999	4,748	6,359	8,468
Real estate and rental and leasing	53	NA	NA	367	D	400	202	268	313	477
Lessors of nonfinancial intangible assets (except copyrighted works)	533	NA	NA	NA	365	379	D	58	D	27
Other real estate and rental and leasing	other 53	NA	NA	NA	D	21 i	D	210	D	450
Professional, scientific, and technical services	54	NA	47,709	37,108	39,731	40,843	37,345	37,995 i	46,255	46,771
Architectural, engineering, and related services	5413	NA	3,384	4,156	D	2,541 i	3,173	3,374	4,158 i	3,475
Computer systems design and related services	5415	NA	15,310	12,458	13,181	13,404 i	10,535 i	12,579 i	17,227	19,168
Scientific research and development services	5417	NA	19,307	16,408	19,295	20,225	18,478	17,870	20,630	20,254
Biotechnology research and development	541711	NA	8,492	6,266	7,985	8,364	5,889	4,898	7,114 i	6,079
Physical, engineering, and life sciences (except biotechnology) research and development	541712	NA	10,129	9,591	10,697	11,261	11,794	12,291	12,807	13,452
Social sciences and humanities research and development	541720	NA	686	551	613	600	795	682	709	723
Other professional, scientific, and technical services	other 54	NA	9,708	4,086	D	4,674	5,158	4,172 i	4,240	3,874
Health care services	621–23	NA	NA	D	D	708 i	535 i	501 i	771 i	1,002

TABLE 70

Worldwide R&D paid for by the company and others and performed by the company, by industry and company size: 2008–16

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008[a]	2009	2010	2011	2012	2013	2014	2015	2016
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	NA	NA	NA	D	D	D	D	D	D
All companies (number of domestic employees)	–	NA	336,571	338,451	359,490	374,916	396,352	416,343	429,174	451,831
Micro companies[b]										
5–9	–	NA	NA	3,792	4,143	3,025 i	3,442 i	3,409 i	3,101 i	1,726 i
Small companies										
10–19	–	NA	NA	NA	NA	NA	NA	NA	5,750 i	5,059 i
20–49	–	NA	NA	NA	NA	NA	NA	NA	10,654 i	10,000 i
Medium companies										
50–99	–	NA	13,785	9,470	9,834	9,728	9,289	10,677	11,946	9,662
100–249	–	NA	14,365	12,989	13,354	13,665	14,980	15,081	14,964	16,194
Large companies										
250–499	–	NA	12,315	11,439	14,573	12,693	13,379	13,675	14,837	14,866
500–999	–	NA	12,124	11,794	11,388	12,955	13,663	15,422	17,442	16,609
1,000–4,999	–	NA	54,600	60,782	63,801	62,729	69,212	71,679	71,259	79,597
5,000–9,999	–	NA	27,461	34,453	32,578	41,006	43,087	51,305	48,399	49,620
10,000–24,999	–	NA	61,681	50,710	61,593	60,544	60,844	63,818	70,864	80,255
25,000 or more	–	NA	118,424	125,067	132,719	144,097	152,547	155,180	159,959	168,243

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

NAICS = 2012 North American Industry Classification System.

[a] Worldwide R&D paid for by the company and others and performed by the company was not published in 2008.

[b] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded R&D. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. Beginning with survey year 2011, the composition of the other nonmanufacturing industry changed. Most statistics for years prior to 2016 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey.

TABLE 71

Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2008–16

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016
All industries	21–23, 31–33, 42–81	290,680	282,505	279,289	290,240	302,759	323,107	340,539	355,671	374,685
Manufacturing industries	31–33	203,755	196,441	199,147	202,363	208,577	222,718	231,705	236,170	250,553
Food	311	2,100	4,099	D	4,393	4,087	5,021	4,854 i	4,828	4,828
Beverages and tobacco products	312	780	477	D	D	D	827	920	1,006	D
Textiles, apparel, and leather products	313–16	815	439	482	608	553	662	631	748	1,166 i
Wood products	321	273	280	252	211	280	220	336 i	195	188
Paper	322	NA	NA	1,341	676	752	920	723	766	851
Printing and related support activities	323	349	210	231	181	256 i	252 i	234	196 i	219 i
Petroleum and coal products	324	NA	NA	D	D	888	281	234	214	381
Chemicals	325	58,250	54,753	58,343	55,853	56,748	62,086	66,134	68,032	73,575
Basic chemicals	3251	NA	NA	1,810	D	2,705	2,620	2,849	3,042	2,545
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	NA	NA	783	798	997	1,197	1,154	1,201	711
Pesticides, fertilizers, and other agricultural chemicals	3253	NA	NA	D	D	D	1,691 i	1,743 i	D	D
Pharmaceuticals and medicines	3254	48,131	46,415	49,469	46,308	47,851	52,790	56,482	57,332	64,628
Soaps, cleaning compounds, and toilet preparations	3256	NA	NA	2,400	2,476	2,342	2,434	2,548	2,579	2,800
Paints, coatings, adhesives, and other chemicals	3255, 3259	NA	NA	D	1,290	D	1,354	1,357 i	D	D
Plastics and rubber products	326	1,817	2,388	2,129	2,278	3,585	3,647	3,614	2,549	3,752
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
Primary metals	331	695	863	681	655	741	618	677	625	592
Fabricated metal products	332	2,419	2,057	1,727	1,857	1,827 i	2,194 i	2,107 i	2,273 i	2,239
Machinery	333	10,104	9,226	10,260	14,725	13,752	12,586	12,106	13,539	12,585
Agricultural implements	33311	NA	NA	1,345	1,277	1,546	1,597	1,578	1,531	1,565
Semiconductor machinery	333242	NA	NA	2,173	2,351	1,291	3,194	2,941	3,214	3,411
Engines, turbines, and power transmission equipment	3336	NA	NA	1,430	4,273	4,336	1,448	2,356	2,515	1,959
Other machinery	other 333	NA	NA	5,312	6,824	6,579	6,347	5,229	6,280	5,650
Computer and electronic products	334	60,464	55,856	61,623	62,438	66,290	68,629	73,256	72,182	77,385
Communications equipment	3342	NA	NA	13,875	12,335	14,352	15,663	18,345	19,424	13,112

TABLE 71

Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2008–16

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016
Semiconductors and other electronic components	3344	22,324	20,023	23,011	24,237	28,218	30,176	31,668	30,451	31,391
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
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	NA	NA	4,189	4,430	4,413	2,634	3,975	2,676	2,632
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	NA	NA	8,293	8,066	7,734	8,106	7,861	7,360	7,533
Other measuring and controlling devices	other 3345	NA	NA	3,265	3,356	3,772	4,379	4,035	4,165	4,720
Other computer and electronic products	other 334	NA	NA	8,990	10,014	7,801	7,671	7,372	8,105	17,997
Electrical equipment, appliances, and components	335	3,143	3,317	3,320	3,624	3,078	4,133	4,323	4,359	4,771
Transportation equipment	336	50,552	48,209	42,940	41,094	42,340	43,648	46,977	49,286	51,275
Automobiles, bodies, trailers, and parts	3361–63	NA	NA	D	D	D	16,733	18,518	19,113	22,042
Aerospace products and parts	3364	36,941	34,563	29,857	26,086 i	24,874 i	24,783	26,292 i	27,440	26,645
Aircraft, aircraft engines, and aircraft parts	336411–13	NA	NA	24,777 i	24,839 i	23,454 i	D	25,002 i	25,793	25,221
Guided missiles, space vehicles, and related parts	336414–15, 336419	NA	NA	5,080	1,247	1,420	D	1,290 i	1,647 i	1,424 i
Military armored vehicles, tanks, and tank components	336992	NA	NA	D	51	D	9 i	18	16	D
Other transportation	other 336	NA	NA	D	D	D	2,124	2,148 i	2,716	D
Furniture and related products	337	477	395	374	319	360	374	377	452	366
Miscellaneous	339	NA	NA	D	D	D	15,292	12,757	13,662	D
Medical equipment and supplies	3391	NA	NA	6,459	7,796	8,333	12,741	10,309	11,353	11,668
Other miscellaneous manufacturing	3399	NA	NA	D	D	D	2,551	2,449	2,309 i	D
Nonmanufacturing industries	21–23, 42–81	86,926	86,064	80,142	87,877	94,183	100,389	108,834	119,501	124,132
Mining, extraction, and support activities	21	NA	NA	2,545	2,365	3,031	4,000	4,633	4,012	3,296
Utilities	22	NA	NA	425	358	348	294	313	480	351
Wholesale trade	42	NA	NA	1,092	1,556 i	2,053 i	452 i	339 i	1,698 i	452 i
Electronic shopping and electronic auctions	454111–12	NA	NA	D	949 i	1,353	1,356 i	1,388	D	1,569 i

TABLE 71

Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2008–16

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016
Transportation and warehousing	48–49	NA	NA	95	132	178	D	679	403	488
Information	51	37,695	35,953	37,088	42,697	46,900	56,608	64,277	65,457	70,748
Publishing	511	28,427	26,838	26,957	28,411	29,067	34,365	36,621	33,348	33,574
Newspaper, periodical, book, and directory publishers	5111	NA	NA	770	372	219 i	342 i	88 i	98 i	79 i
Software publishers	5112	NA	NA	26,187	28,039	28,848	34,023	36,533	33,250	33,495
Telecommunications	517	1,684	1,523	1,912	2,169	2,729 i	3,049	3,768	3,607	D
Data processing, hosting, and related services	518	6,567	2,741	2,753	5,111	4,914	7,156	9,062	9,355	11,914
Other information	other 51	1,016	4,850	5,466	7,006	10,190	12,039	14,826	19,147	D
Finance and insurance	52	NA	NA	2,101	3,447	3,530	4,412	4,122	5,409	7,331
Real estate and rental and leasing	53	NA	NA	330	343	363	191	262	300	475
Lessors of nonfinancial intangible assets (except copyrighted works)	533	NA	NA	NA	324	342	58 i	55	68	27
Other real estate and rental and leasing	other 53	NA	NA	NA	19	21 i	133	207	232	449
Professional, scientific, and technical services	54	37,954	42,380	31,798	33,307	34,121	30,926	31,461 i	38,601	37,595
Architectural, engineering, and related services	5413	3,422	3,258	4,008	3,114	2,483 i	3,132	3,309	4,100 i	3,412
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	15,747
Scientific research and development services	5417	17,913	16,402	13,712	15,713	16,415	14,219	13,324	16,249	14,842
Biotechnology research and development	541711	NA	7,809	5,537	7,043	7,387	4,492	3,459	5,594 i	4,464
Physical, engineering, and life sciences (except biotechnology) research and development	541712	NA	7,916	7,628	8,058	8,431	8,935	9,187	9,950	9,659
Social sciences and humanities research and development	541720	NA	676	547	612	598	792	678	705	719
Other professional, scientific, and technical services	other 54	4,474	9,370	3,720	3,542	4,216	4,334	3,775	3,918	3,595
Health care services	621–23	NA	NA	1,049	542	672 i	528 i	501 i	758 i	848
Other nonmanufacturing	23, 44–45 (excluding	NA	NA	NA	2,181	1,635	D	857 i	D	977 i

TABLE 71

Domestic R&D paid for by the company and others and performed by the company, by industry and company size: 2008–16

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016
	454111–12), 55–56, 624, 71–72, 81									
All companies (number of domestic employees)	–	290,680	282,505	279,289	290,240	302,759	323,107	340,539	355,671	374,685
Micro companies[a]										
5–9	–	NA	NA	3,614	4,060	2,926 i	3,390 i	3,314 i	2,983 i	1,581 i
Small companies										
10–19	–	NA	NA	NA	NA	NA	NA	NA	5,674 i	4,958 i
20–49	–	NA	NA	NA	NA	NA	NA	NA	10,281 i	9,662 i
Medium companies										
50–99	–	9,351	13,277	8,781	9,295	9,100 i	8,939	10,130 i	11,538	9,298
100–249	–	14,662	12,791	11,631	12,303	12,454	13,704	13,606	13,586	14,875
Large companies										
250–499	–	10,219	11,330	10,194	13,013	11,387	12,021	12,228	13,686	13,092
500–999	–	11,886	10,131	10,053	9,993	11,499	12,013	13,129	15,005	14,450
1,000–4,999	–	46,336	44,197	49,108	51,110	50,311	55,974	57,336	57,998	63,971
5,000–9,999	–	24,764	21,769	27,546	24,452	30,708	31,657	38,327	38,858	40,633
10,000–24,999	–	48,737	51,239	41,853	49,107	50,226	51,103	54,452	59,330	65,594
25,000 or more	–	100,820	97,056	99,291	102,222	110,042	119,493	122,533	126,732	136,571

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded R&D. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. Beginning with survey year 2011, the composition of the other nonmanufacturing industry changed. Most statistics for years prior to 2016 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey.

TABLE 72

Foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2008–16

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016
All industries	21–23, 31–33, 42–81	61,475	54,066	59,162	69,251	72,157	73,245	75,804	73,503	77,146
Manufacturing industries	31–33	46,572	40,417	44,464	51,458	53,120	53,392	53,955	51,725	52,689
Food	311	596	817	1,006	1,195	1,076	1,315	1,282	1,231	994
Beverages and tobacco products	312	123	455	783 i	599	532	531	503	523	543
Textiles, apparel, and leather products	313–16	367	80	39	49	52	98	103	70	81
Wood products	321	4	2	3	1	2	2	5 i	3	15
Paper	322	274	257	324	93	106	103	158	102	78
Printing and related support activities	323	9	7	38	30	35	6	3	2	4
Petroleum and coal products	324	D	156	D	D	D	46	64	38	44
Chemicals	325	13,990	9,689	14,267	16,215	13,470	12,464	13,294	12,929	12,313
Basic chemicals	3251	1,198	797	861	D	695	716	784	636	537
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	224	260	255	319	D	597	688	579	333
Pesticides, fertilizers, and other agricultural chemicals	3253	371	D	D	D	D	275 i	299 i	D	432 i
Pharmaceuticals and medicines	3254	10,862	7,041	11,068	12,557	11,069	9,690	10,249	D	9,914
Soaps, cleaning compounds, and toilet preparations	3256	965	873	884	910	870	924	952	D	789
Paints, coatings, adhesives, and other chemicals	3255, 3259	370	D	D	195	210	263	321 i	D	307
Plastics and rubber products	326	341	595	386	362	861	929	905	358	831
Nonmetallic mineral products	327	106	54	282 i	253	261	249 i	155 i	228	185
Primary metals	331	114	130	121	108	77	82	94	86	69
Fabricated metal products	332	188	117	91	135	122	109	222	194	245
Machinery	333	1,929	1,930	2,143	3,587	3,710	2,833	2,984	3,288	3,179
Agricultural implements	33311	399	391	D	293	596	646	D	621	625
Semiconductor machinery	333242	366	285	296	376	66	451	493	599	727
Engines, turbines, and power transmission equipment	3336	92	83	D	D	D	347	537	405	368
Other machinery	other 333	1,072	1,170	1,254	D	D	1,389	D	1,664	1,459
Computer and electronic products	334	15,774	12,917	13,722	16,708	21,117	21,485	20,943	20,678	20,791
Communications equipment	3342	2,951	2,862	3,194	2,863	4,525	4,730	3,702	3,625	2,963
Semiconductors and other electronic components	3344	7,075	6,058	6,343	7,909	10,082	10,434	10,360	9,896	10,304
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
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	838	522	360	557	586	202	1,073	923	922

TABLE 72

Foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2008–16

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	D	508	475	575	578	647	625	673	840
Other measuring and controlling devices	other 3345	D	1,149	1,324	1,258	1,557	2,077	1,423	1,222	1,465
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
Electrical equipment, appliances, and components	335	1,162	1,158	1,447	1,695	1,062	1,605	1,382	1,351	1,436
Transportation equipment	336	10,267	7,974	8,422	7,936	8,075	7,899	9,621	8,412	9,050
Automobiles, bodies, trailers, and parts	3361–63	8,448	6,023	D	D	D	6,877	D	6,622	7,130
Aerospace products and parts	3364	1,816	1,846	1,770	772	D	901	D	1,672	1,817
Aircraft, aircraft engines, and aircraft parts	336411–13	1,742	1,760	D	D	D	D	D	1,670	1,813
Guided missiles, space vehicles, and related parts	336414–15, 336419	74	85	D	D	5	D	D	2	4
Military armored vehicles, tanks, and tank components	336992	0	D	D	1	0	0	D	0	0
Other transportation	other 336	3	D	D	D	D	121	D	118	104
Furniture and related products	337	27	38	33	28	23	28	45	25	40
Miscellaneous manufacturing	339	D	4,044	D	D	D	3,608	2,194	2,207	2,792
Medical equipment and supplies	3391	766	3,813	1,003	D	1,978	3,197	1,782	1,813	2,475
Other miscellaneous manufacturing	3399	D	231	D	D	D	411	412	394 i	317 i
Nonmanufacturing industries	21–23, 42–81	14,903	13,648	14,698	17,792	19,037	19,853	21,849	21,778	24,457
Mining, extraction, and support activities	21	D	D	239	232	D	452	D	336	308
Utilities	22	6	13	17	38	21	23	1	3	1
Wholesale trade	42	509	D	53	141 i	112 i	7	D	25 i	12 i
Electronic shopping and electronic auctions	454111–12	NA	NA	D	D	D	490	D	D	D
Transportation and warehousing	48–49	2	1	29	28 i	8 i	D	13	13	7
Information	51	7,657	7,243	8,011	9,644	9,915	11,767	13,736	12,508	13,384
Publishing	511	6,301	6,332	6,926	7,899	7,880	9,456	10,185	8,842	8,698
Newspaper, periodical, book, and directory publishers	5111	27	47	55	29	2 i	6 i	4 i	9	4
Software publishers	5112	6,274	6,285	6,871	7,870	7,878	9,450	10,181	8,833	8,693
Telecommunications	517	175	86	131	98	59	63	61	41	49
Data processing, hosting, and related services	518	1,089 i	266	142 i	339	661	631	1,294	1,245	1,752
Other information	other 51	93	559	812	1,308	1,316	1,616	2,196	2,378	2,886
Finance and insurance	52	74	518	467	496	628	587	625	950	1,136

TABLE 72

Foreign R&D paid for by the company and others and performed by the company, by industry and company size: 2008–16

(Millions of U.S. dollars)

Industry and company size	NAICS code	2008	2009	2010	2011	2012	2013	2014	2015	2016
Real estate and rental and leasing	53	65	28	37	D	38	11	6	13	2
Lessors of nonfinancial intangible assets (except copyrighted works)	533	NA	NA	NA	41	37	D	3	D	*
Other real estate and rental and leasing	other 53	NA	NA	NA	D	* i	D	3	D	2
Professional, scientific, and technical services	54	6,150	5,328	5,309	6,424	6,723	6,418	6,534	7,653	9,176
Architectural, engineering, and related services	5413	200	126	148 i	D	57	41	65	58	64
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	3,421
Scientific research and development services	5417	3,544	2,905	2,696	3,581	3,810	4,259	4,546	4,380	5,412
Biotechnology research and development	541711	NA	683	729	942	977	1,398	1,438	1,520	1,615
Physical, engineering, and life sciences (except biotechnology) research and development	541712	NA	2,213	1,962	2,638	2,830	2,859	3,103	2,858	3,793
Social sciences and humanities research and development	541720	NA	9	5	1	2	3	4 i	3	4
Other professional, scientific, and technical services	other 54	241	338	366	D	458	825	398 i	322	279
Health care services	621–23	1	10	D	D	36	7	*	12 i	154
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	NA	NA	NA	D	D	D	D	D	D
All companies (number of domestic employees)	–	61,475	54,066	59,162	69,251	72,157	73,245	75,804	73,503	77,146
Micro companies[a]										
5–9	–	NA	NA	178	83	99 i	52 i	95 i	118 i	145
Small companies										
10–19	–	NA	NA	NA	NA	NA	NA	NA	76	101
20–49	–	NA	NA	NA	NA	NA	NA	NA	373	338
Medium companies										
50–99	–	976	509	688 i	539	628	351	547	407	364
100–249	–	1,735	1,574	1,358 i	1,051	1,212	1,276	1,475	1,378	1,319
Large companies										
250–499	–	1,178	985	1,245	1,561	1,306	1,359	1,446	1,151	1,774
500–999	–	1,753	1,992	1,741	1,396	1,455	1,650	2,293	2,437	2,159
1,000–4,999	–	11,350	10,403	11,674	12,691	12,419	13,238	14,343	13,261	15,626
5,000–9,999	–	7,000	5,692	6,907	8,126	10,298	11,430	12,979	9,541	8,986
10,000–24,999	–	11,785	10,442	8,856	12,485	10,317	9,741	9,366	11,534	14,661
25,000 or more	–	24,671	21,368	25,777	30,497	34,056	33,054	32,647	33,226	31,672

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

NAICS = 2012 North American Industry Classification System.

[a] Business R&D and Innovation Survey does not include companies with fewer than five domestic employees.

Note(s)

Detail may not add to total because of rounding. Industry classification is based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded R&D. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. Beginning with survey year 2011, the composition of the other nonmanufacturing industry changed. Most statistics for years prior to 2016 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey.

TABLE 73

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–16

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016
All business activities	21100–81000	328,040	311,170	316,262	336,629	352,951	376,974	399,656	412,590	435,403
Oil and gas extraction	21100	1,215	1,223	1,268	1,379	D	1,487	1,308	1,486	1,089
Mining	21200	NA	D	75	128	92	114	56	71	63
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
Utilities	22100	NA	1,607	903	639	686	615	549	726	515
Construction	23000	NA	198	918	269	393 i	307	297	700	274
Food manufacturing	31100	2,983	4,039	4,478	4,970	4,635	7,028	6,842	5,892	6,178
Beverages manufacturing	31210	605	564	926	668	641	772	753	728	787 i
Tobacco manufacturing	31220	D	792	800	717	662	668	672	681	732
Textiles, apparel, and leather products manufacturing	31990	NA	673	658	712	759	787	780	847	1,332
Wood products manufacturing	32100	264	304	239	208	D	244	336 i	251	288
Paper manufacturing	32200	1,130	1,144	1,231	1,156	1,362	1,588	1,614	D	1,544
Printing and related support activities	32300	297	241	244	265	356 i	391	390	321	340
Petroleum refineries	32401	NA	NA	708	591	807	558	617	526	625
Asphalt paving, roofing, and saturated materials manufacturing	32402	NA	NA	35	39	45	123	78	75	93
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	NA	NA	403	415	382	488	460 i	416	452
Basic chemicals manufacturing	32510	3,806	2,978	3,133	3,614	4,271	4,136	4,036	3,505	3,472
Resins, 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	1,402
Pesticides, fertilizers, and other agricultural chemicals manufacturing	32530	2,100	1,990	1,722	2,333	2,307	2,364 i	2,508 i	D	2,336 i
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing[c]	32541	70,016	68,588	71,603	67,688	69,473	68,318	68,846	63,606	70,246
In vitro diagnostic substances manufacturing[c]	32542	1,988	1,159	1,207	1,544	1,371 i	1,066	1,159	972	1,340

TABLE 73

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–16

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008		2009		2010		2011		2012		2013		2014		2015		2016	
Biotechnology-based pharmaceutical and biological products (except diagnostic substances) manufacturing[c]	32543	NA		NA		NA		NA		NA		10,356		14,947		23,172		24,603	
Soaps, cleaning compounds, and toilet preparations manufacturing	32591	2,787		2,883		3,147		3,472		3,266		3,406		3,493		3,353		3,361	
Paints, adhesives, and other chemicals manufacturing	32592	2,152		2,320		2,238		2,011		2,087		1,979		2,131		D		2,121	
Plastics and rubber products manufacturing	32600	2,536		2,842		3,128		3,689		3,739		3,586		3,592		3,251		3,935	
Clay and glass products manufacturing	32710	966	i	312		1,056	i	920	i	1,154	i	1,077		1,130		1,145		1,203	
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	738		555		522		590		621		618	i	800		601		664	
Primary metal manufacturing	33100	NA		840		933		783		882		792		853		719		720	
Fabricated metal products manufacturing	33200	2,935		2,438		1,971		2,471		2,517		2,460		2,560		2,521		2,613	
Agricultural machinery and equipment manufacturing	33311	1,404		1,507		1,523		1,430		1,893		2,055		1,990		1,916		1,977	
Construction machinery manufacturing	33312	581		653		682		875		816		1,693		1,729		1,556		1,464	
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		1,529	
Semiconductor machinery manufacturing	33321	2,553		1,978		2,279		2,574		1,266	i	3,500		3,363		3,459		3,688	
Industrial machinery manufacturing (except semiconductor machinery)	33322	1,191		853		806		1,128		1,031		1,006		1,237		1,181		894	
Photographic and photocopying equipment manufacturing	33331	NA		852		270		757		25	i	108		25		114		59	
Commercial, service industry, temperature control, and air-flow control	33332	NA		977		1,268		1,143		1,621		1,661		2,251		1,947		2,232	

TABLE 73

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–16

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016
machinery manufacturing										
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	33	587 i	519
Engine, turbine, and power transmission equipment manufacturing	33360	2,386	1,589	3,481	3,623	4,068	3,870	3,346	2,626	2,637
Metalworking and other general purpose machinery manufacturing	33390	2,039	1,618	1,998	2,359	1,916	2,052	2,585	2,728	2,574
Computers and peripheral equipment manufacturing and magnetic and optical media[d]	33412	NA	13,094	12,672	13,319	14,716	15,113	13,437	16,547	23,133
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	10,717
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	2,786
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
Audio and video equipment manufacturing	33430	773	977	1,352	1,019	1,081	1,108	1,282	1,587	1,535
Semiconductor and other electronic components manufacturing	33440	29,911	26,118	29,457	32,354	38,109	40,001	41,125	39,810	40,595
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	3,822	2,544	3,046	3,230	3,494	3,816	4,330	3,875	4,125
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments manufacturing	33452	1,845	2,229	2,417	2,161	2,337	2,564	2,424	2,033	2,615
Measuring and control instruments	33459	3,458	4,425	4,579	4,566	4,871	5,308	5,424	5,637	5,663

TABLE 73

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–16

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016
manufacturing (not listed elsewhere)										
Electrical equipment, appliances, and components manufacturing	33500	4,687	4,229	4,500	4,768	4,773	5,272	5,501	5,313	5,920
Motor vehicles manufacturing	33610	18,296	13,165	14,524	17,011	18,362	17,743	18,984	18,357	20,365
Motor vehicle body and trailer manufacturing	33620	70	96	190	73	98 i	107 i	104	160	119
Motor vehicle parts manufacturing	33630	5,401	4,158	4,310	4,681	4,736	5,600	7,146	7,285	7,394
Aircraft manufacturing	33641	4,053	7,390	4,430	4,512	4,716 i	4,373	4,221	4,859	5,639
Aircraft engine and engine parts manufacturing	33642	2,433	1,765	1,978	2,136	D	1,787	2,068 i	D	D
Other aircraft parts and auxiliary equipment manufacturing	33643	1,222	1,135	1,825	1,752	3,121	3,270	2,980	3,482	3,048
Guided missiles, space vehicles, and related parts manufacturing	33644	1,402	1,176	1,132	1,050	659	487	877	1,034	954
Railroad rolling stock manufacturing	33651	195	83	177	165	237	224	363	310	224
Ship and boat building	33660	151	616 i	608 i	154	143 i	192	489	251	618
Motorcycle, bicycle, and parts manufacturing	33691	199	194	186	234	197	231	283	320	335
Military armored vehicles, tanks, and tank components manufacturing	33692	107	228	182	118	135	90	159	202	130
All other transportation equipment manufacturing	33699	176	135	232	367	437	425	361	430	478
Furniture and related products manufacturing	33700	511	495	402	344	431	433	455	509	490
Medical equipment and supplies manufacturing	33910	11,587	11,457	13,226	13,701	14,259	15,264	14,317	15,145	15,602
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	3,124
Merchant wholesalers, durable goods	42300	449	923 i	714	711	1,277 i	589	516	1,551	647

TABLE 73

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–16

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016
Merchant wholesalers, nondurable goods	42400	257	365 i	348	605	699 i	327	209	484	219
Wholesale electronic markets and agents and brokers (business to business)	42500	14	43 i	19 i	70	173 i	18	D	35	24
Retail trade (except electronic shopping and electronic auctions)	44000	NA	50	164	74	100 i	120	65	D	121
Electronic shopping and electronic auctions	45411	NA	NA	753	D	1,749	1,284	D	D	D
Transportation	48000	NA	319	211	111	199	377	412	229 i	123
Couriers, messengers, and express delivery services	49200	D	14	6	D	D	90	348	D	394
Warehousing and storage	49300	26	17	19	16	17	4	3	D	0
Newspaper, periodical, book, and directory publishers (except Internet)	51110	180	748	853	408 i	257 i	339 i	103	117	87
Software publishers (except Internet)[e]	51120	31,369	26,362	28,457	29,992	31,209	35,047	41,052	36,040	34,806
Motion picture and sound recording (except Internet)	51200	104	135	93	67	67	38	83 i	12	20
Broadcasting (except Internet)	51500	NA	89	100	115	165 i	179	206	306	347
Wired telecommunications carriers	51710	673	D	1,499 i	1,685	1,631 i	1,012 i	1,166	1,269 i	1,180
Wireless telecommunications carriers (except satellite)	51720	532 i	186	724 i	815 i	860 i	1,732 i	2,500	1,192 i	1,458 i
Satellite telecommunications	51740	153	108	229	114	163	176	134	705 i	746
Other telecommunications (not listed elsewhere)	51790	501	351	338	462	399	377	330	536	362
Data processing, hosting, and related services[e]	51800	NA	2,889	3,051	5,293	4,406	4,381	5,402	6,895	6,865
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	4,344	6,730	6,801	11,690
Other information services, including Internet publishing,	51910	NA	5,519	7,270	9,456	12,998	15,433	17,443	25,330	27,567

TABLE 73

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–16

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016
broadcasting, and Web search portals[e]										
Finance: banking and credit intermediation	52200	NA	D	1,235	1,703	2,454	3,238	3,553	3,299	5,171
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
Insurance carriers and related activities	52400	NA	798	611	872	1,429	1,772	1,069	1,573	1,444
Real estate	53100	20	32	3	13	27	105	199	288	440
Rental and leasing services	53200	NA	129	146	51	59	94	80	80	31
Lessors of nonfinancial intangible assets, including patent licensing	53300	80	259	268	369	437	100	97	104	45
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	NA	D	505	705 i	535	696	1,128	1,587	1,051
Architectural, engineering, and related services	54130	1,742	1,115	1,390	1,380	1,232	1,495	1,649	2,449	1,968
Specialized design services	54140	75	76	65	283	157 i	81	42	13	26
Computer systems design and related services[e]	54150	11,476	12,292	11,528	13,673	13,909 i	12,577	13,288	14,090	15,240
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
Research and development services in social sciences and humanities	54172	NA	96	8	19	64	36	47	15	D
Research and development services in biotechnology[c]	54173	NA	6,850	2,601	6,238	6,294	1,723	1,344	2,387	1,275
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	NA	3,208	1,447	2,751	3,166	2,143	3,040	3,197	2,839
Advertising and related services	54180	37	1,950	422	97	375 i	390	424	452	372
Professional, scientific, and	54190	439	1,036	543	1,242	1,199	1,627	810	944	621

TABLE 73

Worldwide R&D paid for by the company and performed by the company and others, by business activity: 2008–16

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016
technical services (not listed elsewhere)										
Management of companies and enterprises	55100	11	40	23	43	18	76	43	D	21
Administrative and support services	56100	NA	419	640	348	609	589	459	375	588
Waste management and remediation services	56200	NA	15	684	20	D	23	D	D	8
Offices of physicians	62110	40	37	371	36	42 i	43	39	28	70
Medical and diagnostic laboratories	62150	903	246	409	287	364	347	410	424	904
Other ambulatory health care services (ambulance, dental, home health care)	62199	NA	47	145 i	15	45 i	52	37	39	23
Hospitals and nursing care facilities	62200	NA	62 i	68	2	2 i	2	2	4	6
Social assistance services	62400	NA	D	15	13	36	47	17	2	2
Arts, entertainment, and recreation	71000	NA	161	137	85	70	29	103 i	50	45
Accommodation and food services	72000	NA	50	119	84	149 i	163	D	106	76
Other services (not listed elsewhere)	81000	NA	89	465	345	484	405	550	669	D
Undistributed	–	10,660	14,175	5,373 i	D	491	359 i	69	0	0

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

NAICS = 2012 North American Industry Classification System.

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

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

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

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

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

Note(s)

Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded R&D. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. Most statistics for years prior to 2016 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey.

TABLE 74

Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–16

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016
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	12,285,760
Oil and gas extraction	21100	271,493	153,939	212,469	331,320	271,983	250,884	241,227	141,687	117,732
Mining	21200	NA	D	38,302	57,661	43,857	54,531	D	D	28,755
Support activities for mining, including oil and gas	21300	NA	45,184	61,062	68,523	79,788	100,175	129,989	74,421	44,702
Utilities	22100	NA	317,243	310,768	348,763	318,893	324,150	356,225	346,925	306,761
Construction	23000	NA	42,287	93,305	107,286	107,685	94,057	91,507	64,463	52,281
Food manufacturing	31100	475,588	630,500	694,763	690,698	688,804	941,309	844,673	744,318	707,781
Beverages manufacturing	31210	143,008	129,396	141,259	180,153	167,003	164,270	166,544	170,059	155,463
Tobacco manufacturing	31220	28,970	134,972	133,993	140,998	130,759	69,191	D	D	65,022
Textiles, apparel, and leather products manufacturing	31990	NA	56,131	68,515	66,416	89,086	70,260	66,546	83,170	113,516
Wood products manufacturing	32100	34,563	27,826	28,342	24,165	32,908	42,472	51,879	33,713	40,764
Paper manufacturing	32200	139,953	110,534	136,302	144,064	142,335	146,748	148,797	D	126,987
Printing and related support activities	32300	26,426	37,743	37,398	32,823	32,152	29,576	34,227	42,885	31,309
Petroleum refineries	32401	NA	NA	837,945	954,108	911,784	968,046	787,825	512,224	415,590
Asphalt paving, roofing, and saturated materials manufacturing	32402	NA	NA	7,566	8,872	8,563	14,504	11,150	10,324	12,300
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	15,672
Basic chemicals manufacturing	32510	273,809	179,494	243,193	299,476	473,666	i 278,661	270,287	212,951	264,981
Resins, 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	91,427
Pesticides, fertilizers, and other agricultural chemicals manufacturing	32530	40,337	71,003	51,940	47,381	57,246	67,823	68,738	72,737	59,610
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing[c]	32541	582,910	438,687	471,763	577,607	594,394	577,930	569,968	564,398	599,300
In vitro diagnostic substances manufacturing[c]	32542	22,317	16,940	20,637	25,005	27,022	13,871	25,365	14,159	16,288
Biotechnology-based pharmaceutical and biological products (except diagnostic substances) manufacturing[c]	32543	NA	NA	NA	NA	NA	40,409	56,454	84,437	90,940
Soaps, cleaning compounds, and toilet preparations manufacturing	32591	142,212	151,565	167,258	170,417	166,942	185,266	196,651	180,201	164,824
Paints, adhesives, and other chemicals manufacturing	32592	113,118	104,308	103,452	120,242	128,998	113,108	128,730	107,146	118,873
Plastics and rubber products manufacturing	32600	162,401	161,057	193,471	243,447	265,623	219,020	241,780	201,164	240,149
Clay and glass products manufacturing	32710	36,417	27,803	37,853	34,184	36,960	39,365	34,863	39,676	47,765
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	34,781
Primary metal manufacturing	33100	NA	124,478	197,315	179,318	176,544	161,443	128,532	103,093	121,362
Fabricated metal products manufacturing	33200	188,359	132,465	161,593	179,228	207,423	199,678	235,784	194,098	165,127
Agricultural machinery and equipment manufacturing	33311	48,185	46,695	53,946	43,410	59,651	68,793	63,617	53,559	51,777
Construction machinery manufacturing	33312	32,109	23,195	30,685	42,974	43,355	63,344	65,348	56,090	49,370

TABLE 74

Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–16

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016
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	48,043
Semiconductor machinery manufacturing	33321	20,019	10,505	21,588	25,960	9,973	24,420	27,333	24,653	30,749
Industrial machinery manufacturing (except semiconductor machinery)	33322	26,984	21,368	30,723	44,666	42,619	39,357	51,615	39,189	37,747
Photographic and photocopying equipment manufacturing	33331	NA	7,471	D	D	307 i	7,502	9,162	8,602	7,670
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	114,388
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	15	D	5,580 i
Engine, turbine, and power transmission equipment manufacturing	33360	86,660	46,879	84,686	112,562	120,116	146,129	D	85,560	89,194
Metalworking and other general purpose machinery manufacturing	33390	90,067	66,350	95,017	112,947	125,495	105,487	149,607	140,673	116,040
Computers and peripheral equipment manufacturing and magnetic and optical media[d]	33412	NA	273,429	330,020	342,416	304,309	307,523	297,193	282,890	414,723
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	76,228
Radio, television, and wireless communication equipment manufacturing	33422	76,167	64,808	79,675	92,884	136,470	148,680	168,774 i	D	49,323
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	16,352
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
Semiconductor and other electronic components manufacturing	33440	220,272	196,399	296,058	336,789	332,771	320,780	350,779	D	296,187
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	41,395	27,437	29,041	38,560	39,590	43,130	43,537	44,739	47,577
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments manufacturing	33452	38,474	55,866	68,907	47,701	63,724	66,326	67,154	58,670	59,659
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	102,293
Electrical equipment, appliances, and components manufacturing	33500	154,206	129,174	160,532	165,156	164,998	182,490	198,505	195,327	213,569
Motor vehicles manufacturing	33610	521,541	399,125	476,726	539,595	541,730	615,136	539,139	646,110	709,702
Motor vehicle body and trailer manufacturing	33620	D	15,688	23,105	15,325	34,284	25,913	32,719	23,229	63,845
Motor vehicle parts manufacturing	33630	163,993	126,638	242,201	224,450	228,418	269,022	379,492	294,414	245,224
Aircraft manufacturing	33641	97,635	75,960	89,235	121,480	97,484 i	154,241	139,924	148,986	136,497
Aircraft engine and engine parts manufacturing	33642	42,829	37,086	34,925	42,514	40,376	54,024	48,134	D	38,176
Other aircraft parts and auxiliary equipment manufacturing	33643	30,319	36,714	41,704	56,509	44,556	60,520	84,966	97,198	85,120
Guided missiles, space vehicles, and related parts manufacturing	33644	D	51,326	D	D	16,554	17,200	30,237	31,776	30,600
Railroad rolling stock manufacturing	33651	7,248	3,639	9,075 i	8,870	14,255	12,639	19,679	19,353	14,871
Ship and boat building	33660	16,461	37,439 i	D	D	23,966 i	16,927 i	39,049	15,426	D
Motorcycle, bicycle, and parts manufacturing	33691	8,423	6,677	6,646	8,948	7,829	11,331	9,142	9,067	9,525
Military armored vehicles, tanks, and tank components manufacturing	33692	13,341	10,136	D	6,239	4,893	4,354 i	7,502	D	4,263
All other transportation equipment manufacturing	33699	9,513	6,332	13,008	13,415	18,469	28,933	12,026	14,565	14,472
Furniture and related products manufacturing	33700	43,401	35,821	37,487	39,031	43,719	41,407	45,760	43,530	45,372
Medical equipment and supplies manufacturing	33910	164,066	159,611	243,406	304,215	217,549	237,729	234,177	235,706	239,051

TABLE 74

Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–16

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016
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	131,768
Merchant wholesalers, durable goods	42300	412,269	313,095	334,004	214,772	246,702	378,550	180,014	260,038	224,331
Merchant wholesalers, nondurable goods	42400	340,956	273,118	280,982	496,309	587,019	571,742	698,182	547,921	513,889
Wholesale electronic markets and agents and brokers (business to business)	42500	2,600	8,684	3,347	4,722 i	115,452 i	53,497	86,215	41,905	60,202
Retail trade (except electronic shopping and electronic auctions)	44000	NA	206,489	223,211	104,922	257,466	156,839	442,527	210,412	292,344
Electronic shopping and electronic auctions	45411	NA	NA	D	D	88,213	96,577	D	130,399	D
Transportation	48000	NA	D	182,535	109,842	139,615	95,821	117,267	D	126,059
Couriers, messengers, and express delivery services	49200	D	D	47,619	D	D	D	170,934	D	187,345
Warehousing and storage	49300	31,235	1,536	24,457	22,885	3,983	13,530	2,585	D	4,652
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
Software publishers (except Internet)[e]	51120	210,186	195,833	214,359	230,898	237,602	266,587	278,159	272,944	256,714
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
Broadcasting (except Internet)	51500	NA	39,734	53,313	44,029	67,429	81,499	D	74,473	84,899
Wired telecommunications carriers	51710	D	187,439	210,704	268,345	223,829	181,992	230,630	216,588	181,904
Wireless telecommunications carriers (except satellite)	51720	135,248	154,682	138,479	156,696	193,408	D	247,759	D	172,416
Satellite telecommunications	51740	19,330	12,662 i	16,021	2,783	3,056	D	3,581	44,400	61,927
Other telecommunications (not listed elsewhere)	51790	5,603	9,122	7,737	18,803	17,803	18,504	6,507	14,561	8,524
Data processing, hosting, and related services[e]	51800	NA	36,196	38,523	60,641	95,872 i	58,502	81,059	79,017	76,310
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	27,442	D	33,792	56,784
Other information services, including Internet publishing, broadcasting, and Web search portals[e]	51910	NA	41,660	77,319	39,551	45,729	65,134	102,254	94,541	112,825
Finance: banking and credit intermediation	52200	NA	D	1,068,703	631,129	673,238 i	347,139	364,224	377,622	401,295
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
Insurance carriers and related activities	52400	NA	294,233	281,344	280,278	358,159	397,971	380,117	420,526	372,903
Real estate	53100	D	7,738	D	D	D	D	D	8,537	9,311
Rental and leasing services	53200	NA	32,231	36,299	23,830	29,033	35,488	21,986	29,238	19,067
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
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	NA	D	16,188	D	11,315	14,588	22,315	22,259	19,511
Architectural, engineering, and related services	54130	42,680	96,534	147,309	102,126	114,240 i	125,923	134,541	139,846	105,993
Specialized design services	54140	D	6,504	3,976	2,581	3,646 i	3,614	2,165	D	706
Computer systems design and related services[e]	54150	210,916	216,477	224,026	377,919 i	272,065	249,600	272,937	243,790	249,595
Management, scientific, and technical consulting services	54160	52,497	60,125	43,190	76,910	85,161	81,834	93,077	92,120	63,141
Research and development services in social sciences and humanities	54172	NA	980	1,170	827	D	1,301	992	D	1,131
Research and development services in biotechnology[c]	54173	NA	22,354 i	8,493	8,657	11,316	12,390	17,543	10,962	9,090

TABLE 74

Worldwide sales for companies located in the United States that performed or funded R&D, by business activity: 2008–16

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	NA	19,858	18,840	23,446	33,296	36,913	32,703	36,038	37,987
Advertising and related services	54180	D	48,883	12,992 i	D	52,764	D	D	D	D
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	13,888
Management of companies and enterprises	55100	828	2,333	3,613	17,275	5,435	177,880	9,213	16,180	11,794 i
Administrative and support services	56100	NA	35,867	45,135	32,735	50,684 i	44,004	243,644	50,037	55,675
Waste management and remediation services	56200	NA	6,242	14,172	8,182	6,564	6,245	4,766	24,985	27,493
Offices of physicians	62110	7,492	25,752	24,133	23,844	35,513	36,233	19,041	36,724	40,574
Medical and diagnostic laboratories	62150	20,968	15,216	37,950	17,047	21,038	17,914	5,919	20,904	27,294 i
Other ambulatory health care services (ambulance, dental, home health care)	62199	NA	8,127	8,487	D	3,361 i	10,919	5,274	5,651	5,226
Hospitals and nursing care facilities	62200	NA	D	D	D	D	D	26,866	27,616	32,896
Social assistance services	62400	D	286	448	326	249	1,065	1,338	63	77
Arts, entertainment, and recreation	71000	NA	17,339	16,089	16,023	18,344	D	D	18,677	20,639
Accommodation and food services	72000	NA	D	69,474	39,421	88,878 i	107,255	46,228	76,898	66,954
Other services (not listed elsewhere)	81000	NA	15,585	43,778	129,084	57,612	142,029	78,365	70,781	238,452
Less: intersegment eliminations	–	381,031	237,743	234,289	281,460	309,288	301,615	316,930	240,217	227,524
Undistributed	–	1,092,275	1,590,109	516,754	598,369 i	167,240 i	D	4,602	9,547 i	0

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

NAICS = 2012 North American Industry Classification System.

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

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

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

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

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

Note(s)

Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded R&D. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. Most statistics for years prior to 2016 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey.

TABLE 75

Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–16

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016
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	9,191,871
Oil and gas extraction	21100	127,788	61,582	85,797	178,926	i 124,569	120,495	124,534	71,385	58,244
Mining	21200	NA	D	33,072	38,109	24,837	38,270	22,962	37,589	i 18,634
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
Utilities	22100	NA	D	301,613	337,871	309,573	316,082	347,997	336,457	302,288
Construction	23000	NA	27,180	81,641	88,626	64,402	60,516	66,835	49,892	45,590
Food manufacturing	31100	394,404	503,047	501,332	494,683	503,915	693,438	608,765	541,557	523,397
Beverages manufacturing	31210	83,691	78,740	84,764	95,236	83,774	106,580	109,397	D	111,433
Tobacco manufacturing	31220	28,680	32,431	31,357	29,645	27,706	35,864	36,177	31,715	34,196
Textiles, apparel, and leather products manufacturing	31990	NA	45,893	56,890	52,532	68,545	55,066	51,532	70,105	93,256
Wood products manufacturing	32100	28,183	26,213	25,241	22,344	28,764	36,703	44,706	28,998	35,117
Paper manufacturing	32200	100,057	80,030	99,820	103,867	101,033	106,399	106,178	108,659	92,775
Printing and related support activities	32300	22,678	33,532	32,163	26,809	26,267	26,281	29,178	35,056	26,808
Petroleum refineries	32401	NA	NA	540,612	581,297	578,075	639,569	521,504	336,271	245,480
Asphalt paving, roofing, and saturated materials manufacturing	32402	NA	NA	7,549	8,781	8,489	13,260	8,873	9,694	9,066
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	10,569
Basic chemicals manufacturing	32510	158,621	103,950	150,240	206,723	344,515	i 198,843	195,066	154,351	205,258
Resins, 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	58,372
Pesticides, fertilizers, and other agricultural chemicals manufacturing	32530	28,010	47,317	41,528	33,380	40,317	45,660	55,122	D	42,103
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing[c]	32541	445,985	309,750	324,266	414,284	428,486	415,199	414,154	410,983	454,867
In vitro diagnostic substances manufacturing[c]	32542	15,353	9,805	12,835	13,735	14,646	8,141	14,006	6,219	7,753
Biotechnology-based pharmaceutical and biological products (except diagnostic substances) manufacturing[c]	32543	NA	NA	NA	NA	NA	36,856	48,419	71,205	77,531
Soaps, cleaning compounds, and toilet preparations manufacturing	32591	69,942	71,452	81,151	70,851	82,518	87,034	101,458	94,015	83,100
Paints, adhesives, and other chemicals manufacturing	32592	63,149	62,724	60,506	64,497	79,372	67,504	73,975	68,020	73,419
Plastics and rubber products manufacturing	32600	118,523	114,191	137,777	173,290	194,568	153,705	165,082	156,033	175,735
Clay and glass products manufacturing	32710	24,394	19,014	25,143	21,754	20,164	22,987	21,577	23,739	30,853
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	28,328
Primary metal manufacturing	33100	NA	97,493	161,558	148,670	153,926	137,000	104,419	90,956	105,918
Fabricated metal products manufacturing	33200	142,788	102,595	119,246	130,090	155,294	i 160,359	168,139	150,860	129,815
Agricultural machinery and equipment manufacturing	33311	27,543	25,669	29,904	29,258	35,667	45,717	36,857	32,054	30,093
Construction machinery manufacturing	33312	18,228	13,180	19,480	25,854	31,853	42,912	41,256	35,668	35,074

TABLE 75

Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–16

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016
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	21,616
Semiconductor machinery manufacturing	33321	9,091	4,765	11,918	15,018	6,839	10,807	11,067	8,215	15,676
Industrial machinery manufacturing (except semiconductor machinery)	33322	19,452	15,372	21,762	29,736	31,127	29,265	35,077	32,599	25,375
Photographic and photocopying equipment manufacturing	33331	NA	5,392	3,927 i	4,791 i	D	6,885	7,246	7,124	6,774
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	76,726
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	15	D	2,068 i
Engine, turbine, and power transmission equipment manufacturing	33360	58,560	30,093	46,693	68,243	74,148	89,526	45,367	50,302	52,344
Metalworking and other general purpose machinery manufacturing	33390	54,007	43,998	58,532	71,081	86,258	81,492	98,230	99,506	77,458
Computers and peripheral equipment manufacturing and magnetic and optical media[d]	33412	NA	136,666	167,290	174,898	143,492	180,146	165,617	153,211	212,338
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	44,014
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	40,293 i
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	14,452
Audio and video equipment manufacturing	33430	10,969	10,929	19,142	7,296	14,633	14,832	13,162	D	25,739 i
Semiconductor and other electronic components manufacturing	33440	119,612	117,302	138,124	151,590	146,764	123,263	162,118	172,062	156,528
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	28,976	18,709	19,647	25,057	27,605	31,248	28,949	29,150	32,312
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments manufacturing	33452	33,348	46,237	57,639	40,372	53,425	52,990	55,142	48,787	47,879
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	62,706
Electrical equipment, appliances, and components manufacturing	33500	106,551	85,758	105,982	106,576	110,094	133,238	141,600	143,695	140,087
Motor vehicles manufacturing	33610	346,591	274,985	329,874	373,194	375,113	459,721	385,647	526,522	574,326
Motor vehicle body and trailer manufacturing	33620	9,363	15,184	22,168	14,423	31,982	25,726	32,146	23,083	63,455
Motor vehicle parts manufacturing	33630	97,433	77,528	146,257	125,593	130,372	155,179	244,948	192,928	152,650
Aircraft manufacturing	33641	97,973	69,001 i	81,666	111,748	91,545 i	145,641	132,472	139,909	130,676
Aircraft engine and engine parts manufacturing	33642	35,056	24,737	25,563	27,491	26,706	46,618	41,051	D	36,861
Other aircraft parts and auxiliary equipment manufacturing	33643	21,141	26,755	31,157	43,898	34,541	47,588	68,545	77,236	68,070
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
Railroad rolling stock manufacturing	33651	6,354	2,763	7,095 i	7,204	11,800	10,875	16,122	16,100	11,110
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
Motorcycle, bicycle, and parts manufacturing	33691	8,078	6,282	6,081	7,422	7,067	10,406	7,777	7,687	6,294 i
Military armored vehicles, tanks, and tank components manufacturing	33692	13,092	9,674	9,072	5,755	4,668	4,190 i	4,895	4,304	4,185
All other transportation equipment manufacturing	33699	7,131	5,438	11,079	11,066	16,258	15,809	D	11,472	11,977
Furniture and related products manufacturing	33700	36,218	31,479	32,876	32,881	37,447 i	35,446	39,675	38,024	38,473
Medical equipment and supplies manufacturing	33910	105,647	102,585	169,760	225,177	136,664	160,263	155,890	154,650	162,044

TABLE 75

Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–16

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016
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	86,242
Merchant wholesalers, durable goods	42300	238,101	196,341	206,240	171,815	221,488	353,401 i	161,500	232,112	196,996
Merchant wholesalers, nondurable goods	42400	274,190	239,385	247,311	266,388	349,833	362,965	457,745	387,489	360,816
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	59,657
Retail trade (except electronic shopping and electronic auctions)	44000	NA	D	195,958	70,424	214,728 i	128,479	400,192	196,896	275,053
Electronic shopping and electronic auctions	45411	NA	NA	32,624	40,254	53,712	59,174	43,787 i	D	110,618
Transportation	48000	NA	D	95,591	83,912	107,212	87,113	111,576	D	108,956
Couriers, messengers, and express delivery services	49200	D	D	36,420	D	D	D	123,456	D	141,429
Warehousing and storage	49300	28,723	1,296	23,982	21,910	3,157	12,235	1,971	2,305	3,359
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	7,262
Software publishers (except Internet)[e]	51120	121,028	118,001	129,649	132,970	136,905	154,237	163,059	159,688	155,325
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
Broadcasting (except Internet)	51500	NA	34,110	45,779	39,563	59,926	73,283	59,724	64,390	70,184
Wired telecommunications carriers	51710	99,917	D	209,490	261,484	216,736	181,127	227,778	213,921	179,239
Wireless telecommunications carriers (except satellite)	51720	134,162	153,937	138,473	156,525	193,254	205,148	247,714	210,820	172,357
Satellite telecommunications	51740	14,005	6,743 i	15,845	2,430	2,822	3,143	3,518	43,812	61,622
Other telecommunications (not listed elsewhere)	51790	4,374	8,108	7,222	15,929	14,610	16,325	5,973	13,669	7,685
Data processing, hosting, and related services[e]	51800	NA	29,903	31,417	51,197	82,997 i	49,201	67,167	64,916	59,466
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	19,455	26,461	26,654	44,095
Other information services, including Internet publishing, broadcasting, and Web search portals[e]	51910	NA	27,907	47,397	28,424	28,760	36,613	57,405	53,823	75,034
Finance: banking and credit intermediation	52200	NA	D	992,651	601,628	631,902 i	305,994	317,147	312,954	343,070
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
Insurance carriers and related activities	52400	NA	282,640	265,110	265,293	349,252	363,799	347,710	398,746	353,842
Real estate	53100	6,053	D	4,615	4,727	8,069	8,227	10,128	8,449	9,253
Rental and leasing services	53200	NA	D	27,719	18,597	21,801	26,614	15,330	23,848	12,368
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
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	NA	D	14,565	7,394	9,093	11,974	18,498 i	18,538	16,696
Architectural, engineering, and related services	54130	37,749	81,565	113,603	65,209	94,868 i	80,859	85,535	90,666	79,090
Specialized design services	54140	3,325	D	3,522	2,353	3,301 i	2,714	1,487	769	638
Computer systems design and related services[e]	54150	124,832	140,234	143,787	224,144	167,759	158,858	168,793	165,417	175,987
Management, scientific, and technical consulting services	54160	33,588	36,811	28,351	52,489	57,925	59,508	84,830	75,668	55,607
Research and development services in social sciences and humanities	54172	NA	978	1,168	820	934	1,297	969	1,042	1,124
Research and development services in biotechnology[c]	54173	NA	18,691 i	7,194	7,388	9,769	10,689	15,872	9,381	6,614

TABLE 75

Domestic sales for companies located in the United States that performed or funded R&D, by business activity: 2008–16

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	NA	16,041	15,845	19,094	27,670	32,098	27,450	30,843	30,731
Advertising and related services	54180	14,574	D	11,336 i	21,227	27,500	34,889	34,379	38,454	44,671
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	12,355
Management of companies and enterprises	55100	752	2,310	3,347	11,847	4,131	176,993	8,497	D	11,173 i
Administrative and support services	56100	NA	29,045	25,660	22,146	38,874 i	26,981	214,331	23,581	27,537
Waste management and remediation services	56200	NA	D	13,971	7,223	6,080	5,650	4,152	23,159	25,585
Offices of physicians	62110	7,492	25,751	24,133	23,844	35,513	36,233	19,041	36,724	40,574
Medical and diagnostic laboratories	62150	19,930	14,359	36,288	15,778	19,655	17,027	5,024	19,415	25,398 i
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	5,226
Hospitals and nursing care facilities	62200	NA	D	7,831	16,084	870 i	1,227	26,866	27,485	32,609
Social assistance services	62400	D	D	448	326	249	1,036	1,336	63	77
Arts, entertainment, and recreation	71000	NA	14,265	12,920	12,727	15,248	13,180	12,903	16,137	17,723
Accommodation and food services	72000	NA	D	37,218	27,476	54,266 i	57,908	31,664	44,505	32,457
Other services (not listed elsewhere)	81000	NA	9,638	35,994	118,268	44,823	120,458	60,949	51,253	173,754
Less: intersegment eliminations	–	219,384	110,499	132,754	117,417	136,579	136,540	160,374	126,960	130,160
Undistributed	–	756,553	1,137,705	412,892	450,613 i	108,244 i	D	1,945	D	0

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

NAICS = 2012 North American Industry Classification System.

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

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

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

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

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

Note(s)

Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded R&D. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. Most statistics for years prior to 2016 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey.

TABLE 76

Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–16

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016
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	3,093,889
Oil and gas extraction	21100	143,705	92,357	126,671	152,394	147,415	130,389	116,693	70,302	59,489
Mining	21200	NA	D	5,230	19,552	19,020	16,261	D	D	10,121
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	18,877
Utilities	22100	NA	D	9,155	10,892	9,320	8,068	8,229	10,468	4,473
Construction	23000	NA	15,107	11,664	18,660	43,283	33,541	24,672	14,571	6,691
Food manufacturing	31100	81,184	127,453	193,432	196,015	184,889	247,871	235,909	202,761	184,384
Beverages manufacturing	31210	59,317	50,655	56,495	84,916	83,229	57,690	57,147	D	44,030
Tobacco manufacturing	31220	290	102,541	102,636	111,353	103,052	33,327	D	D	30,826
Textiles, apparel, and leather products manufacturing	31990	NA	10,239	11,625	13,883	20,542	15,193	15,014	13,065	20,260
Wood products manufacturing	32100	6,381	1,613	3,101 i	1,821	4,144	5,769	7,172	4,715	5,647
Paper manufacturing	32200	39,895	30,504	36,481	40,196	41,303	40,349	42,619	D	34,212
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
Petroleum refineries	32401	NA	NA	297,333	372,811	333,710	328,477	266,321	175,953	170,110
Asphalt paving, roofing, and saturated materials manufacturing	32402	NA	NA	17	91	74 i	1,244	2,278	630	3,234
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	5,103
Basic chemicals manufacturing	32510	115,189	75,544	92,953	92,754	129,151	79,818	75,221	58,600	59,722
Resins, 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
Pesticides, fertilizers, and other agricultural chemicals manufacturing	32530	12,327	23,686	10,412	14,001	16,929	22,163 i	13,617	D	17,507
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing[c]	32541	136,925	128,937	147,497	163,323	165,908	162,730	155,814	153,415	144,433
In vitro diagnostic substances manufacturing[c]	32542	6,964	7,135	7,802	11,270	12,376	5,730	11,359	7,940	8,536 i
Biotechnology-based pharmaceutical and biological products (except diagnostic substances) manufacturing[c]	32543	NA	NA	NA	NA	NA	3,553	8,035	13,232	13,408
Soaps, cleaning compounds, and toilet preparations manufacturing	32591	72,271	80,113	86,107	99,565	84,423	98,232	95,193	86,186	81,724
Paints, adhesives, and other chemicals manufacturing	32592	49,968	41,584	42,946	55,746	49,627	45,604	54,754	39,126	45,453
Plastics and rubber products manufacturing	32600	43,878	46,866	55,694	70,156	71,055	65,315	76,697	45,131	64,414
Clay and glass products manufacturing	32710	12,023	8,789	12,710	12,430	16,796	16,378	13,287	15,938	16,912
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	6,453
Primary metal manufacturing	33100	NA	26,985	35,756	30,648	22,619	24,443	24,114	12,138	15,444
Fabricated metal products manufacturing	33200	45,571	29,870	42,347	49,138	52,129	39,319	67,646	43,238	35,312
Agricultural machinery and equipment manufacturing	33311	20,642	21,025	24,042 i	14,152	23,984	23,076	26,760	21,505	21,684
Construction machinery manufacturing	33312	13,881	10,015	11,205	17,120	11,502	20,431	24,092	20,423	14,296

TABLE 76

Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–16

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016
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	26,427
Semiconductor machinery manufacturing	33321	10,928	5,740	9,670	10,941	3,134	13,613	16,266	16,438	15,074
Industrial machinery manufacturing (except semiconductor machinery)	33322	7,532	5,996	8,961	14,930	11,492	10,092	16,537	6,590	12,372
Photographic and photocopying equipment manufacturing	33331	NA	2,080	D	D	D	618	1,915	1,477	896
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	37,662
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	0	D	3,512 i
Engine, turbine, and power transmission equipment manufacturing	33360	28,100	16,787	37,994	44,319	45,968	56,604	D	35,258	36,850
Metalworking and other general purpose machinery manufacturing	33390	36,061	22,352	36,485	41,866	39,237	23,995	51,377	41,166	38,582
Computers and peripheral equipment manufacturing and magnetic and optical media[d]	33412	NA	136,763	162,729	167,518	160,818	127,377	131,576	129,679	202,386
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	32,213
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	9,030
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	1,900
Audio and video equipment manufacturing	33430	2,243	4,112	3,100	4,180	3,294	4,764	5,171	D	9,734
Semiconductor and other electronic components manufacturing	33440	100,661	79,098	157,934	185,199	186,007	197,516	188,661	D	139,659
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	12,419	8,728	9,394	13,503	11,985	11,882	14,588	15,589	15,265
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments manufacturing	33452	5,126	9,629	11,268	7,329	10,300	13,337	12,013	9,882 i	11,780
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	39,587
Electrical equipment, appliances, and components manufacturing	33500	47,654	43,416	54,549	58,580	54,904	49,253	56,905	51,633	73,482
Motor vehicles manufacturing	33610	174,950	124,140	146,852	166,401	166,616	155,415	153,493	119,588	135,376
Motor vehicle body and trailer manufacturing	33620	D	504	937	903	2,302	187	573	145	390
Motor vehicle parts manufacturing	33630	66,559	49,109	95,944	98,857	98,046	113,842	134,544	101,485	92,573
Aircraft manufacturing	33641	S	6,959	7,569	9,732 i	5,939	8,600 i	7,452	9,077	5,821
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
Other aircraft parts and auxiliary equipment manufacturing	33643	9,178	9,959	10,547	12,611	10,015	12,933	16,421	19,962	17,050
Guided missiles, space vehicles, and related parts manufacturing	33644	D	D	D	D	1,899	2,431	2,366	2,434 i	339
Railroad rolling stock manufacturing	33651	894	875	1,980	1,666	2,455	1,764	3,557 i	3,253	3,761
Ship and boat building	33660	1,581	D	D	D	1,188 i	1,919 i	6,971 i	1,858	D
Motorcycle, bicycle, and parts manufacturing	33691	345	395	565	1,526	762	926	1,365	1,381	3,231 i
Military armored vehicles, tanks, and tank components manufacturing	33692	249	462	D	484	224	164	2,608	D	78
All other transportation equipment manufacturing	33699	2,382	895	1,929	2,349	2,212	13,125	D	3,093	2,496
Furniture and related products manufacturing	33700	7,183	4,342	4,610	6,151	6,272	5,960	6,085	5,506	6,898
Medical equipment and supplies manufacturing	33910	58,419	57,025	73,646	79,038	80,885	77,466	78,288	81,056	77,007

TABLE 76

Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–16

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016
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	45,526 i
Merchant wholesalers, durable goods	42300	174,168	116,754	127,763	42,957	25,213	25,149 i	18,514	27,926	27,336
Merchant wholesalers, nondurable goods	42400	66,765	33,733	33,672	229,921	237,186	208,777	240,437	160,432	153,073
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
Retail trade (except electronic shopping and electronic auctions)	44000	NA	D	27,253	34,498	42,738	28,360	42,336	13,516	17,291
Electronic shopping and electronic auctions	45411	NA	NA	D	D	34,500	37,403	D	D	D
Transportation	48000	NA	D	86,945	25,930	32,403	8,708	5,691	D	17,103
Couriers, messengers, and express delivery services	49200	D	D	11,199	D	0	30,192	47,478	D	45,916
Warehousing and storage	49300	2,512	240	474	975	826	1,295	614	D	1,294
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
Software publishers (except Internet)[e]	51120	89,158	77,832	84,710	97,929	100,697	112,350	115,101	113,255	101,389
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
Broadcasting (except Internet)	51500	NA	5,624	7,533	4,466	7,504 i	8,215	D	10,083	14,715
Wired telecommunications carriers	51710	D	D	1,214	6,862	7,093	865	2,852	2,667	2,665
Wireless telecommunications carriers (except satellite)	51720	1,085	745	6	171	154 i	D	45	D	59
Satellite telecommunications	51740	5,325	5,919 i	176	353 i	234	D	63	587	305
Other telecommunications (not listed elsewhere)	51790	1,230	1,015	515	2,875	3,193 i	2,179	534	893	840
Data processing, hosting, and related services[e]	51800	NA	6,292	7,107	9,443	12,874	9,301	13,891	14,101	16,844
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	7,987 i	D	7,138	12,689
Other information services, including Internet publishing, broadcasting, and Web search portals[e]	51910	NA	13,753	29,921	11,126	16,969	28,521	44,849 i	40,718	37,791
Finance: banking and credit intermediation	52200	NA	45,027	76,052 i	29,501	41,335	41,144	47,077	64,668	58,225
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
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
Real estate	53100	D	D	D	D	D	D	D	88	57
Rental and leasing services	53200	NA	D	8,580 i	5,232 i	7,232	8,873	6,656	5,390	6,699
Lessors of nonfinancial intangible assets, including patent licensing	53300	D	352	225	359	764	640	517	168	82
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	NA	864 i	1,623	D	2,222	2,614	3,816 i	3,720	2,815
Architectural, engineering, and related services	54130	4,931	14,969	33,706	36,917	19,373	45,064	49,007	49,180	26,903
Specialized design services	54140	D	D	454	228	345	900	678	D	68
Computer systems design and related services[e]	54150	86,084	76,243	80,239	153,776 i	104,306	90,742	104,143	78,373	73,608
Management, scientific, and technical consulting services	54160	18,909	23,315	14,838	24,421	27,236	22,327	8,247	16,452	7,534
Research and development services in social sciences and humanities	54172	NA	2	2	7	D	4	22	D	7
Research and development services in biotechnology[c]	54173	NA	3,663 i	1,299	1,269	1,547	1,701	1,671	1,581	2,476 i

TABLE 76

Foreign sales for companies located in the United States that performed or funded R&D, by business activity: 2008–16

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008	2009	2010	2011	2012	2013	2014	2015	2016
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	NA	3,817	2,994	4,352	5,625	4,814	5,253	5,194	7,255
Advertising and related services	54180	D	D	1,656	D	25,263	D	D	D	D
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	1,533
Management of companies and enterprises	55100	76	23	266	5,428	1,304	887	716	D	622
Administrative and support services	56100	NA	6,821	19,476	10,588	11,810	17,023	29,314	26,456	28,138
Waste management and remediation services	56200	NA	D	201	959	484	595	614	1,827	1,908
Offices of physicians	62110	0	* i	0	0	0	0	0	0	0
Medical and diagnostic laboratories	62150	1,037	857	1,662	1,269	1,383	887	895	1,488 i	1,896 i
Other ambulatory health care services (ambulance, dental, home health care)	62199	NA	D	154	D	27	0	0	0	0
Hospitals and nursing care facilities	62200	NA	0	D	D	D	D	0	131	287
Social assistance services	62400	D	D	0	0	0	29	2	0	0
Arts, entertainment, and recreation	71000	NA	3,074	3,169	3,297	3,096	D	D	2,540	2,916
Accommodation and food services	72000	NA	9,891	32,256	11,945	34,612	49,347	14,564	32,394	34,497
Other services (not listed elsewhere)	81000	NA	5,946	7,784	10,816	12,789	21,571	17,416	19,528	64,699
Less: intersegment eliminations	–	161,647	127,244	101,536	164,044	172,709	165,075	156,556	113,257	97,364
Undistributed	–	335,723	452,404	103,862	147,756 i	58,997 i	D	2,657	D	0

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

NAICS = 2012 North American Industry Classification System.

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

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

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

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

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

Note(s)

Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded R&D. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. Most statistics for years prior to 2016 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey.

TABLE 77

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2008–16

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008[c]	2009[d]	2010[d]	2011	2012	2013	2014	2015	2016
All business activities	21100–81000	NA	NA	NA	290,240	302,759	323,107	340,539	355,671	374,685
Oil and gas extraction	21100	NA	NA	NA	D	D	D	1,108	D	867
Mining	21200	NA	NA	NA	83	88	80	54	68	58
Support activities for mining, including oil and gas	21300	NA	NA	NA	D	1,860	1,871	2,349	2,076	1,544
Utilities	22100	NA	NA	NA	298	434	343	343	485	349
Construction	23000	NA	NA	NA	752	756	244 i	204 i	521	255 i
Food manufacturing	31100	NA	NA	NA	3,769	3,565	5,156	4,934 i	4,388 i	4,893
Beverages manufacturing	31210	NA	NA	NA	D	D	628	D	664	D
Tobacco manufacturing	31220	NA	NA	NA	D	140	163	D	153	153
Textiles, apparel, and leather products manufacturing	31990	NA	NA	NA	623	688	687	662 i	794	1,244 i
Wood products manufacturing	32100	NA	NA	NA	202	278	234	322 i	227	241
Paper manufacturing	32200	NA	NA	NA	755	982	1,166	1,028	D	1,168
Printing and related support activities	32300	NA	NA	NA	244	305 i	389	363	287	304
Petroleum refineries	32401	NA	NA	NA	D	596	438	D	443	441
Asphalt paving, roofing, and saturated materials manufacturing	32402	NA	NA	NA	38	41	117 i	66	52 i	75
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	NA	NA	NA	285	218	312 i	279 i	268	316
Basic chemicals manufacturing	32510	NA	NA	NA	3,099	3,228	2,925	3,144	3,071	2,839
Resins, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	NA	NA	NA	815	1,093	999	1,054	1,213	932
Pesticides, fertilizers, and other agricultural chemicals manufacturing	32530	NA	NA	NA	D	1,951	2,114 i	2,057 i	D	1,883 i
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing[e]	32541	NA	NA	NA	42,381	43,672	42,456	43,748	40,540	45,271
In vitro diagnostic substances manufacturing[e]	32542	NA	NA	NA	1,110	1,044 i	831	729	801	1,013
Biotechnology-based pharmaceutical and biological products (except diagnostic substances) manufacturing[e]	32543	NA	NA	NA	NA	NA	7,118	10,337	14,071	16,421
Soaps, cleaning compounds, and toilet preparations manufacturing	32591	NA	NA	NA	2,344	2,261	2,286	2,365	2,451	2,551
Paints, adhesives, and other chemicals manufacturing	32592	NA	NA	NA	1,552	1,630	1,489	1,562 i	D	D
Plastics and rubber products manufacturing	32600	NA	NA	NA	2,669	3,277	3,010	3,072 i	2,910	3,402
Clay and glass products manufacturing	32710	NA	NA	NA	801 i	987 i	973 i	1,003 i	948	991
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	NA	NA	NA	303	367	458 i	564 i	393 i	382
Primary metal manufacturing	33100	NA	NA	NA	552	750	644	703	596 i	601

TABLE 77

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2008–16

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008[c]	2009[d]	2010[d]	2011	2012	2013	2014	2015	2016
Fabricated metal products manufacturing	33200	NA	NA	NA	D	2,236	2,535 i	2,280	2,541	2,356
Agricultural machinery and equipment manufacturing	33311	NA	NA	NA	989	1,175	1,193	1,230	1,172	1,194
Construction machinery manufacturing	33312	NA	NA	NA	655	675	1,340	1,309	1,210	1,211
Mining, oil, and gas field machinery and equipment manufacturing	33319	NA	NA	NA	1,735	1,999	1,436 i	1,142	1,431	1,107
Semiconductor machinery manufacturing	33321	NA	NA	NA	2,207	1,308 i	3,146	2,979	3,218	3,374
Industrial machinery manufacturing (except semiconductor machinery)	33322	NA	NA	NA	945	850	878	1,158	1,143	901
Photographic and photocopying equipment manufacturing	33331	NA	NA	NA	656	23 i	458	79	133	83
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	NA	NA	NA	D	1,182	1,367	1,446	1,380	1,686
Digital cameras manufacturing	33333	NA	NA	NA	NA	NA	NA	25	491 i	421 i
Engine, turbine, and power transmission equipment manufacturing	33360	NA	NA	NA	3,257	3,603	2,373	1,847	2,304	2,367
Metalworking and other general purpose machinery manufacturing	33390	NA	NA	NA	1,832	1,607	1,780	2,089	2,292	2,123
Computers and peripheral equipment manufacturing and magnetic and optical media[f]	33412	NA	NA	NA	10,311	10,893	11,162	9,651	10,997	18,324
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	NA	NA	NA	7,006	5,101	5,534	7,734	9,529	8,184
Radio, television, and wireless communication equipment manufacturing	33422	NA	NA	NA	4,182	5,851	7,664	6,325 i	3,387 i	D
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	NA	NA	NA	871	1,937	1,729	1,687	1,695 i	1,799
Audio and video equipment manufacturing	33430	NA	NA	NA	798	865	876	1,018	1,071 i	972
Semiconductor and other electronic components manufacturing	33440	NA	NA	NA	24,580	28,983	30,792	31,986	30,805	31,413
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	NA	NA	NA	2,787	2,868 i	3,178 i	3,670	3,409	3,485 i
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments manufacturing	33452	NA	NA	NA	5,666	6,403	6,550	6,234	6,503	8,276
Measuring and control instruments manufacturing (not listed elsewhere)	33459	NA	NA	NA	3,191	3,465	3,901	4,045	4,201	4,223
Electrical equipment, appliances, and components manufacturing	33500	NA	NA	NA	3,007	3,391	4,208	4,461	4,378	4,816
Motor vehicles manufacturing	33610	NA	NA	NA	9,320	11,314	11,696	12,134	12,502	14,810

TABLE 77

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2008–16

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008[c]	2009[d]	2010[d]	2011	2012	2013	2014	2015	2016
Motor vehicle body and trailer manufacturing	33620	NA	NA	NA	69	91 i	98 i	96	156 i	114
Motor vehicle parts manufacturing	33630	NA	NA	NA	3,010	D	4,554	6,022	6,158	6,613
Aircraft manufacturing	33641	NA	NA	NA	5,853	15,380 i	16,607 i	15,632 i	14,757 i	11,989 i
Aircraft engine and engine parts manufacturing	33642	NA	NA	NA	1,636	1,296	1,758	2,294 i	1,580	1,738
Other aircraft parts and auxiliary equipment manufacturing	33643	NA	NA	NA	1,896	2,655	3,446	4,443	4,919	3,817
Guided missiles, space vehicles, and related parts manufacturing	33644	NA	NA	NA	3,526	2,850	2,703	2,826 i	3,011	3,063 i
Railroad rolling stock manufacturing	33651	NA	NA	NA	136	177	183	295	240	D
Ship and boat building	33660	NA	NA	NA	D	D	1,106	1,568 i	D	D
Motorcycle, bicycle, and parts manufacturing	33691	NA	NA	NA	212 i	176 i	214 i	251	282	286
Military armored vehicles, tanks, and tank components manufacturing	33692	NA	NA	NA	D	122	215	358	335	392
All other transportation equipment manufacturing	33699	NA	NA	NA	415	D	362	428	D	368
Furniture and related products manufacturing	33700	NA	NA	NA	300	382	383	389	458	405
Medical equipment and supplies manufacturing	33910	NA	NA	NA	10,141	10,703	11,797	10,987	11,336	11,727
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	NA	NA	NA	2,593	D	2,544	2,387	2,455 i	2,600 i
Merchant wholesalers, durable goods	42300	NA	NA	NA	505	1,461 i	449 i	414 i	1,507 i	559 i
Merchant wholesalers, nondurable goods	42400	NA	NA	NA	429	651 i	272 i	D	546 i	153 i
Wholesale electronic markets and agents and brokers (business to business)	42500	NA	NA	NA	54	182 i	D	139	D	23
Retail trade (except electronic shopping and electronic auctions)	44000	NA	NA	NA	52	101 i	96 i	58 i	87	153
Electronic shopping and electronic auctions	45411	NA	NA	NA	940 i	1,239	993	1,051	1,543 i	1,587 i
Transportation	48000	NA	NA	NA	123	D	D	388	205 i	100
Couriers, messengers, and express delivery services	49200	NA	NA	NA	D	D	D	344	D	394
Warehousing and storage	49300	NA	NA	NA	15	15	15	3	3	0
Newspaper, periodical, book, and directory publishers (except Internet)	51110	NA	NA	NA	345 i	229 i	316 i	89 i	99 i	80 i
Software publishers (except Internet)[g]	51120	NA	NA	NA	22,635	23,803	26,661	31,392	29,887 i	26,811
Motion picture and sound recording (except Internet)	51200	NA	NA	NA	61	73 i	86	71 i	10	16
Broadcasting (except Internet)	51500	NA	NA	NA	94	36	53	70 i	101 i	D
Wired telecommunications carriers	51710	NA	NA	NA	867	1,482 i	951 i	945 i	1,229 i	1,067 i
Wireless telecommunications carriers (except satellite)	51720	NA	NA	NA	391 i	739 i	1,768 i	2,481	1,176 i	1,477 i
Satellite telecommunications	51740	NA	NA	NA	D	195	106	107	681 i	699 i

TABLE 77

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2008–16

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008[c]	2009[d]	2010[d]	2011	2012	2013	2014	2015	2016
Other telecommunications (not listed elsewhere)	51790	NA	NA	NA	495	383	322	255	459	448
Data processing, hosting, and related services[g]	51800	NA	NA	NA	4,922	3,997	4,009	4,754	5,839	6,130
Cloud computing applications and Internet-based software services	51801	NA	NA	NA	NA	NA	3,727 i	5,718	5,783	9,798
Other information services, including Internet publishing, broadcasting, and Web search portals[g]	51910	NA	NA	NA	D	11,397	13,485	15,306	21,534	D
Finance: banking and credit intermediation	52200	NA	NA	NA	1,365	1,601	1,834	2,451	2,708	4,474
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	NA	NA	NA	1,148	893	1,153	937	1,352	1,516
Insurance carriers and related activities	52400	NA	NA	NA	D	1,141	1,573	887	1,364	1,216
Real estate	53100	NA	NA	NA	13	26 i	100	193	280	438
Rental and leasing services	53200	NA	NA	NA	27	D	69	59	D	22
Lessors of nonfinancial intangible assets, including patent licensing	53300	NA	NA	NA	319	369	74	78	79	40
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	NA	NA	NA	578 i	417 i	514 i	826 i	1,283	891
Architectural, engineering, and related services	54130	NA	NA	NA	2,028	4,206 i	3,398	3,392	4,143 i	3,424
Specialized design services	54140	NA	NA	NA	271	207 i	101	97	83	78
Computer systems design and related services[g]	54150	NA	NA	NA	11,129	12,390 i	11,472 i	13,216 i	13,647	14,431
Management, scientific, and technical consulting services	54160	NA	NA	NA	1,745	2,280	2,030	1,958	1,761	2,137 i
Research and development services in social sciences and humanities	54172	NA	NA	NA	D	601	792	745	756	D
Research and development services in biotechnology[e]	54173	NA	NA	NA	6,030	7,146	4,145	3,083 i	5,178 i	3,939 i
Research and development services in physical, engineering, and life sciences (except biotechnology)	54174	NA	NA	NA	7,196	9,427	9,139	9,068	10,907	10,667
Advertising and related services	54180	NA	NA	NA	80	377 i	450 i	435	424	344
Professional, scientific, and technical services (not listed elsewhere)	54190	NA	NA	NA	1,316	2,463 i	1,786	1,020	1,228	885
Management of companies and enterprises	55100	NA	NA	NA	20	40	68	25 i	D	28
Administrative and support services	56100	NA	NA	NA	338	436	556 i	401 i	202 i	419
Waste management and remediation services	56200	NA	NA	NA	19 i	D	39 i	31	24 i	25
Offices of physicians	62110	NA	NA	NA	24	73 i	74 i	88 i	79 i	106 i
Medical and diagnostic laboratories	62150	NA	NA	NA	764	1,027	959	965	1,204	1,280 i

TABLE 77

Domestic R&D paid for by the company and others and performed by the company, by business activity: 2008–16

(Millions of U.S. dollars)

Business activity[a]	Business code[b]	2008[c]		2009[d]		2010[d]		2011		2012		2013		2014		2015		2016	
Other ambulatory health care services (ambulance, dental, home health care)	62199	NA		NA		NA		11		41	i	51	i	35	i	42	i	23	i
Hospitals and nursing care facilities	62200	NA		NA		NA		2		2	i	2		7	i	7		9	
Social assistance services	62400	NA		NA		NA		7		36		38		16		2		2	
Arts, entertainment, and recreation	71000	NA		NA		NA		105		108		31		91	i	D		44	
Accommodation and food services	72000	NA		NA		NA		74		131	i	123	i	57		87		61	
Other services (not listed elsewhere)	81000	NA		NA		NA		366		553		366		576		682		D	
Undistributed	–	NA		NA		NA		28,583	i	1,689	i	336	i	63		0		0	

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

NAICS = 2012 North American Industry Classification System.

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

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

[c] Questions used to collect these data in survey year 2008 are not directly comparable to those used in later survey years.

[d] Data were collected as worldwide R&D paid for by others and performed by the company for survey years 2009 and 2010.

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

[f] 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.

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

Note(s)

Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded R&D. For survey year 2008, industry classification was based on the 2002 NAICS. For survey years 2009–13, industry classification was based on the 2007 NAICS. Most statistics for years prior to 2016 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey.

Technical Notes

Survey Overview

Purpose. The Business R&D and Innovation Survey (BRDIS) is the primary source of information on research and development expenditures and the R&D workforce of businesses operating in the 50 U.S. states and the District of Columbia.

Data collection authority. The information collected by BRDIS is solicited under the authority of the National Science Foundation (NSF) Act of 1950, as amended, and the America COMPETES Reauthorization Act of 2010. Response to this annual survey is mandatory and confidential; the U.S. Census Bureau collects the data under the authority of Title 13, Section 8 of the United States Code. The Office of Management and Budget (OMB) control number is 0607-0912 and expires on 29 February 2020.

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

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

Key Survey Information

Frequency. Annual.

Initial survey year. BRDIS began collecting data for calendar year 2008 after replacing the Survey of Industrial Research and Development (SIRD) that collected data for 1953–2007.

Reference period. Calendar year 2016.

Response unit. Company.

Sample or census. Sample.

Population size. 1,485,151 companies. This is a substantial decrease from the previous cycle because of a change in coverage criteria. See section Target Population for details.

Sample size. 44,861 companies.

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. BRDIS has been designed to provide detailed statistics on global and domestic R&D expenditures of companies located in the United States and on these companies' R&D employees, intellectual property, technology transfer, and innovation activities.

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

Target Population

The target population for BRDIS consists of all for-profit companies that have five or more paid employees in the United States, that have at least one establishment that is in business during the survey year and is located in the United States,

and that are classified in certain industries based on the 2012 North American Industry Classification System (NAICS), with a particular focus on those companies that perform R&D in the United States.

The Business Register, a U.S. Census Bureau compilation that contains information on more than 3 million establishments with paid employees, serves as the primary input to the sample frame from which the BRDIS 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. Prior to 2016 BRDIS, companies were excluded from the frame if they were classified in a NAICS industry that was outside the scope of BRDIS. Additionally, companies were excluded from the frame if they had fewer than five employees based on the company's prior year aggregated employment data. However, if the employment information was unavailable and a company's prior year aggregated payroll was $250,000 or more, these companies were included in the frame. These scoping criteria were changed for 2016 BRDIS for industries that compose other nonmanufacturing: NAICS 23, 44, 45, 55, 56, 624, 71, 72, and 81. Small companies with at least 5 but less than 10 employees in these industries accounted for a large share of the 2014 BRDIS frame (approximately 22%) but had small levels of verified R&D ($38 million, or less than 0.02% of total domestic R&D) and therefore were excluded from the sample frame. However, if the prior year employment information was unavailable and a company's prior year aggregated payroll was $500,000 or more, these companies were included in the frame.

Sample Frame

The scope of the 2016 BRDIS 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 five or more paid employees in the United States, based on employment on 12 March 2015; (4) have at least one establishment that is physically located in the United States and is in business at the end of calendar year 2016 (the time at which the U.S. Census Bureau finished the 2015 Business Register processing); and (5) are not federally funded R&D centers.

Single-unit company records were extracted from the 2015 Business Register if the company had at least five paid employees in 2015 or, if employment information was unavailable, if the company's 2015 payroll was greater than or equal to $250,000. Companies were removed from the sample frame if their NAICS codes were designated as Crop production (NAICS 111), Animal production (NAICS 112), Postal service (NAICS 491), Educational services (NAICS 61), Private households (NAICS 814), or Public administration (NAICS 92) or if they were no longer in business or were nonprofits. Companies were also removed from the sample 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 2015 Business Register if the given establishment's 2015 payroll was greater than zero or if the establishment employed at least one person in 2015. Prior to creating records for multiunit companies from these establishments, establishments classified as Postal service (NAICS 491), Private households (NAICS 814), or Public administration (NAICS 92) were removed, as were those that were not physically located in the 50 U.S. states or the District of Columbia. Unlike single-unit companies, establishments classified as Crop production (NAICS 111), Animal production (NAICS 112), or Educational services (NAICS 61) were not removed during the construction of multiunit company records. From the resulting set of multiunit companies, companies were removed from the sample frame if they had fewer than five 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 sample 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) BRDIS, (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 2015 from the Business Register.

Industry Classification for Sampling

Each company was assigned to 1 of 60 industry sampling strata based on the reported business segment in which the company performed the largest amount of total domestic R&D as reported in the prior period (2011–15 BRDIS), if available. If these business segment data were not reported for a given company, assignment is based on the NAICS codes of its establishments in the U.S. Census Bureau's Business Register using the following method, with some adjustments made to account for vertical integration of related business activities within the company. The company was first assigned to the economic sector, defined by a 2-digit NAICS code that accounted for the highest percentage of its aggregated annual payroll. Then the company was assigned to a subsector, defined by a 3-digit NAICS code that accounted for the highest percentage of its annual payroll within the economic sector. Next, the company was assigned a 4-digit NAICS code within the subsector, again based on the highest percentage of its aggregated annual payroll within the subsector. Finally, the company was assigned a 6-digit NAICS code within the 4-digit NAICS code, based on the highest percentage of its aggregated annual payroll within the 4-digit NAICS code. The industry used for sampling purposes was not necessarily the same code used for publication; see section Postsampling Industry Classification.

Stratification of the Sample Frame

Each company in an industry sampling stratum was further assigned to one of three R&D groups based on information about its prior domestic R&D activity: (1) companies with a positive value for the measure of size based on R&D (*known positive R&D group*), (2) companies with a zero value for the measure of size based on R&D (*known zero R&D group*), and (3) companies with unknown R&D activity (*unknown R&D group*). For 2016, there were 34,958 companies in the first group, 11,355 companies in the second group, and 1,438,838 companies in the third group, for a total of 1,485,151 companies (table A-1). This was a decrease of 544,285 companies compared with the target population for 2015 BRDIS of 2,029,436 companies. The population decreased primarily because the criteria for inclusion in the BRDIS sample was changed as described above in the section Target Population.

Sample Selection

In the known positive R&D group, Pareto probability-proportional-to-size (PPS) sampling was used within each noncertainty industry stratum, where the probability of selection was proportional to the company's measure of size. In the unknown R&D group, Pareto PPS sampling was typically used within each industry stratum, though simple random sampling was used for industries in which the number of companies in the sample frame was high and the likelihood of R&D was low. In the known zero R&D group, a single Pareto PPS sample was selected across all industry strata. Each sample strata had a certainty and noncertainty portion (table A-2). Companies in select industries or those that exhibited characteristics of large R&D companies, including those with the largest amounts of R&D or annual payroll, were selected for the sample with certainty (i.e., the probability of selection was equal to 1). The probability of selection for other companies in the known positive R&D and unknown R&D groups depended on their size, the number of companies selected, and the total size or number of companies in their industry strata. The number of companies selected was based on a coefficient of variation constraint on the estimated sample total for the industry stratum and was increased, if necessary, to ensure that the minimum probability of selection is 0.05 for the known positive R&D group and one of three values for the unknown R&D group—0.004 or 0.01 for Nonmanufacturing industries (NAICS other than 31–33) and Incomplete manufacturers (Incomplete NAICS beginning with 3), depending on the population size and likelihood of R&D, and 0.02 for Manufacturing (NAICS 31–33); Computer systems design and related services (NAICS 5415); and Management, scientific, and technical consulting services (NAICS 5416). For the known zero R&D group, the probability of selection for other companies depended on their size and the number of companies selected. The number of companies selected was based on a coefficient of variation constraint and was increased, if necessary, to ensure that the minimum probability of selection is 0.02.

Once selected, each company was assigned a sampling weight equal to the reciprocal of its probability of selection for the sample. Companies that were selected for the sample with certainty were assigned sampling weights equal to 1, and companies that were selected using random or Pareto PPS sampling were assigned weights ranging from 1 to 250. A

complete and detailed description of the sample design and estimation methodology is given in the annual BRDIS methodology report available from the NCSES project officer.

Sample Size

With the sample design parameters detailed above, a total of 41,361 companies were selected. This sample size represented a substantial drop from prior years. To maintain a comparable sample size, 3,500 additional sampling units were selected from industries with a history of high coefficients of variation. Adding these additional sampling units to the initial sample brought the total sample size to 44,861, of which 18,184 companies were in the known positive R&D group, 1,058 companies were in the known zero R&D group, and 25,619 companies were in the unknown R&D group (table A-3 and table A-4). A complete and detailed description of the selection of additional sampling units is given in the annual BRDIS methodology report available from the NCSES project officer.

During the survey's annual contact update procedures, 107 large R&D performers from the 2015 sample were found that were not included on the 2016 sample frame. To follow up, records for these companies were added to the 2016 sample with certainty. Because it was expected that many of these records would not contribute to 2016 BRDIS tabulations due to changes in company structure, these companies are not included in sample frame counts or sample sizes (table A-5).

Data Collection and Processing Methods

In addition to paper questionnaires, an electronic mode of data reporting via the U.S. Census Bureau's Centurion data collection instrument was available to all BRDIS respondents. Respondents were made aware of Centurion in BRDIS-related correspondence and transmittals from the U.S. Census Bureau. For paper versus electronic response rates, see section Response by Mode.

Questionnaires

For the 2016 cycle of BRDIS, two questionnaires were used to collect data for the survey. Companies with domestic R&D performance greater than or equal to $1 million in 2014 or 2015 were sent the standard survey form, BRDI-1. All other companies were sent an abbreviated form, BRDI-1(S) (table A-6 and table A-7). A small number of companies with a history of chronic delinquency were sent the abbreviated form instead of the standard questionnaire. Some companies requested multiple forms to facilitate subcompany reporting (table A-8).

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

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

Section 2. Financial schedule A. Includes accounting questions about the company's R&D expenses and capital expenditures for R&D.

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

Section 4. Management and strategy of R&D. Includes questions related to the nature of the company's R&D and how the R&D is being performed. This section was targeted toward company employees responsible for managing R&D departments or programs.

Section 5. Human resources. Includes questions related to the human resources involved in the company's R&D activities.

Section 6. Intellectual property and technology transfer. Includes questions on the company's production, use, acquisition, and disposition of intellectual property related to science and technology (S&T), with a focus on patents.

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

Response Rates

Unit Response Rates

Of the companies surveyed for the 2016 survey, 19.5% did not submit any response, and an additional 0.3% 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 NSF and the U.S. Census Bureau to measure unit response to BRDIS were check-in rates, unit response rates, and coverage rates.

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

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

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

For the 2016 BRDIS, the check-in rate was 80.5%, and the URR was 80.2%. The coverage rate for the 2016 BRDIS was 92.6% for the known positive R&D group, 73.4% for the unknown R&D group, and 88.0% for the known zero R&D group (table A-9 and table A-10).

Item Response Rates

BRDIS 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 2016 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 BRDIS, 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 BRDIS estimate. TQNR tables corresponding to each data table are available from the NCSES project officer.

Response by Mode

Overall, 7% of checked-in cases responded to BRDIS by mailing in the paper form, and 93% responded using the online version of the survey. However, companies receiving Form BRDI-1 were more likely to respond online; 97% of all checked-in BRDI-1 forms were submitted online, as opposed to only 92% of all checked-in BRDI-1(S) forms. Lastly, 96% of checked-in companies with account managers responded via the Internet.

Data Editing

Given the size and complexity of BRDIS, many survey responses included errors that required correction or unusual patterns that required validation. Several hundred automated edit checks were programmed to improve the efficiency of analyst data review and correction (table A-11).

Approximately two-thirds of these edit checks were designed to catch arithmetic errors and logically inconsistent responses (*balance edits*). The remaining edit checks were designed to flag outliers for further analyst review (*analytical*

edits). Descriptions of the data edits and edit failure rates are in annual methodology reports available from the NCSES project officer.

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

Techniques for Handling Unit and Item Nonresponse

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

Unit Nonresponse

Except for estimates of counts, patents, patent licensing agreements, product or process innovation, and intellectual property protection, unit nonresponse is handled by adjusting weighted reported data and imputed data as follows. Each company's sampling weight is multiplied by a nonresponse adjustment factor. To calculate the adjustment factors, each company in the sample that is eligible for tabulation is assigned to one (and only one) adjustment cell. The adjustment cells are based on the three R&D groups, which are subdivided based on R&D size and certainty status and also on the industry sampling strata described in the section Stratification of the Sample Frame that are updated using information on industry classification reported in BRDIS. 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 2016 BRDIS (see section Sample Frame) was also used to adjust for unit nonresponse. For companies in the known positive R&D stratum, the measure of size was based on R&D in the United States. For companies in the unknown R&D stratum, the measure of size was based on total annual payroll in the United States. For companies in the known zero R&D stratum, an arbitrary value of 1 was assigned as the measure of size so that the records would be subjected to further examination.

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

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

Item Nonresponse

Item nonresponse for a given company is handled by item imputation. For account manager companies, large companies, and special cases, analysts impute these data using direct substitution of available company data (i.e., data from the company's website, annual Form 10-K report, or administrative sources) or ad hoc methods, which are approved by NSF's and the U.S. Census Bureau's subject-matter experts. For other cases, including cases where analysts were unable to provide a superior estimate, data are imputed by programmed item imputation procedures. Depending on the particular

item being imputed for a company, these procedures are based on a combination of (1) direct substitution of available company data, (2) ratio imputation using the company's survey data for both current and prior year, and (3) ratio imputation using survey data from both the company and other similar companies, which reported both the survey item being imputed for the company and the other survey item used in the ratio. Tables of imputation rates corresponding to each data table are available from the NCSES project officer.

Estimation

The general methodology used to produce estimates from BRDIS 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 BRDIS 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 BRDIS estimate is multiplied by both its sampling weight and its nonresponse adjustment factor (if applicable), and these weighted values are then summed to create the estimate. No nonresponse adjustment factor is used for estimates of counts, patents, patent licensing agreements, and product or process innovation. For these estimates, each value that contributes to a given BRDIS estimate is weighted only by its sampling weight.

Postsampling Industry Classification

As mentioned in the section Industry Classification for Sampling, the industry classification assigned to companies for sampling was based on either reported BRDIS business segment data from prior years or annual payroll. To produce more accurate estimates for the current survey year, a company's reported business code data, if available for the current survey year, were used to assign an updated industry code for tabulations. The company's response to the domestic R&D performance questions from the current survey year was used to classify each company into the business code that accounted for the largest amount of total domestic R&D performance. The business codes reported by companies with large amounts of R&D were validated, and in some cases corrected, by survey staff. If no business code data were available for a company's domestic R&D performance, the industry code used for sampling was also used for tabulations.

R&D, by Core-Based Statistical Area (CBSA)

CBSA-level estimates of business R&D are modeled using BRDIS data reported by companies on the address 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 BRDIS methodology cannot attribute all R&D to a specific location. R&D that could not be attributed to a location includes R&D reported on Form BRDI-1 that was not allocated to a specific state and R&D reported on Form BRDI-1(S) by multiestablishment companies. This R&D was performed in one of the 50 states or the District of Columbia, but the specific location is not estimated and is reported as "undistributed" in BRDIS tables.

R&D, by State

The estimation methodology for state estimates takes the form of a hybrid estimator, combining the unweighted reported amount, by state, with a weighted amount apportioned (or raked) across states with relevant industrial activity. The hybrid estimator smooths the estimate over states with R&D activity, by industry, and accounts for real observed change within a

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

Innovation

Historically, BRDIS has only produced estimates of innovation activity as sums of weighted data (reported or imputed) for companies that responded to the innovation activity items. Beginning with the 2016 BRDIS, the innovation activity estimates include an imputed value for the companies that did not respond to the innovation activity items. The nonresponding companies are proportionally allocated to the two innovation activity responses (*innovation active*, or *innovation inactive*) based on the percentage of companies in each of the innovation active and innovation inactive groups. The weights are based only on the sampling weight. There is an adjustment to the weight to account for nonresponse.

R&D, by Business Segment Code

To provide increased granularity on R&D activities, BRDIS 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 BRDIS for companies to use to categorize their business operations. The list of business codes for the 2016 cycle of BRDIS was based on the 2012 NAICS. To assist companies in selecting appropriate business codes, likely business codes were provided to respondents by printing them on the forms mailed to companies and by prepopulating them on the online version of the survey. For companies that reported to the 2014 or 2015 BRDIS, the most recent business codes reported by the company were used to provide the business codes. For companies that did not report to the 2014 or 2015 BRDIS, establishment payroll data from the Business Register were used to provide the business codes.

Company Counts

The company count estimates for 2014 and onward are not comparable with estimates published for previous years. BRDIS review and correction procedures were amended beginning in survey year 2014 to include a more systematic analysis of companies reporting small amounts of R&D (less than $10,000) and no R&D employees. Many of these responses were determined to be reporting errors (false positive R&D), and their R&D was set to zero. These corrections had a negligible impact on BRDIS R&D estimates compared to earlier years. But because these companies tended to have high sample weights, these corrections had a large impact on the estimate of R&D-active companies compared to prior years (when many fewer such corrections were made).

Survey Quality Measures

Sampling and Nonsampling Errors

The estimates produced from BRDIS 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 sample frame. This error results because only a subset of the sample frame is measured in a sample survey. For published estimates from BRDIS, standard errors are produced for estimated percentages, while relative standard errors (RSEs) are produced for all other estimates. Tables of the estimated measures of sampling variability corresponding to each data table are available from the NCSES project officer.

Standard errors may be used to define confidence intervals about the corresponding estimates with a desired level of confidence. If a confidence interval were constructed for each possible sample that could be selected, then it would be expected that the percentage of confidence intervals containing the result of a complete enumeration of the sample 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 BRDIS. This depends on the correlation between the measure of size on the sample frame that was used to assign the selection probabilities and the actual data that are collected in BRDIS, which cannot be predicted accurately for all companies when the sample

is designed. However, the largest companies known to perform R&D are included in the sample with certainty so that these companies will not contribute to the sampling error of the resulting estimates produced from BRDIS.

The sample size is sufficiently large that estimates based on the total sample are subject to low sampling error. However, because priority in designing the sample was given to industries that were identified in previous surveys as conducting large amounts of R&D expenditures, the sampling error may be larger for estimates for the lower-priority industries. The RSE for the estimate of total domestic R&D performed by the company was 0.34% in 2016.

Potential nonsampling errors include coverage error and various response and operational errors, such as errors during data collection, reporting errors, transcription errors, and bias due to nonresponse. These are all types of errors that could also occur if a complete enumeration of the sample 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 the reviewing data for reasonableness and consistency. Though nonsampling error is not measured directly, quality control procedures were employed throughout the survey process to minimize this type of error.

Measurement Error

Variations in respondent interpretations of the definitions of R&D activities and variations in accounting procedures are of particular concern—specifically, the characterization and reporting of R&D activities by large defense contractors funded by the U.S. federal government; the reporting of R&D activities by companies classified in the R&D services industry (NAICS 5417); and the method used by companies, in general, to count and report numbers of employees in various categories, such as the number of employees who work full-time versus part-time on R&D. The sophistication and comprehensiveness of a company's accounting and personnel tracking systems often depend on its size and activities and on its willingness to accommodate government-sponsored surveys. While no metric of measurement error is produced, ongoing efforts to minimize measurement error include questionnaire pretesting, improvement of questionnaire wording and format, inclusion of more cues and examples in the questionnaire instructions, in-person and telephone interviews and consultations with respondents, and post-survey evaluations.

Data Comparability (Changes)

Differences between the 2015 and 2016 BRDIS Questionnaires

The following changes were made to the 2016 BRDIS from the 2015 BRDIS:

- Questions on royalties and licensing fees were added to both the R&D paid for by the company and the R&D paid for by others type-of-cost sections.
- Questions on the type of worldwide R&D paid for by the company were added to Form BRDI-1(S).
- Questions on the type of worldwide R&D paid for by others were added to Form BRDI-1(S).
- A question on all other contract R&D services paid for by customers was added to Form BRDI-1(S).
- A question on R&D performed by universities, colleges, and academic researchers located inside the United States was added, while a question on R&D performed by foreign governments was removed.
- A question on R&D funded by universities, colleges, and academic researchers located inside the United States was added, while a question on R&D funded by foreign governments was removed.
- A question on whether utility patent sales and licensing revenues were received from companies or organizations outside the United States was added to Form BRDI-1.
- A question on whether utility patent purchases and licensing payments were made to companies or organizations outside the United States was added to Form BRDI-1.
- A question on whether the company filed for the tax credit for increasing research activities (IRS Form 6765) in tax year 2016 was added to Form BRDI-1.
- Questions on the importance of intellectual property protections were removed from the form.

Differences between the 2014 and 2015 BRDIS Questionnaires

The following changes were made to the 2015 BRDIS from the 2014 BRDIS:

- A question on phase IV clinical trials was added to Form BRDI-1.
- A question on R&D performed by others that was paid for by U.S. federal government agencies or laboratories was added to Form BRDI-1.
- Questions on the type of foreign R&D paid for and performed by company were added to Form BRDI-1.
- Questions on the type of foreign R&D performed by company but paid for by others were added to Form BRDI-1.
- A question on nonprovisional utility patents was added to Form BRDI-1.
- Questions related to R&D in photonics and optics application areas were removed from Form BRDI-1.

Differences between the 2013 and 2014 BRDIS Questionnaires

The following changes were made to the 2014 BRDIS from the 2013 BRDIS:

- A question on monetary gifts to universities or colleges restricted to supporting R&D was added to Form BRDI-1.
- A question on revenue received from patent licensing was added to Form BRDI-1.
- A question on purchasing patents from others was added to Form BRDI-1.
- A question on licensing patents from others was added to Form BRDI-1.
- One business code was added to the list of business codes collected on the survey: 33333, Digital cameras manufacturing. In prior years, this line of business was included in the business code 33412, Computers and peripheral equipment manufacturing and magnetic and optical media.
- Questions related to patenting were removed from Form BRDI-1(S).
- Questions related to innovation were added to Form BRDI-1(S).

Differences between the 2012 and 2013 BRDIS Questionnaires

The following changes were made to the 2013 BRDIS from the 2012 BRDIS:

- The list of countries for which foreign R&D performance data were collected was expanded by three: Hungary, Luxembourg, and Norway.
- A question was restored asking the amount of R&D the company plans to recoup through indirect charges on U.S. federal government contracts (independent R&D). This question was last asked on the 2010 BRDIS.
- Questions on R&D for software products and R&D for embedded software were combined.
- A question on R&D for software products and embedded software paid for by the federal government was added.
- A question was restored related to the educational attainment of scientists and engineers. This question was last asked on the 2010 BRDIS.
- Two business codes were added to the list of business codes collected on the survey: 32542, Biotechnology-based pharmaceutical and biological products (except diagnostics), and 51801, Cloud computing applications and Internet-based software services.
- Delinquent companies in the known positive R&D stratum for the past two survey cycles were sent a BRD-1(S) form to see if they report at least the high-level numbers.

Differences between the 2011 and 2012 BRDIS Questionnaires

For 2012, a much shorter (8-page) version of the short form, BRD-1(S), was implemented. The form included 19 high-level detail items on worldwide sales; domestic sales; R&D expense funded both by company and by others; employment both worldwide and domestic, including R&D employment; and patents applied for and issued. Companies that reported $1 million or more of domestic R&D performance were then sent the long form (BRDI-1) for additional details. The BRD-1(S) form was sent to companies in the unknown and known zero R&D strata. In section 2, the questionnaire collected the additional detail categories for capital expenditures. In section 3, four agencies were added to the type of agency question so as to reduce the amount reported in the “All other” category. In section 4, the percentage of R&D that was directed toward business areas or product lines new to the respondent’s company and also the percentages that pertain to

defense applications, health or medical applications, or agricultural applications were added for R&D funded by the company and R&D funded by others.

Differences between the 2010 and 2011 BRDIS Questionnaires

For the 2011 data collection, the innovation questions and instructions in section 1 were changed based on the results of the 2010 experiment. Cycling continued for data items not needed every year. The survey was expanded in several ways to address data gaps: the list of countries in which companies could report foreign R&D performance was expanded, a question was added to collect intracompany R&D transactions, and questions were added about companies' second-largest R&D location. In addition, questions pertaining to full-time equivalent (FTE) R&D scientists and engineers were revised to improve respondent understanding of survey concepts.

Differences between the 2009 and 2010 BRDIS Questionnaires

For the 2010 data collection, the most notable changes made to the questionnaire were the inclusion of a one-time section (section 7) on R&D time frame and R&D product life, the inclusion of an experiment testing the impact of different innovation questions and instructions, and the addition of a survey supplement to collect detailed information from companies reporting R&D paid for by others. In addition, questions and instructions about company ownership were expanded to clarify, especially for foreign-owned companies, the information that should be reported on the survey. Cycling began for data items not needed every year from every company. These items will be returned to the questionnaire cyclically, depending on the demand for and quality of the collected data. Finally, data items poorly reported during the first two cycles of BRDIS were deleted.

The section titled "R&D Time Frame and R&D Product Life" was added to the questionnaire for the 2010 cycle to aid in estimating the depreciation of R&D when it is treated as an investment in the U.S. System of National Accounts.

The experiment testing the impact of different innovation questions and instructions used two versions of the BRDIS short form. The innovation questions on the 2010 Form BRDI-1A were identical to questions used on the 2009 Form BRDI-1A, and the 2010 Form BRDI-1B altered the questions and instructions to replicate innovation questions on the European Union's Community Innovation Survey. The experiment did not produce statistically significant differences in measured rates of innovation.

Differences between the 2008 and 2009 BRDIS Questionnaires

Several changes were made to the 2009 BRDIS questionnaire—in part, to address reporting errors observed during the 2008 survey cycle. Briefly, these changes included the following:

- A screening question at the beginning of the form asking companies whether they had R&D activity during the reporting period was removed.
- Exclusion instructions in the main R&D expense question were replaced with a series of targeted questions. This approach was based on the premise that the economic concepts requested by BRDIS do not always conform to the R&D measures tracked by companies. Rather than directly ask for concepts that may diverge from respondent preconceptions about R&D, the approach in 2009 guided respondents to derive amounts that conformed to the BRDIS definition of R&D.
- Inclusion instructions in the main R&D paid for by others question were replaced with a series of targeted questions.
- Data for R&D performed by others were derived rather than collected directly. For the 2009 cycle of BRDIS, R&D performed by others was the sum of two R&D costs known to be tracked by companies: payments to business partners for collaborative R&D, and purchased R&D services.
- The order of the "Management and Strategy of R&D" and the "Financial Schedule B" (R&D paid for by others) sections was switched.

Definitions

Capital expenditure. Capital expenditures are payments by a business for assets that usually have a useful life of more than 1 year, like buildings, equipment, or software. The value of assets acquired or improved through capital expenditures is recorded on a company's balance sheet. Expenditures for long-lived assets used in a company's R&D operations are not included in its R&D expense, but any depreciation recorded for those assets would be included in its R&D expense. Data are collected in BRDIS for capital expenditures for R&D operations for structures, equipment, capitalized software, and other items.

Core-based statistical area (CBSA). A CBSA is a U.S. geographic area that consists of one or more counties (or equivalents) anchored by an urban center of at least 10,000 people plus adjacent counties that are socioeconomically tied to the urban center by commuting. CBSAs are defined by OMB in the Executive Office of the President.

Employment, total and R&D. Involves the number of people employed by R&D-performing or R&D-funding companies in all locations, both foreign and domestic, during the pay period that included 12 March of the survey year. (The date 12 March is what most employers use when paying first-quarter employment taxes to IRS.) R&D employees are those who provide direct support to R&D, such as researchers, R&D managers, technicians, clerical staff, and others assigned to R&D groups. Those not included are employees who provide indirect support to R&D, such as corporate personnel, security guards, and cafeteria workers. In addition to head counts of total and R&D employees, estimates of FTE domestic R&D employment are produced from BRDIS. This is the number of persons employed who were assigned full-time to R&D, plus a prorated number of employees who worked on R&D only part of the time.

Expense and R&D expense. Involves money spent or costs incurred in an organization's efforts to generate revenue, representing the cost of doing business. Expenses may be in the form of actual cash payments (such as wages and salaries), a computed expired portion (depreciation) of an asset, or an amount taken out of earnings (such as bad debts). Expenses are summarized and charged in the income statement as deductions from the income before assessing income tax. Whereas all expenses are costs, not all costs are expenses (e.g., costs incurred in acquisition of income generating assets—see the definition of *capital expenditure* above). R&D expense is the cost of R&D funded by the company itself and performed within the respondent company's facilities, both foreign and domestic, or performed by others outside of the company under contract, subcontract, grant, or other funding arrangement.

Innovation. BRDIS questions on innovation activities refer only to product and process innovation. A *product innovation* is the market introduction of a new or significantly improved good or service with respect to its capabilities, user-friendliness, components, or subsystems. A *process innovation* is the implementation of a new or significantly improved production process, distribution method, or support activity for the company's goods or services. Product and process innovations (new or improved) must be new to the respondent company, but they do not need to be new to the company's market, and the innovations could have been originally developed by the respondent company or by other companies. Purely organizational innovations (i.e., those of benefit only to the company) are excluded.

R&D and business R&D. R&D is planned, creative work aimed at discovering new knowledge or devising new applications of available knowledge. This includes (1) activities aimed at acquiring new knowledge or understanding without specific immediate commercial applications or uses (basic research), (2) activities aimed at solving a specific problem or meeting a specific commercial objective (applied research), and (3) systematic use of research and practical experience and resulting in additional knowledge, which is directed to producing new or improved goods, services, or processes (development). R&D includes both direct costs, such as salaries of researchers, and administrative and overhead costs clearly associated with the company's R&D. However, R&D does not include expenditures for routine product testing, quality control, and technical services unless they are an integral part of an R&D project. R&D also does not include market research; efficiency surveys or management studies; literary, artistic, or historical projects, such as films, music, or books and other publications; and prospecting or exploration for natural resources.

R&D, biotechnology. Biotechnology is the application of S&T to living organisms, as well as parts, products, and models thereof, to alter living or nonliving materials for the production of knowledge, goods, and services. The following list provides examples of areas of biotechnology in which R&D may be performed.

- DNA or RNA: genomics; pharmacogenomics; gene probes; genetic engineering; DNA or RNA sequencing, synthesis, or amplification; gene expression profiling; and use of antisense technology, large-scale DNA synthesis, genome editing and gene editing, and gene drive
- Proteins and other molecules: sequencing, synthesis, or engineering of proteins and peptides (including large-molecule hormones); improved delivery methods for large molecule drugs; proteomics; protein isolation and purification; signaling; and identification of cell receptors
- Cell and tissue culture and engineering: cell or tissue culture, tissue engineering (including tissue scaffolds and biomedical engineering), cellular fusion, vaccine or immune stimulants, embryo manipulation, marker-assisted breeding technologies, and metabolic engineering
- Process biotechnology techniques: fermentation using bioreactors, biorefining, bioprocessing, bioleaching, biopulping, biobleaching, biodesulfurization, bioremediation, biosensing, biofiltration and phytoremediation, and molecular aquaculture
- Gene and RNA vectors: gene therapy and viral vectors
- Bioinformatics: construction of databases on genomes, protein sequences, and modeling complex biological processes, including systems biology
- Nanobiotechnology: applies the tools and processes of nano- or microfabrication to build devices for studying biosystems and applications in, for example, drug delivery or diagnostics

R&D intensity or R&D-to-sales ratio. R&D intensity is a ratio, expressed as a percentage, calculated by dividing the cost of R&D by sales. The ratio serves as an indicator of the relative incidence of R&D among groups of companies, primarily among industries and company size classifications. In this report, R&D intensity ratios are calculated various ways, depending on the measure of R&D (R&D paid for by the respondent company, paid for by others outside of the company, or both) and whether the respondent company performs and funds or only performs R&D.

R&D, nanotechnology. The understanding of processes and phenomena and the application of S&T to organisms and to organic and inorganic materials—as well as parts, products, and models thereof—at the nanometer scale (but not exclusively below 100 nanometers) in one or more dimensions, where the onset of size-dependent phenomena usually enables novel applications. These applications utilize the properties of nanoscale material that differ from the properties of individual atoms, molecules, and bulk matter for the production of knowledge, goods, and services, like improved materials, devices, and systems that exploit these new properties. The following list provides examples of areas of nanotechnology in which R&D may be performed.

- Nanomaterial: material with any external dimension in the nanoscale or having internal structure or surface structure in the nanoscale
- Nanoelectronics: field of S&T concerned with the development and production of functional electronic devices with nanoscale components
- Nanophotonics: branch of photonics concerned with interaction of photons with nanomaterials aiming to design optical or optoelectronic components
- Nanomedicine: medical application of nanotechnology (e.g., medical application of nanomaterials and biological devices, nanoelectronics biosensors, and possible future applications of molecular nanotechnology, such as biological machines)
- Nanomagnetics: the study of the magnetic response of nanomaterials to an applied magnetic field and their applications
- Nanomechanics: a branch of nanoscience studying fundamental mechanical (elastic, thermal, and kinetic) properties of physical systems at the nanometer scale
- Nanofiltration: a membrane filtration process used for the softening of water and the removal of organic matter; includes nanomembranes

- Nanotools: multicomponent tools and devices used for manipulation, nanolithography, and nanofabrication
- Nanoinstruments or nanodevices: multicomponent instruments or devices used for observation, analysis, or control of matter at the nanometer scale
- Nanomanufacturing: intentional synthesis generation of control of nanomaterials, or fabrication steps in the nanoscale, for commercial purposes

R&D paid for by others, worldwide and domestic. The cost of R&D funded by others outside of the company, including the U.S. federal government, and performed within the respondent company's facilities, both foreign and domestic.

R&D paid for by the company and others, worldwide and domestic. Involves the cost of R&D funded by the company itself or by others outside of the company and performed within the respondent company's facilities, both foreign and domestic, or performed by others outside of the company under contract, subcontract, grant, or other funding arrangement.

R&D performed by the company, worldwide and domestic. The cost of R&D performed within the respondent company's facilities, both foreign and domestic, funded by the company itself or by others outside of the company.

R&D performed by the company and others, worldwide and domestic. The cost of R&D performed within the respondent company's facilities, both foreign and domestic, or performed by others outside of the company under contract, subcontract, grant, or other funding arrangement.

R&D performed by others, worldwide and domestic. Involves the cost of R&D funded by the company itself or by others outside of the company and performed by others outside of the company under contract, subcontract, grant, or other funding arrangement.

R&D, software and Internet. R&D activity in software and Internet applications refers only to activities that have an element of uncertainty and that are intended to close knowledge gaps and meet scientific and technological needs. This item is reported in this survey regardless of the eventual user (internal or external). R&D activity in software includes software development or improvement activities that expand scientific or technological knowledge and construction of new theories and algorithms in the field of computer science. R&D activity in software excludes software development that does not depend on a scientific or technological advance, such as supporting or adapting existing systems, adding functionality to existing application programs, routine debugging of existing systems and software, creating new software based on known methods and applications, converting or translating existing software and software languages, and adapting a product to a specific client, unless knowledge that significantly improved the base program was added in that process.

Sales, worldwide and domestic. Dollar values for goods sold or services rendered by R&D-performing or R&D-funding companies located in the 50 U.S. states and the District of Columbia to customers outside the company, including the U.S. federal government, foreign customers, and the company's foreign subsidiaries. Included are revenues from a company's foreign operations and subsidiaries and from discontinued operations. If a respondent company is owned by a foreign parent company, sales to the parent company and to affiliates not owned by the respondent companies are included. Excluded are intracompany transfers, returns, allowances, freight charges, and excise, sales, and other revenue-based taxes.

Data Availability

Publications

The data from BRDIS can be found online at **https://www.nsf.gov/statistics/industry/**. Detailed historical statistics from the predecessor survey, SIRD, can be obtained from NSF's Industrial Research and Development Information System at **https://www.nsf.gov/statistics/iris/**. Information from BRDIS is also included in *Science and Engineering Indicators* and in *National Patterns of R&D Resources*.

Electronic Access

BRDIS contains confidential data that are protected under Title 13 and Title 26 of the United States Code. Two types of data are currently available: public-use tabular statistics and restricted microdata. Detailed tabular statistics can be obtained by contacting the BRDIS project officer. Microdata for the SIRD and BRDIS can only be accessed at the U.S. Census Bureau's secure **Research Data Centers** (RDCs). To learn more about RDCs and for instructions on how to apply for data use, please visit the Center for Economic Studies page on **research opportunities** (**http://www.census.gov/ces/rdcresearch/index.html**).

Technical Tables

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TECHNICAL TABLE A-1

Target population counts, by frame partition: 2008–16

(Number of companies)

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

[a] For each year, the estimate of the number of companies in the total target population is based on the original sampling frame that was created to select the sample. The target population estimates in this table do not include R&D performers from the previous year's sample, which were not on the original sampling frame but were found during the survey's annual contact update procedures. See table A-5 for the counts of companies that were added to each year's sample.

Note(s)

Companies were said to be known to conduct R&D (known positive R&D) if they reported positive R&D in any of the previous 5 survey years. For survey years 2008–15, companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 5 survey years and no positive R&D in any of the 5 years. For survey year 2016, companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 3 survey years and no positive R&D in any of the previous 5 survey years. Companies were said to be unknown if no R&D information was available. For survey year 2016, the target population no longer includes companies in the other nonmanufacturing industry with fewer than 10 domestic employees.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey.

TECHNICAL TABLE A-2

Companies in the target population and selected for the sample, by industry and company size: 2016

(Number of companies)

Industry and company size	NAICS code	Companies in target population[a]	Companies selected for the sample		
			All companies	Noncertainties	Certainties
All industries	21–23, 31–33, 42–81	1,485,151	44,861	24,015	20,846
Manufacturing industries	31–33	143,100	18,391	9,884	8,507
Food	311	12,840	941	616	325
Beverages and tobacco products	312	3,440	288	189	99
Textiles, apparel, and leather products	313–16	6,770	681	439	242
Wood products	321	7,047	600	409	191
Paper	322	1,879	403	236	167
Printing and related support activities	323	11,113	988	774	214
Petroleum and coal products[b]	324	467	195	62	133
Chemicals	325	6,335	2,197	871	1,326
Basic chemicals	3251	875	288	102	186
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	682	297	147	150
Pesticides, fertilizers, and other agricultural chemicals	3253	381	139	70	69
Pharmaceuticals and medicines	3254	1,578	630	77	553
Soaps, cleaning compounds, and toilet preparations	3256	1,126	364	221	143
Paints, coatings, adhesives, and other chemicals	3255, 3259	1,693	479	254	225
Plastics and rubber products	326	6,490	1,070	558	512
Nonmetallic mineral products	327	5,551	467	274	193
Primary metals	331	2,384	458	174	284
Fabricated metal products	332	30,303	2,024	1,208	816
Machinery	333	13,427	2,120	1,071	1,049
Agricultural implements	33311	764	242	138	104
Semiconductor machinery	333242	125	123	0	123
Engines, turbines, and power transmission equipment	3336	561	170	80	90
Other machinery	other 333	11,977	1,585	853	732
Computer and electronic products	334	6,860	1,915	782	1,133
Communications equipment	3342	807	232	51	181
Semiconductors and other electronic components	3344	2,403	529	250	279
Navigational, measuring, electromedical, and control instruments	3345	2,601	869	349	520
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	413	198	63	135
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	314	129	33	96
Other measuring and controlling devices	other 3345	1,874	542	253	289
Other computer and electronic products	other 334	1,049	285	132	153
Electrical equipment, appliances, and components	335	3,101	725	385	340
Transportation equipment	336	6,237	1,162	537	625
Motor vehicles, bodies, trailers, and parts	3361–63	3,926	584	294	290
Aerospace products and parts	3364	993	253	73	180
Aircraft, aircraft engine, and aircraft parts	336411–13	942	206	73	133
Guided missile, space vehicle, and related parts	336414, 336415, 336419	51	47	0	47
Military armored vehicle, tank, and tank component	336992	38	36	0	36

TECHNICAL TABLE A-2

Companies in the target population and selected for the sample, by industry and company size: 2016

(Number of companies)

Industry and company size	NAICS code	Companies in target population[a]	Companies selected for the sample		
			All companies	Noncertainties	Certainties
Other transportation equipment	other 336	1,280	289	170	119
Furniture and related products	337	7,245	677	446	231
Miscellaneous manufacturing	339	10,986	1,383	818	565
Medical equipment and supplies	3391	4,012	642	353	289
Other miscellaneous	3399	6,974	741	465	276
Unclassified	–	625	97	35	62
Nonmanufacturing industries	21–23, 42–81	1,342,051	26,470	14,131	12,339
Mining, extraction, and support activities[b]	21	8,803	601	314	287
Utilities	22	1,248	184	41	143
Wholesale trade	42	120,894	3,536	2,327	1,209
Electronic shopping and electronic auctions	454111–12	6,790	415	314	101
Transportation and warehousing	48–49	56,527	858	499	359
Information	51	24,430	2,445	1,144	1,301
Publishing	511	8,241	1,068	515	553
Newspaper, periodical, book, and directory publishers	5111	5,018	458	312	146
Software publishers	5112	3,223	610	203	407
Telecommunications	517	3,396	283	138	145
Data processing, hosting, and related services	518	4,102	724	283	441
Other information	other 51	8,691	370	208	162
Finance and insurance	52	59,349	1,145	363	782
Real estate and rental and leasing	53	54,307	684	389	295
Lessors of nonfinancial intangible assets (except copyrighted works)	533	747	100	4	96
Other real estate and rental and leasing	other 53	53,560	584	385	199
Professional, scientific, and technical services	54	198,358	10,572	4,238	6,334
Architectural, engineering, and related services	5413	30,414	1,665	976	689
Computer systems design and related services	5415	27,201	2,262	1,538	724
Scientific research and development services	5417	3,993	3,993	0	3,993
Biotechnology research and development	541711	1,043	1,043	0	1,043
Physical, engineering, and life sciences (except biotechnology) research and development	541712	2,696	2,696	0	2,696
Social sciences and humanities research and development	541720	254	254	0	254
Other professional, scientific, and technical services	other 54	136,750	2,652	1,724	928
Health care services	621–23	222,535	2,297	1,637	660
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	587,725	3,483	2,719	764
Unclassified	–	1,085	250	146	104
Company size (number of domestic employees)					
All companies	–	1,485,151	44,861	24,015	20,846
< 5[c]	–	10,373	424	193	231
5–9	–	407,520	7,230	5,296	1,934
10–19	–	533,994	7,417	5,748	1,669
20–49	–	343,379	8,064	5,813	2,251
50–99	–	103,825	5,366	3,096	2,270
100–249	–	55,149	6,425	2,577	3,848
250–499	–	15,905	3,564	784	2,780

TECHNICAL TABLE A-2

Companies in the target population and selected for the sample, by industry and company size: 2016

(Number of companies)

Industry and company size	NAICS code	Companies in target population[a]	Companies selected for the sample		
			All companies	Noncertainties	Certainties
500–999	–	7,419	2,407	289	2,118
1,000–4,999	–	5,920	2,837	155	2,682
5,000–9,999	–	822	530	33	497
10,000–24,999	–	508	344	18	326
25,000 or more	–	337	253	13	240

NAICS = 2012 North American Industry Classification System.

[a] Estimates of the number of companies in the target population are based on the original sampling frame that was created to select the 2016 Business R&D and Innovation Survey (BRDIS) sample. These estimates do not include 90 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 2016 sample with certainty but are not reflected in the number of certainties selected for the sample.

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

[c] This category includes companies that are represented on the sampling frame as having missing data, but these companies are in scope to BRDIS because they have at least $250,000 in annual payroll.

Note(s)

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. The total sample size reflects the time between sample selection and survey mailout; that is, the sample was updated before actual mailout took place.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TECHNICAL TABLE A-3

Sample size, by frame partition: 2008–16

(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

Note(s)

Companies were said to be known to conduct R&D (known positive R&D) if they reported positive R&D in any of the previous 5 survey years. For survey years 2008–15, companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 5 survey years and no positive R&D in any of the 5 years. For survey year 2016, companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 3 survey years and no positive R&D in any of the previous 5 survey years. Companies were said to be unknown if no R&D information was available.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics and U.S. Census Bureau, Business R&D and Innovation Survey.

TECHNICAL TABLE A-4

Companies sampled, by sampling stratum: 2016

(Number of companies)

Stratum	Total
Total	44,861
Known positive R&D	18,184
Certainties	13,089
Noncertainties	5,095
Known zero R&D	1,058
Certainties	819
Noncertainties	239
Unknown R&D	25,619
Certainties	6,938
Noncertainties	18,681

Note(s)

Companies were said to be known to conduct R&D (known positive R&D) if they reported positive R&D in any of the previous 5 survey years. Companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 3 survey years and no positive R&D in any of the 5 years. Companies were said to be unknown if no R&D information was available.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TECHNICAL TABLE A-5

Companies included in the survey that were not in the original sampling frame: 2008–16

(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

Note(s)

This table shows the counts of companies that were found during the update procedures, were added to each year's sample, and mailed a form. These company counts are not in table A-2.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey.

TECHNICAL TABLE A-6

Survey forms mailed, by type: 2008–16

(Number)

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

na = not applicable.

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

Note(s)

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey.

TECHNICAL TABLE A-7

Survey forms mailed, by sampling stratum: 2016

(Number)

Stratum	Total forms mailed initially			BRDI-1 forms mailed due to reported data from BRDI-1(S) forms	Total BRDI-1 forms mailed
	Total	BRDI-1	BRDI-1(S)		
Total	44,733	7,183	37,550	1,578	8,761
Known positive R&D	18,113	7,068	11,045	900	7,968
Certainties	13,043	6,649	6,394	638	7,287
Noncertainties	5,070	419	4,651	262	681
Known zero R&D	1,044	27	1,017	12	39
Certainties	805	27	778	11	38
Noncertainties	239	0	239	1	1
Unknown R&D	25,486	12	25,474	660	672
Certainties	6,830	8	6,822	471	479
Noncertainties	18,656	4	18,652	189	193
Cases not in the frame	90	76	14	6	82

Note(s)

Companies were sent the detailed survey form (BRDI-1) if their R&D spending was at least $1.0 million in 2014 or 2015 (except companies that did not respond in these prior 2 years). All other companies received an abbreviated form (BRDI-1(S)). Companies were said to be known to conduct R&D (known positive R&D) if they reported positive R&D in any of the previous 5 survey years. Companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 3 survey years and no positive R&D in any of the 5 years. Companies were said to be unknown if no R&D information was available.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TECHNICAL TABLE A-8

Survey forms mailed for companies with subcompany reporting units, by sampling stratum: 2016

(Number)

Stratum	Sent one form		Sent multiple forms[a]		
	BRDI-1	BRDI-1(S)	Companies	BRDI-1	BRDI-1(S)
Total	7,100	37,542	12	83	8
Known positive R&D	6,985	11,037	12	83	8
Certainties	6,566	6,386	12	83	8
Noncertainties	419	4,651	0	0	0
Known zero R&D	27	1,017	0	0	0
Certainties	27	778	0	0	0
Noncertainties	0	239	0	0	0
Unknown R&D	12	25,474	0	0	0
Certainties	8	6,822	0	0	0
Noncertainties	4	18,652	0	0	0
Cases not in the frame	76	14	0	0	0

[a] Under special arrangement with the U.S. Census Bureau, to facilitate reporting, portions of some companies are surveyed separately using multiple survey forms. This special arrangement extends to holding companies to facilitate reporting among the operating units. The number of companies does not include companies that made special reporting arrangements with the U.S. Census Bureau after the initial mailout.

Note(s)

Companies were sent the detailed survey form (BRDI-1) if their R&D spending was at least $1.0 million in 2014 or 2015 (except companies that did not respond in these prior 2 years). All other companies received an abbreviated form (BRDI-1(S)). Companies were said to be known to conduct R&D (known positive R&D) if they reported positive R&D in any of the previous 5 survey years. Companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 3 survey years and no positive R&D in any of the 5 years. Companies were said to be unknown if no R&D information was available.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TECHNICAL TABLE A-9

Response measures: 2008–16

(Percent)

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

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

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

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

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey.

TECHNICAL TABLE A-10

Unit response rates, by industry and survey form type: 2016

(Number)

Industry	NAICS code	Active reporting units[a]	Reporting units that met the response criteria[b]	Reporting units that met the response criteria (%)
All companies				
All industries	21–23, 31–33, 42–81	42,122	33,800	80.2
Manufacturing industries	31–33	17,779	14,250	80.2
Food	311	903	693	76.7
Beverages and tobacco products	312	275	227	82.5
Textiles, apparel, and leather products	313–16	645	496	76.9
Wood products	321	577	471	81.6
Paper	322	402	344	85.6
Printing and related support activities	323	923	748	81.0
Petroleum and coal products	324	187	152	81.3
Chemicals	325	2,291	1,871	81.7
Basic chemicals	3251	266	217	81.6
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	283	229	80.9
Pesticides, fertilizers, and other agricultural chemicals	3253	135	110	81.5
Pharmaceuticals and medicines	3254	781	665	85.1
Soaps, cleaning compounds, and toilet preparations	3256	348	275	79.0
Paints, coatings, adhesives, and other chemicals	3255, 3259	478	375	78.5
Plastics and rubber products	326	1,024	803	78.4
Nonmetallic mineral products	327	460	381	82.8
Primary metals	331	443	352	79.5
Fabricated metal products	332	1,921	1,567	81.6
Machinery	333	2,067	1,671	80.8
Agricultural implements	33311	233	186	79.8
Semiconductor machinery	333242	96	78	81.3
Engines, turbines, and power transmission equipment	3336	149	124	83.2
Other machinery	other 333	1,589	1,283	80.7
Computer and electronic products	334	1,844	1,411	76.5
Communications equipment	3342	225	174	77.3
Semiconductors and other electronic components	3344	522	419	80.3
Navigational, measuring, electromedical, and control instruments	3345	851	642	75.4
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	195	139	71.3
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	120	97	80.8
Other measuring and controlling devices	other 3345	536	406	75.7
Other computer and electronic products	other 334	246	176	71.5
Electrical equipment, appliances, and components	335	683	542	79.4
Transportation equipment	336	1,137	915	80.5
Motor vehicles, bodies, trailers, and parts	3361–63	577	461	79.9
Aerospace products and parts	3364	255	214	83.9
Aircraft, aircraft engines, and aircraft parts	336411–13	213	181	85.0
Guided missiles, space vehicles, and related parts	336414–15, 336419	42	33	78.6

TECHNICAL TABLE A-10

Unit response rates, by industry and survey form type: 2016

(Number)

Industry	NAICS code	Active reporting units[a]	Reporting units that met the response criteria[b]	Reporting units that met the response criteria (%)
Military armored vehicles, tanks, and tank components	336992	32	23	71.9
Other transportation equipment	other 336	273	217	79.5
Furniture and related products	337	659	537	81.5
Miscellaneous manufacturing	339	1,338	1,069	79.9
Medical equipment and supplies	3391	651	517	79.4
Other miscellaneous	3399	687	552	80.3
Nonmanufacturing industries	21–23, 42–81	24,343	19,550	80.3
Mining, extraction, and support activities	21	570	460	80.7
Utilities	22	167	149	89.2
Wholesale trade	42	3,403	2,746	80.7
Electronic shopping and electronic auctions	454111–12	380	299	78.7
Transportation and warehousing	48–49	803	640	79.7
Information	51	2,388	1,854	77.6
Publishing	511	984	764	77.6
Newspaper, periodical, book, and directory publishers	5111	426	340	79.8
Software publishers	5112	558	424	76.0
Telecommunications	517	264	212	80.3
Data processing, hosting, and related services	518	788	612	77.7
Other information	other 51	352	266	75.6
Finance and insurance	52	1,147	993	86.6
Real estate and rental and leasing	53	616	478	77.6
Lessors of nonfinancial intangible assets (except copyrighted works)	533	86	61	70.9
Other real estate and rental and leasing	other 53	530	417	78.7
Professional, scientific, and technical services	54	9,288	7,372	79.4
Architectural, engineering, and related services	5413	1,635	1,360	83.2
Computer systems design and related services	5415	2,058	1,544	75.0
Scientific research and development services	5417	3,307	2,552	77.2
Biotechnology research and development	541711	760	541	71.2
Physical, engineering, and life sciences (except biotechnology) research and development	541712	2,335	1,824	78.1
Social sciences and humanities research and development	541720	212	187	88.2
Other professional, scientific, and technical services	other 54	2,288	1,916	83.7
Health care services	621–23	2,120	1,772	83.6
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	3,461	2,787	80.5
Form BRDI-1 companies				
All industries	21–23, 31–33, 42–81	7,009	5,460	77.9
Manufacturing industries	31–33	4,187	3,417	81.6
Food	311	174	136	78.2
Beverages and tobacco products	312	25	20	80.0

TECHNICAL TABLE A-10

Unit response rates, by industry and survey form type: 2016

(Number)

Industry	NAICS code	Active reporting units[a]	Reporting units that met the response criteria[b]	Reporting units that met the response criteria (%)
Textiles, apparel, and leather products	313–16	64	54	84.4
Wood products	321	24	23	95.8
Paper	322	42	34	81.0
Printing and related support activities	323	33	24	72.7
Petroleum and coal products	324	24	19	79.2
Chemicals	325	927	769	83.0
Basic chemicals	3251	130	110	84.6
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	63	45	71.4
Pesticides, fertilizers, and other agricultural chemicals	3253	18	15	83.3
Pharmaceuticals and medicines	3254	541	468	86.5
Soaps, cleaning compounds, and toilet preparations	3256	66	48	72.7
Paints, coatings, adhesives, and other chemicals	3255, 3259	109	83	76.1
Plastics and rubber products	326	229	183	79.9
Nonmetallic mineral products	327	62	53	85.5
Primary metals	331	76	60	78.9
Fabricated metal products	332	271	232	85.6
Machinery	333	545	451	82.8
Agricultural implements	33311	45	38	84.4
Semiconductor machinery	333242	30	25	83.3
Engines, turbine, and power transmission equipment	3336	33	26	78.8
Other machinery	other 333	437	362	82.8
Computer and electronic products	334	718	553	77.0
Communications equipment	3342	113	85	75.2
Semiconductors and other electronic components	3344	191	156	81.7
Navigational, measuring, electromedical, and control instruments	3345	325	248	76.3
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	88	57	64.8
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	38	35	92.1
Other measuring and controlling devices	other 3345	199	156	78.4
Other computer and electronic products	other 334	89	64	71.9
Electrical equipment, appliances, and components	335	215	181	84.2
Transportation equipment	336	324	270	83.3
Motor vehicles, bodies, trailers, and parts	3361–63	183	145	79.2
Aerospace products and parts	3364	89	80	89.9
Aircraft, aircraft engines, and aircraft parts	336411–13	75	68	90.7
Guided missiles, space vehicles, and related parts	336414–15, 336419	14	12	85.7
Military armored vehicles, tanks, and tank components	336992	6	5	83.3
Other transportation equipment	other 336	46	40	87.0
Furniture and related products	337	45	34	75.6
Miscellaneous manufacturing	339	389	321	82.5

TECHNICAL TABLE A-10

Unit response rates, by industry and survey form type: 2016

(Number)

Industry	NAICS code	Active reporting units[a]	Reporting units that met the response criteria[b]	Reporting units that met the response criteria (%)
Medical equipment and supplies	3391	252	207	82.1
Other miscellaneous	3399	137	114	83.2
Nonmanufacturing industries	21–23, 42–81	2,822	2,043	72.4
Mining, extraction, and support activities	21	54	39	72.2
Utilities	22	41	36	87.8
Wholesale trade	42	121	55	45.5
Electronic shopping and electronic auctions	454111–12	12	9	75.0
Transportation and warehousing	48–49	16	12	75.0
Information	51	790	623	78.9
Publishing	511	271	207	76.4
Newspaper, periodical, book, and directory publishers	5111	5	4	80.0
Software publishers	5112	266	203	76.3
Telecommunications	517	61	49	80.3
Data processing, hosting, and related services	518	389	323	83.0
Other information	other 51	69	44	63.8
Finance and insurance	52	101	76	75.2
Real estate and rental and leasing	53	13	9	69.2
Lessors of nonfinancial intangible assets (except copyrighted works)	533	3	3	100.0
Other real estate and rental and leasing	other 53	10	6	60.0
Professional, scientific, and technical services	54	1,492	1,048	70.2
Architectural, engineering, and related services	5413	216	159	73.6
Computer systems design and related services	5415	311	206	66.2
Scientific research and development services	5417	791	556	70.3
Biotechnology research and development	541711	207	116	56.0
Physical, engineering, and life sciences (except biotechnology) research and development	541712	565	424	75.0
Social sciences and humanities research and development	541720	19	16	84.2
Other professional, scientific, and technical services	other 54	174	127	73.0
Health care services	621–23	60	41	68.3
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	122	95	77.9
Form BRDI-1(S) companies				
All industries	21–23, 31–33, 42–81	35,113	28,340	80.7
Manufacturing industries	31–33	13,592	10,833	79.7
Food	311	729	557	76.4
Beverages and tobacco products	312	250	207	82.8
Textiles, apparel, and leather products	313–16	581	442	76.1
Wood products	321	553	448	81.0
Paper	322	360	310	86.1
Printing and related support activities	323	890	724	81.3
Petroleum and coal products	324	163	133	81.6

TECHNICAL TABLE A-10

Unit response rates, by industry and survey form type: 2016

(Number)

Industry	NAICS code	Active reporting units[a]	Reporting units that met the response criteria[b]	Reporting units that met the response criteria (%)
Chemicals	325	1,364	1,102	80.8
Basic chemicals	3251	136	107	78.7
Resins, synthetic rubber, and artificial synthetic fibers and filaments	3252	220	184	83.6
Pesticides, fertilizers, and other agricultural chemicals	3253	117	95	81.2
Pharmaceuticals and medicines	3254	240	197	82.1
Soaps, cleaning compounds, and toilet preparations	3256	282	227	80.5
Paints, coatings, adhesives, and other chemicals	3255, 3259	369	292	79.1
Plastics and rubber products	326	795	620	78.0
Nonmetallic mineral products	327	398	328	82.4
Primary metals	331	367	292	79.6
Fabricated metal products	332	1,650	1,335	80.9
Machinery	333	1,522	1,220	80.2
Agricultural implements	33311	188	148	78.7
Semiconductor machinery	333242	66	53	80.3
Engines, turbines, and power transmission equipment	3336	116	98	84.5
Other machinery	other 333	1,152	921	79.9
Computer and electronic products	334	1,126	858	76.2
Communications equipment	3342	112	89	79.5
Semiconductors and other electronic components	3344	331	263	79.5
Navigational, measuring, electromedical, and control instruments	3345	526	394	74.9
Electromedical, electrotherapeutic, and irradiation apparatuses	334510, 334517	107	82	76.6
Search, detection, navigation, guidance, aeronautical, and nautical systems and instruments	334511	82	62	75.6
Other measuring and controlling devices	other 3345	337	250	74.2
Other computer and electronic products	other 334	157	112	71.3
Electrical equipment, appliances, and components	335	468	361	77.1
Transportation equipment	336	813	645	79.3
Motor vehicles, bodies, trailers, and parts	3361–63	394	316	80.2
Aerospace products and parts	3364	166	134	80.7
Aircraft, aircraft engines, and aircraft parts	336411–13	138	113	81.9
Guided missiles, space vehicles, and related parts	336414–15, 336419	28	21	75.0
Military armored vehicles, tanks, and tank components	336992	26	18	69.2
Other transportation equipment	other 336	227	177	78.0
Furniture and related products	337	614	503	81.9
Miscellaneous manufacturing	339	949	748	78.8
Medical equipment and supplies	3391	399	310	77.7
Other miscellaneous	3399	550	438	79.6
Nonmanufacturing industries	21–23, 42–81	21,521	17,507	81.3
Mining, extraction, and support activities	21	516	421	81.6
Utilities	22	126	113	89.7

TECHNICAL TABLE A-10

Unit response rates, by industry and survey form type: 2016

(Number)

Industry	NAICS code	Active reporting units[a]	Reporting units that met the response criteria[b]	Reporting units that met the response criteria (%)
Wholesale trade	42	3,282	2,691	82.0
Electronic shopping and electronic auctions	454111–12	368	290	78.8
Transportation and warehousing	48–49	787	628	79.8
Information	51	1,598	1,231	77.0
Publishing	511	713	557	78.1
Newspaper, periodical, book, and directory publishers	5111	421	336	79.8
Software publishers	5112	292	221	75.7
Telecommunications	517	203	163	80.3
Data processing, hosting, and related services	518	399	289	72.4
Other information	other 51	283	222	78.4
Finance and insurance	52	1,046	917	87.7
Real estate and rental and leasing	53	603	469	77.8
Lessors of nonfinancial intangible assets (except copyrighted works)	533	83	58	69.9
Other real estate and rental and leasing	other 53	520	411	79.0
Professional, scientific, and technical services	54	7,796	6,324	81.1
Architectural, engineering, and related services	5413	1,419	1,201	84.6
Computer systems design and related services	5415	1,747	1,338	76.6
Scientific research and development services	5417	2,516	1,996	79.3
Biotechnology research and development	541711	553	425	76.9
Physical, engineering, and life sciences (except biotechnology) research and development	541712	1,770	1,400	79.1
Social sciences and humanities research and development	541720	193	171	88.6
Other professional, scientific, and technical services	other 54	2,114	1,789	84.6
Health care services	621–23	2,060	1,731	84.0
Other nonmanufacturing	23, 44–45 (excluding 454111–12), 55–56, 624, 71–72, 81	3,339	2,692	80.6

NAICS = 2012 North American Industry Classification System.

[a] Active reporting units are defined as reporting units of active companies that are in the scope of the survey (for-profit companies with locations in the United States, 5 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. For the calculation of the unit response rates, these reporting units remained disaggregated.

[b] Reporting units were considered to have fulfilled the response criteria if they reported that they performed or funded R&D. If not, a reporting unit fulfilled the response criteria if they reported a value for worldwide sales or domestic sales, or if they reported a positive value for paid worldwide employees or paid domestic employees. Form type breakout is based on the status at the time of the initial mailout.

Note(s)

Companies were sent the detailed survey form (BRDI-1) if their R&D spending was at least $1.0 million in 2014 or 2015 (except companies that did not respond in these prior 2 years). All other companies received an abbreviated form (BRDI-1(S)).

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

TECHNICAL TABLE A-11

Companies that required an analyst action, by sampling stratum: 2016

(Number)

Stratum	Total	Companies deleted[a]	Companies requiring action due to merger or acquisition[b]	Companies requiring action due to analyst review[c]
Total	2,751	2,671	69	11
Known positive R&D	689	664	21	4
Certainties	530	513	13	4
Noncertainties	159	151	8	0
Known zero R&D	29	27	2	0
Certainties	23	22	1	0
Noncertainties	6	5	1	0
Unknown R&D	2,017	1,965	46	6
Certainties	542	525	14	3
Noncertainties	1,475	1,440	32	3
Cases not in the frame	16	15	0	1

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

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

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

Note(s)

Companies were said to be known to conduct R&D (known positive R&D) if they reported positive R&D in any of the previous 5 survey years. Companies were said to have known zero R&D if they reported zero R&D in at least 1 of the previous 3 survey years and no positive R&D in any of the 5 years. Companies were said to be unknown if no R&D information was available.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Business R&D and Innovation Survey, 2016.

Suggested Citation and Acknowledgments

National Science Foundation, National Center for Science and Engineering Statistics. 2019. *Business R&D and Innovation: 2016.* Detailed Statistical Tables NSF 19-318. Alexandria, VA. Available at **https://ncses.nsf.gov/pubs/nsf19318/**.

The U.S. Census Bureau, under National Science Foundation interagency agreement number NCSES-0219101, collected and tabulated the data and produced the statistics for this report. This work was performed by Yvette Moore, Jeffrey Kellner, Steven Wilkinson, Susan Shrieves, Ebenezer Amoako, David Garrow, Deena Grover, Lucia Chavez, Melvin Dangan, Robert Ford, and Neil Hillis, under the direction of Michael Flaherty. Under the same interagency agreement, mathematical statistician support was provided by Ana Rodriguez, John Slanta, Lucas Streng, and Abigail Legge, under the direction of Colt Viehdorfer, and business accounting and subject-matter support was provided by Brandon Shackelford. RTI International edited the tables under contract number NSFDACS17T1045. RTI staff members Roxanne Snaauw and Catherine Boykin prepared the tables for composition; August Gering performed quality control and coordinated the work.

This report was developed and coordinated by Raymond M. Wolfe in NCSES's Research and Development Statistics Program under the direction of John E. Jankowski. Emilda Rivers, division director, reviewed and provided overall guidance. Statistical review of the draft manuscript was performed by Jock Black, mathematical statistician, and Samson Adeshiyan, chief statistician. Publication processing support was provided by Catherine Corlies and Rajinder Raut in NCSES's Information and Technology Services Program under the direction of May Aydin.

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