

Table 64. Domestic R&D paid for by the company and others and performed by the company, by business activity: 2011–24

(Millions of U.S. dollars)

Business activity ^a	Business code ^b	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
All business activities	21100–81000	290,240	302,759	323,107	340,539	355,671	378,590	396,979	443,633	491,434	538,870	608,429	691,987	723,206	765,082	
Oil and gas extraction	21100	D	D	D	1,108	D	867	0 - 11,355	i 0 - 16,964	712	681	544	D	852	639	
Mining	21200	83	88	80	54	68	58	121	92	121	104	89	i 138	i D	110	
Support activities for mining, including oil and gas	21300	D	1,860	1,871	2,349	2,076	1,544	1,599	i 836	i 1,364	722	651	i 786	i 584	1,158	
Utilities	22100	298	434	343	343	485	349	323	i 272	274	275	D	D	595	D	
Construction	23000	752	756	244	i 204	i 521	258	i 507	686	868	1,071	749	788	778	733	
Food manufacturing	31100	3,769	3,565	5,156	4,934	i 4,388	i 4,966	4,809	4,678	4,756	5,098	5,120	6,529	i 5,652	6,291	
Beverage manufacturing	31210	D	D	628	D	664	0 - 28,354	i 734	702	654	663	740	794	961	912	
Tobacco manufacturing	31220	D	140	163	D	153	153	175	196	189	217	233	213	275	232	
Textile, apparel, and leather products manufacturing	31990	623	688	687	662	i 794	1,244	i 904	934	831	768	577	D	689	743	
Wood products manufacturing	32100	202	278	234	322	i 227	238	236	261	232	234	476	304	307	363	
Paper manufacturing	32200	755	982	1,166	1,028	D	1,165	1,411	1,302	1,472	1,244	1,534	1,337	1,613	1,469	
Printing and related support activities	32300	244	305	i 389	363	287	304	265	321	439	352	298	340	536	420	
Petroleum refineries	32401	D	596	438	D	443	441	396	491	0 - 17,119	0 - 25,158	392	432	437	531	
Asphalt paving, roofing, and saturated materials manufacturing	32402	38	41	117	i 66	52	i 75	124	107	110	197	138	92	134	141	
Other petroleum and coal products manufacturing, including motor oil, hydraulic fluid, and charcoal	32403	285	218	312	i 279	i 268	202	223	133	106 - 2,076	120	91	129	134	122	
Basic chemicals manufacturing	32510	3,099	3,228	2,925	3,144	3,071	2,946	2,897	2,897	2,638	3,039	3,048	3,151	3,378	3,345	
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	32520	815	1,093	999	1,054	1,213	930	825	1,262	1,293	1,338	1,375	1,369	1,288	D	
Pesticide, fertilizer, and other agricultural chemicals manufacturing	32530	D	1,951	2,114	i 2,057	i D	1,900	i 1,977	2,384	i 2,094	1,512	1,482	D	D	D	
Pharmaceutical, medicinal, botanical, and biological products (except diagnostic substances) manufacturing ^c	32541	42,381	43,672	42,456	43,748	40,540	43,964	45,846	48,489	55,243	56,811	60,803	61,161	62,999	63,457	
In vitro diagnostic substances manufacturing ^c	32542	1,110	1,044	i 831	729	801	987	1,308	1,151	1,380	1,596	1,621	1,777	2,583	3,193	
Biotechnology-based pharmaceutical and biological products (except diagnostic substances)	32543	NA	NA	7,118	10,337	14,071	16,440	18,629	23,591	29,477	32,452	39,327	51,625	59,514	65,536	
Soap, cleaning compound, and toilet preparations manufacturing	32591	2,344	2,261	2,286	2,365	2,451	2,550	2,492	2,534	0 - 17,119	2,404	2,477	2,586	2,594	2,398	
Paint, adhesive, and other chemical manufacturing	32592	1,552	1,630	1,489	1,562	i D	0 - 28,354	1,636	1,361	1,423	1,472	1,356	1,384	1,370	D	
Plastics and rubber products manufacturing	32600	2,669	3,277	3,010	3,072	i 2,910	3,396	3,264	3,128	2,997	2,921	3,225	3,515	3,013	2,862	
Clay and glass products manufacturing	32710	801	i 987	i 973	i 1,003	i 948	987	1,199	1,333	1,326	i 1,376	i 1,375	1,382	1,256	1,464	i
Cement, concrete, lime, gypsum, and other nonmetallic mineral products manufacturing	32790	303	367	458	i 564	i 393	i 374	378	331	437	374	417	446	365	i 350	i
Primary metal manufacturing	33100	552	750	644	703	596	i 0 - 28,354	608	708	742	915	1,036	1,231	756	1,159	
Fabricated metal products manufacturing	33200	D	2,236	2,535	i 2,280	2,541	2,321	2,650	2,764	3,278	3,895	4,614	4,020	3,668	3,783	
Agricultural machinery and equipment manufacturing	33311	989	1,175	1,193	1,230	1,172	1,194	1,224	1,529	1,549	0 - 25,158	1,531	D	D	D	
Construction machinery manufacturing	33312	655	675	1,340	1,309	1,210	1,209	1,203	1,316	i 1,276	1,254	1,384	1,249	1,737	1,506	
Mining, oil, and gas field machinery and equipment manufacturing	33319	1,735	1,999	1,436	i 1,142	1,431	1,107	1,272	1,324	1,104	1,028	1,222	1,262	1,223	1,063	
Semiconductor machinery manufacturing	33321	2,207	1,308	i 3,146	2,979	3,218	3,374	3,707	4,131	4,396	4,752	5,308	5,466	D	D	
Industrial machinery manufacturing (except semiconductor machinery)	33322	945	850	878	1,158	1,143	900	1,049	971	1,386	1,042	1,432	1,503	1,874	1,451	
Photographic and photocopying equipment manufacturing	33331	656	23	i 458	79	133	92	61	59	i 162	0 - 25,158	70	D	88	71	
Commercial, service industry, temperature control, and air-flow control machinery manufacturing	33332	D	1,182	1,367	1,446	1,380	0 - 28,354	1,780	1,667	1,712	1,440	1,907	2,287	2,544	2,578	
Digital cameras manufacturing	33333	NA	NA	NA	25	491	i 421	i 475	230	409	313	i 273	194	215	238	
Engine, turbine, and power transmission equipment manufacturing	33360	3,257	3,603	2,373	1,847	2,304	2,365	2,543	2,273	2,550	2,466	2,051	2,463	D	3,819	

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Business activity ^a	Business code ^b	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Metalworking and other general purpose machinery manufacturing	33390	1,832	1,607	1,780	2,089	2,292	2,139	2,039	2,468	2,394	2,881	2,530	2,831	2,504	2,804
Computers and peripheral equipment manufacturing and magnetic and optical media ^d	33412	10,311	10,893	11,162	9,651	10,997	18,321	20,751	21,765	19,060 i	22,842	24,769	27,920	D	D
Telephone apparatus manufacturing, including routers, modems, and gateways	33421	7,006	5,101	5,534	7,734	9,529	8,182	7,789	8,550	8,495	7,562	7,912	D	D	9,188
Radio, television, and wireless communication equipment manufacturing	33422	4,182	5,851	7,664	6,325 i	3,387 i	4,108 i	3,942 i	0 - 16,964 i	2,589 i	2,286	3,299	3,446	3,799	3,292
Other communication equipment manufacturing (except radio, television, and wireless communication equipment)	33429	871	1,937	1,729	1,687	1,695 i	1,798	1,536	0 - 16,964	1,686	1,641	681	595	672	518
Audio and video equipment manufacturing	33430	798	865	876	1,018	1,071 i	972	1,058	1,084	1,270	1,285	1,517	1,713	1,895	1,622
Semiconductor and other electronic components manufacturing	33440	24,580	28,983	30,792	31,986	30,805	31,428	30,858	31,240	35,725	44,110	47,620	52,484	49,653	55,353
Electromedical, electrotherapeutic, and irradiation apparatus manufacturing	33451	2,787	2,868 i	3,178 i	3,670	3,409	3,417 i	3,094	4,079	3,973	3,902	4,386	5,107	5,437	4,466
Search, detection, navigation, guidance, aeronautical, and nautical system and instruments manufacturing	33452	5,666	6,403	6,550	6,234	6,503	8,275	6,538	7,819	7,870	8,840 i	3,918	6,258	6,594	6,655
Measuring and control instruments manufacturing (not listed elsewhere)	33459	3,191	3,465	3,901	4,045	4,201	4,222	3,885	3,888	3,911	4,376	4,273	4,185	4,383	4,517
Electrical equipment, appliances, and components manufacturing	33500	3,007	3,391	4,208	4,461	4,378	4,805	4,512	4,362	5,230	5,295	5,389	6,702	6,763	6,548
Motor vehicles manufacturing	33610	9,320	11,314	11,696	12,134	12,502	15,095	16,308	17,447	15,241	15,574	22,120	D	D	25,676
Motor vehicle body and trailer manufacturing	33620	69	91 i	98 i	96	156 i	113	44	93	155	82	137	162	282	238
Motor vehicle parts manufacturing	33630	3,010	D	4,554	6,022	6,158	6,401	6,946	7,800	8,146 i	7,780	7,727	7,688	6,571	5,905
Aircraft manufacturing	33641	5,853	15,380 i	16,607 i	15,632 i	14,757 i	0 - 28,354 i	9,704 i	14,488 i	10,720 i	15,641	9,842 i	17,877 i	19,011	18,800 i
Aircraft engine and engine parts manufacturing	33642	1,636	1,296	1,758	2,294 i	1,580	1,738	1,850	2,226	2,104	2,038	8,245 i	4,396	4,810	4,948
Other aircraft parts and auxiliary equipment manufacturing	33643	1,896	2,655	3,446	4,443	4,919	3,817	4,453	1,887	1,434	1,740	1,490	2,873	3,252	3,122
Guided missiles, space vehicles, and related parts manufacturing	33644	3,526	2,850	2,703	2,826 i	3,011	3,063 i	3,269	3,405	3,496	3,357	2,426	6,685	7,505	6,808 i
Railroad rolling stock manufacturing	33651	136	177	183	295	240	187	0 - 11,355	148	0 - 17,119 i	239	212 i	289	259	D
Ship and boat building	33660	D	D	1,106	1,568 i	D	0 - 28,354 i	1,289	0 - 16,964	0 - 17,119	964	859	960	1,492	D
Motorcycle, bicycle, and parts manufacturing	33691	212 i	176 i	214 i	251	282	286	0 - 11,355	372	368	417	447	454	380	390
Military armored vehicle, tank, and tank components manufacturing	33692	D	122	215	358	335	392	653 i	664 i	541	468	731	657	369 i	210 i
All other transportation equipment manufacturing	33699	415	D	362	428	D	368	564	465	465	552	563	397	638	589
Furniture and related products manufacturing	33700	300	382	383	389	458	364	438	428	458	462	458	432	490	475
Medical equipment and supplies manufacturing	33910	10,141	10,703	11,797	10,987	11,336	12,024	13,299	13,211	14,801	14,638	16,886	18,572	19,197	21,421
Miscellaneous manufacturing not listed elsewhere (games, office supplies, slot machines, etc.)	33990	2,593	D	2,544	2,387	2,455 i	2,597 i	2,575	2,861	2,499	3,032	3,133	3,261	2,941	2,833
Merchant wholesalers, durable goods	42300	505	1,461 i	449 i	414 i	1,507 i	551 i	364	730 i	750	855	1,303 i	1,085	1,675 i	1,091
Merchant wholesalers, nondurable goods	42400	429	651 i	272 i	D	546 i	153 i	207	273 i	0 - 17,119	384	656 i	619	687 i	660 i
Wholesale electronic markets and agents and brokers (business to business)	42500	54	182 i	D	139	D	23	41 i	94 i	37 i	36 i	50	167 r	233 i	60
Retail trade (except electronic shopping and electronic auctions)	44000	52	101 i	96 i	58 i	87	149	69	190	280	216	353	353	736	737
Electronic shopping and electronic auctions	45411	940 i	1,239	993	1,051	1,543 i	0 - 28,354 i	0 - 11,355	0 - 16,964 i	0 - 17,119 i	0 - 25,158 i	11,930 i	12,205 i	6,239 i	6,048 i
Transportation	48000	123	D	D	388	205 i	100	691	2,045 i	9,398 i	0 - 25,158 i	5,929 i	6,816 i	8,133	8,345
Couriers, messengers, and express delivery services	49200	D	D	D	344	D	394	421	446	290	923	1,115	D	3,729	2,287
Warehousing and storage	49300	15	15	15	3	3	0	90	76	128 i	33	17	D	48	32
Newspaper, periodical, book, and directory publishers (except Internet)	51110	345 i	229 i	316 i	89 i	99 i	80 i	83	151	84	0 - 25,158	123 i	D	15	336 i
Software publishers (except Internet) ^e	51120	22,635	23,803	26,661	31,392	29,887 i	26,685	24,362	25,742	24,798	23,520	27,768	34,040	37,485	42,990
Motion picture and sound recording (except Internet)	51200	61	73 i	86	71 i	10	16	27 i	148	72	81	22	D	111	48
Broadcasting (except Internet)	51500	94	36	53	70 i	101 i	0 - 28,354 i	0 - 11,355	186	0 - 2,469	0 - 25,158 i	D	D	453 i	494 i

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Business activity ^a	Business code ^b	2011		2012		2013		2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024	
Wired telecommunications carriers	51710	867		1,482	i	951	i	945	i	1,229	i	1,067	i	924		469		424		505		599		624		472		481	
Wireless telecommunications carriers (except satellite)	51720	391	i	739	i	1,768	i	2,481		1,176	i	1,477	i	1,920		2,147		2,306		2,022		2,492		2,582		2,289		2,322	
Satellite telecommunications	51740	D		195		106		107		681	i	699	i	593		451		475		0 - 25,158		510		600		665		720	
Other telecommunications (not listed elsewhere)	51790	495		383		322		255		459		448		413		691		0 - 17,119		427		304		315		496		452	
Data processing, hosting, and related services ^e	51800	4,922		3,997		4,009		4,754		5,839		6,295		6,217		6,809		8,885		11,223		13,119		11,545		12,519		16,183	
Cloud computing applications and Internet-based software services	51801	NA		NA		3,727	i	5,718		5,783		9,981		16,812		20,600		28,631		39,147		43,704		51,466		51,029		54,815	
Other information services, including Internet publishing, broadcasting, and Web search portals ^e	51910	D		11,397		13,485		15,306		21,534		23,962		28,445		37,435		46,171		53,228		63,300		D		D		D	
Finance: banking and credit intermediation	52200	1,365		1,601		1,834		2,451		2,708		4,474		4,819		4,309		4,924		7,917		12,268		10,430		17,439		16,313	
Securities, commodity contracts, and other financial investments and related activities, including funds and trusts	52310	1,148		893		1,153		937		1,352		1,516		1,587		1,248		1,445		1,815		4,409		D		5,424		5,813	
Insurance carriers and related activities	52400	D		1,141		1,573		887		1,364		1,216		1,127		1,673		2,190		2,542		3,655		1,949		2,753		2,732	
Real estate	53100	13		26	i	100		193		280		438		251		377		0 - 17,119		368		674		785		331		521	
Rental and leasing services	53200	27		D		69		59		D		97	i	536	i	639		945		2,766		1,423		1,644		1,956		2,395	
Lessors of nonfinancial intangible assets, including patent licensing	53300	319		369		74		78		79		40		58		23		59		0 - 25,158		14		D		72		34	
Legal, accounting, tax preparation, bookkeeping, and payroll services	54111	578	i	417	i	514	i	826	i	1,283		892		875		1,148		1,901		2,492		2,674		3,239		3,611		4,522	i
Architectural, engineering, and related services	54130	2,028		4,206	i	3,398		3,392		4,143	i	3,259		2,664		4,293		4,421		4,347		D		5,749		4,652		4,604	
Specialized design services	54140	271		207	i	101		97		83		77		198	i	0 - 16,964		163		212		170		122		154		136	
Computer systems design and related services ^e	54150	11,129		12,390	i	11,472	i	13,216	i	13,647		14,159		12,607		16,346		19,604		16,755		18,727		20,470		22,627		25,311	
Management, scientific, and technical consulting services	54160	1,745		2,280		2,030		1,958		1,761		2,137	i	1,903		2,796		2,561		2,671		3,758		4,116		D		4,820	
Research and development services in the social sciences and humanities	54172	D		601		792		745		756		0 - 28,354		1,124		674		764		0 - 25,158		563		703		563		715	
Research and development services in biotechnology ^{c,f}	54173	6,030		7,146		4,145		3,083	i	5,178	i	3,911	i	3,610		5,398		5,564		5,482		8,119		9,463		8,108		6,164	
Research and development services in the physical, engineering, and life sciences (except biotechnology)	54174	7,196		9,427		9,139		9,068		10,907		10,621		11,842		14,904		15,130	i	19,362	i	24,453	i	27,180	i	24,386	i	25,296	
Research and development services in nanotechnology	54175	NA		NA		NA		NA		NA		NA		NA		NA		NA		0 - 25,158	i	232		293		395		561	
Advertising and related services	54180	80		377	i	450	i	435		424		344		381		1,032	i	1,107	i	1,284	i	2,095	i	2,003	i	1,108	i	1,050	i
Professional, scientific, and technical services (not listed elsewhere)	54190	1,316		2,463	i	1,786		1,020		1,228		874		1,113		1,246		1,649		1,883		1,714		2,420		2,265		2,202	
Management of companies and enterprises	55100	20		40		68		25	i	D		28		70		0 - 16,964		0 - 17,119		0 - 25,158		D		D		D		27	
Administrative and support services	56100	338		436		556	i	401	i	202	i	418		1,405		2,302		3,285		3,521		3,264		4,213		4,681		4,800	
Waste management and remediation services	56200	19	i	D		39	i	31		24	i	25		20		20		20		0 - 25,158		530	r	D		49		63	
Offices of physicians	62110	24		73	i	74	i	88	i	79	i	106	i	190		155		508		235		192		D		278		282	
Medical and diagnostic laboratories	62150	764		1,027		959		965		1,204		0 - 28,354	i	1,210		2,049		2,467		2,065		2,849		3,799		2,873		2,604	
Other ambulatory health care services (ambulance, dental, home health care)	62199	11		41	i	51	i	35	i	42	i	24	i	65		46		148		93		297		318		549		344	
Hospitals and nursing care facilities	62200	2		2	i	2		7	i	7		9		0 - 11,355		0 - 10,879		0 - 11,355		0 - 25,158		7		9		D		D	
Social assistance services	62400	7		36		38		16		2		2		0 - 11,355		0 - 16,964		0 - 17,119		0 - 25,158		D		7		4		D	
Arts, entertainment, and recreation	71000	105		108		31		91	i	D		44		48		44		415		0 - 25,158		64	r	D		216		158	
Accommodation and food services	72000	74		131	i	123	i	57		87		61		49		120		80		122		163		104		203		188	
Other services (not listed elsewhere)	81000	366		553		366		576		682		0 - 28,354		0 - 11,355		0 - 16,964		654		0 - 25,158		D		6,955	i	D		585	
Undistributed ^g	–	28,583	i	1,689	i	336	i	63		0		0		0		0		0		0		0		0		0		0	

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

- ^a Business activity 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 2017 North American Industry Classification System (NAICS) industry definitions.
- ^c Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2013 and beyond: 32543, Biotechnology-based pharmaceutical and biological products (except diagnostic substances).
- ^d Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2014 and beyond: 33333, Digital cameras manufacturing.
- ^e Estimates for this business code may not be comparable to those from prior years due to the introduction of a related business code for survey year 2013 and beyond: 51801, Cloud computing applications and Internet-based software services.
- ^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 2020 and beyond: 54175, Research and development services in nanotechnology.
- ^g Undistributed includes data reported that were not allocated to a business activity.

Note(s):
Detail may not add to total because of rounding. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D and are not comparable with estimates published for years prior to 2018. For survey years 2009–13, industry classification was based on the 2007 NAICS. For survey years 2014–19, industry classification was based on the 2012 NAICS. For survey years beginning in 2020, classification was based on the 2017 NAICS. Most statistics for years prior to 2024 have been revised since original publication. Revised statistics include adjustments based on information obtained after the original statistics were prepared. An estimate range may be displayed in place of a single estimate to avoid disclosing operations of individual companies.

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