



## A Snapshot of Business R&D Employment in the United States

by Brandon Shackelford and Francisco Moris<sup>1</sup>

**C**ompanies active in research and development (those that paid for or performed R&D) employed 1.5 million R&D workers in the United States in 2013 (table 1), according to the Business R&D and Innovation Survey (BRDIS).<sup>2</sup> R&D employees are defined in BRDIS as all employees who work on R&D or who provide direct support to R&D, such as researchers, R&D managers, technicians, clerical staff, and others assigned to R&D groups. Although these R&D workers account for just over 1% of total business employment in the United States, they play a vital role in creating the new ideas and technologies that keep companies competitive, create new markets, and spur economic growth.<sup>3</sup> This InfoBrief presents data from BRDIS on the characteristics of these R&D workers, highlighting similarities and differences between different types of R&D-active companies.

### R&D Employment by Size of Business

As with R&D spending, R&D employment in the United States is dominated by large companies (NSB 2016). Companies with 500 or more domestic employees accounted for over two-thirds of the 1.5 million business R&D employees in the United States in 2013 (table 1). As a group, however, these

large companies employ fewer R&D employees as a share of their total employment (6.5%) than do smaller companies (11.7%). This difference is due in part to the fact that smaller companies include a larger share of start-ups and similar businesses that devote a greater share of their operations to R&D than do larger and more mature companies.

The three largest industry groups in terms of domestic R&D employment in 2013 were software publishers (North American Industry Classification System [NAICS] code 5112) with 181,000 R&D employees, pharmaceuticals and medicines (NAICS 3254) with 117,000, and semiconductor and other electronic components (NAICS 3344) with 109,000 (table 1). R&D employees account for a much larger share of the U.S. workforce of these industries (25.4%, 18.8%, and 32.4%, respectively) than they do for all R&D-active companies across all industries in the United States (7.5%).

### U.S. Business R&D Employment by Occupation Category

In terms of broad occupational categories, two-thirds of businesses' R&D employees in the United States were scientists, engineers, or R&D

managers, and the remainder were technicians or other support staff (figure 1). Scientists and engineers are the researchers responsible for the design and creation of experiments, theories, and new products, processes, or methods. Technicians and other support staff typically work under the supervision of scientists and engineers and perform tasks such as computer programming, carrying out experiments, preparing statistical analysis, and clerical support and report writing. The scientific research and development services industry—which is dominated by contract research organizations that assist pharmaceutical, biotechnology, and medical device companies with clinical trials management—employs relatively more technicians and support staff as a share of its domestic R&D employment than do most other industries.

### R&D Employment by Sex

Women accounted for one-quarter of businesses' R&D employees in the United States in 2013 (figure 2), consistent with their underrepresentation in science and engineering (S&E) fields of study. Among the industry groups with the largest number of R&D employees, those with the highest representation of women in their domestic R&D workforce were pharmaceuticals and

TABLE 1. Employment of companies that performed or funded U.S. business R&D, by selected industry and company size: 2013  
(Thousands)

Industry, NAICS code, and company size	Worldwide employment <sup>a</sup>									Foreign share (%) <sup>b</sup>		
	Worldwide employment <sup>a</sup>			Domestic employment <sup>a</sup>			Foreign employment <sup>a</sup>			Foreign share (%) <sup>b</sup>		
	All	R&D	Non-R&D	All	R&D	Non-R&D	All	R&D	Non-R&D	All	R&D	Non-R&D
All industries, 21–33, 42–81	30,560	2,095	28,465	20,046	1,495	18,551	10,514	600	9,914	34.4	28.6	34.8
Manufacturing industries, 31–33	17,661	1,266	16,395	10,457	898	9,559	7,204	368	6,836	40.8	29.1	41.7
Chemicals, 325	2,692	229	2,463	1,607	166	1,441	1,085	63	1,022	40.3	27.5	41.5
Pharmaceuticals and medicines, 3254	1,073	155	918	622	117	505	451	38	413	42.0	24.5	45.0
Other 325	1,619	74	1,545	985	49	936	634	25	609	39.2	33.8	39.4
Machinery, 333	1,637	113	1,524	918	83	835	719	30	689	43.9	26.5	45.2
Computer and electronic products, 334	2,715	395	2,320	1,277	255	1,022	1,438	140	1,298	53.0	35.4	55.9
Semiconductor and other electronic components, 3344	1,055	183	872	336	109	227	719 i	74	645 i	68.2	40.4	74.0
Navigational, measuring, electromedical, control instruments, 3345	909	81	828	526	61	465	383	20	363	42.1	24.7	43.8
Other 334	751	131	620	415	85	330	336	46	290	44.7	35.1	46.8
Transportation equipment, 336	3,111	215	2,896	1,854	157	1,697	1,257	58	1,199	40.4	27.0	41.4
Automobiles, trailers, and parts, 3361–63	1,905	119	1,786	930	83	847	975	36	939	51.2	30.3	52.6
Aerospace products and parts, 3364	994	86	908	751	64	687	243	22	221	24.4	25.6	24.3
Other 336	210	12	198	172	11	161	38	1	37	18.1	8.3	18.7
Manufacturing nec, other 31–33	1,775	138	1,637	952	92	860	823	46	777	46.4	33.3	47.5
Nonmanufacturing industries, 21–23, 42–81	12,899	828	12,071	9,589	597	8,992	3,310	231	3,079	25.7	27.9	25.5
Information, 51	3,353	406	2,947	2,182	277	1,905	1,171	129	1,042	34.9	31.8	35.4
Software publishers, 5112	1,625	290	1,335	714	181	533	911	109	802	56.1	37.6	60.1
Data processing, hosting, and related services, 518	423	51	372	288	42	246	135	9	126	31.9	17.6	33.9
Other 51	1,305	65	1,240	1,180	54	1,126	125	11	114	9.6	16.9	9.2
Professional, scientific, and technical services, 54	1,992	310	1,682	1,430	223	1,207	562	87	475	28.2	28.1	28.2
Computer systems design and related services, 5415	808	113	695	512	75	437	296	38	258	36.6	33.6	37.1
Scientific R&D services, 5417	292	106	186	232	72	160	60	34	26	20.5	32.1	14.0
Other 54	892	91	801	686	76	610	206	15 i	191	23.1	16.5	23.8
Nonmanufacturing nec, other 21–23, 42–81	3,102	29	3,073	2,342	27	2,315	760	2	758	24.5	6.9	24.7
Size of company (number of domestic employees)												
5–24	617	112	505	578	98	480	39	14	25	6.3	12.5	5.0
25–49	626	80	546	567	72	495	59	8	51	9.4	10.0	9.3
50–99	835	89	746	790	81	709	45	8	37	5.4	9.0	5.0
100–249	1,219	128	1,091	986	112	874	233	16	217	19.1	12.5	19.9
250–499	1,030	97	933	842	79	763	188	18	170	18.3	18.6	18.2
500–999	1,043	85	958	762	68	694	281	17	264	26.9	20.0	27.6
1,000–4,999	4,188	364	3,824	2,537	240	2,297	1,651	124	1,527	39.4	34.1	39.9
5,000–9,999	3,331	254	3,077	1,599	141	1,458	1,732	113	1,619	52.0	44.5	52.6
10,000–24,999	4,613	269	4,344	2,903	201	2,702	1,710	68	1,642	37.1	25.3	37.8
25,000 or more	13,059	618	12,441	8,482	403	8,079	4,577	215	4,362	35.0	34.8	35.1

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

NAICS = North American Industry Classification System; nec = not elsewhere classified.

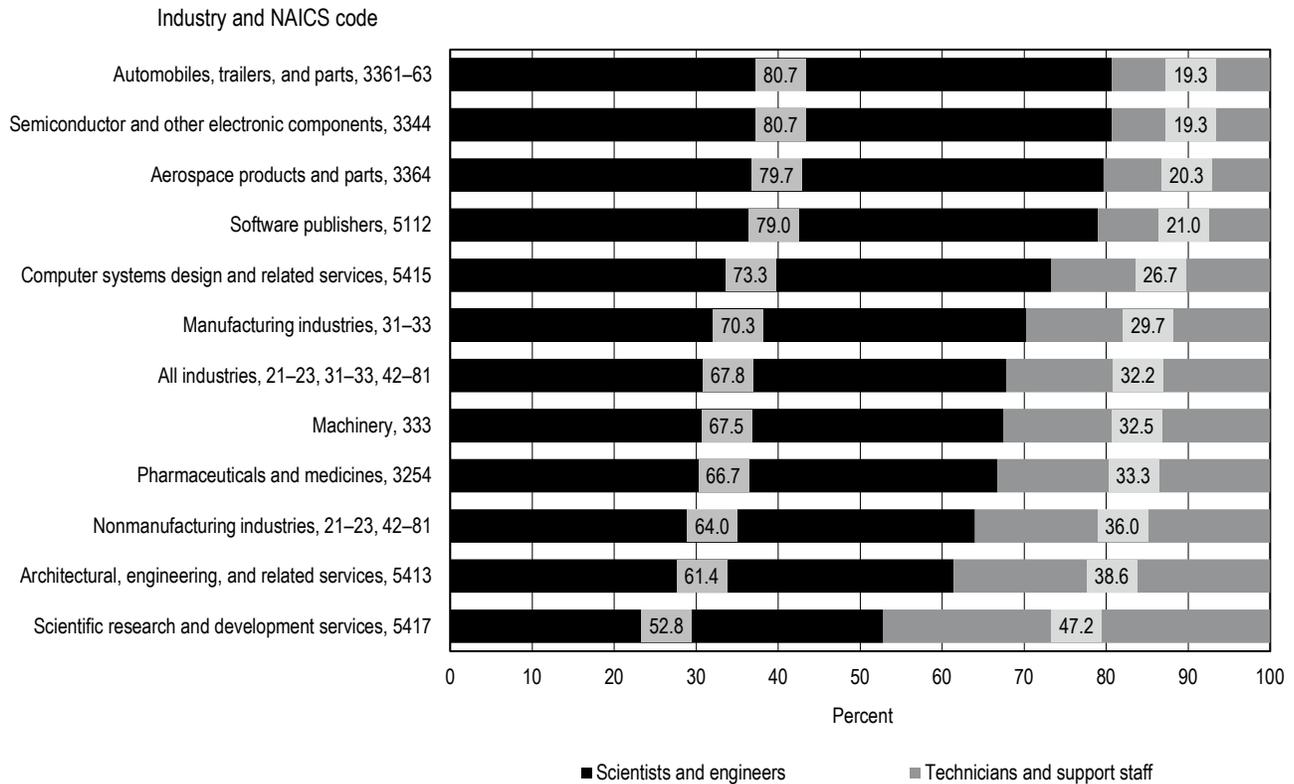
<sup>a</sup> Headcount on 12 March represents employment figures for the year.

<sup>b</sup> Foreign share = (foreign employment / worldwide employment) × 100 for U.S.-located R&D-active firms.

NOTES: 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. Industry classification was 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. Excludes data for federally funded research and development centers. The Business R&D and Innovation Survey does not include companies with fewer than five employees.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, Business R&D and Innovation Survey, 2013.

FIGURE 1. Domestic R&D employment, by occupation and selected industry: 2013



NAICS = North American Industry Classification System.

NOTES: Scientists and engineers includes R&D managers. Form BRD-1(S) collected counts of domestic R&D employees, but no detail on the occupation of these employees. These details were imputed for companies reporting on Form BRD-1(S).

SOURCES: National Science Foundation, National Center for Science and Engineering Statistics and U.S. Census Bureau, Business R&D and Innovation Survey, 2013.

medicines (NAICS 3254) (48%) and scientific research and development services (NAICS 5417) (47%). These industries require R&D employees educated in biosciences fields of study, one of the few S&E fields where women now account for the majority of undergraduate and graduate degree earners in the United States (NSF/NCSES 2015).<sup>4</sup> Industries with large numbers of R&D employees but with a lower representation of women in the business R&D workforce—such as software publishers (NAICS 5112), aerospace products and parts (NAICS 3364), computer and electronic products (NAICS 334), automobiles, trailers, and parts (NAICS 3361-63),

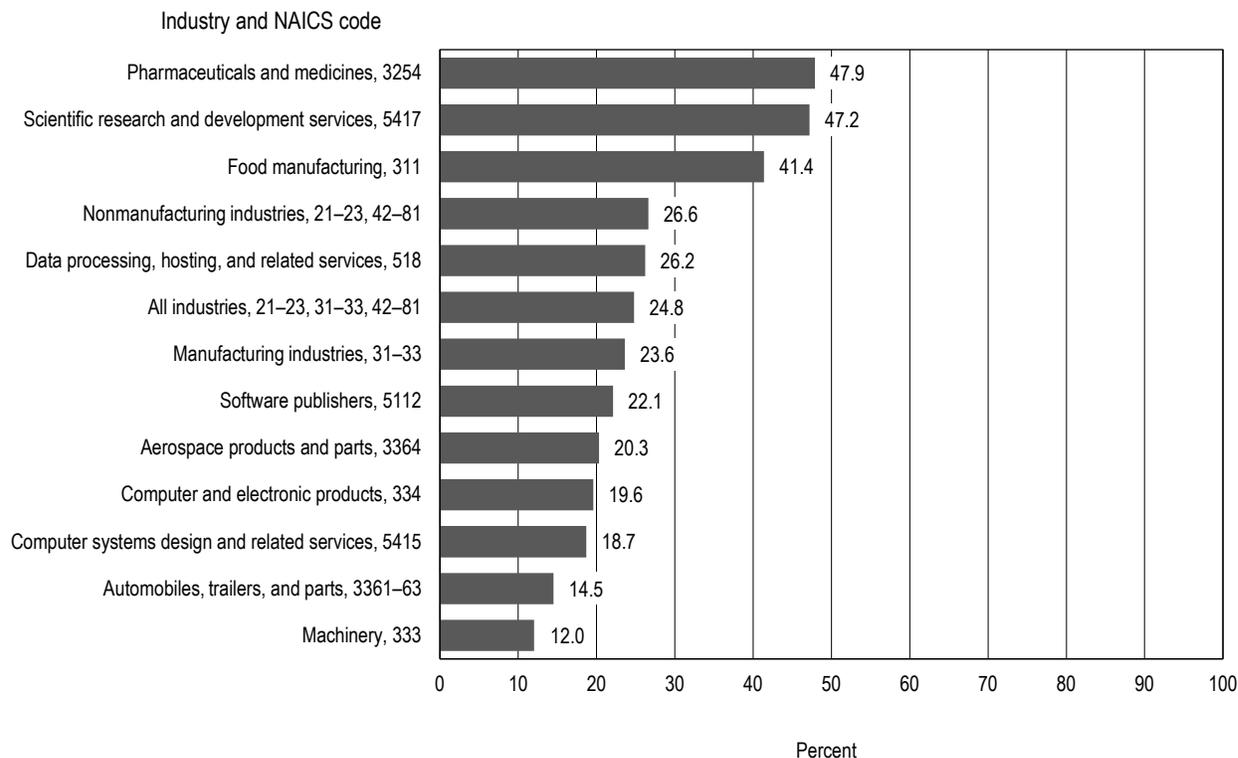
and machinery manufacturers (NAICS 333)—typically employ R&D workers educated in fields such as engineering and computer science that historically have had a low participation rate for women.

### R&D Full-Time Equivalent Employees

Most of the BRDIS employment data are collected in terms of headcounts of persons employed by companies during the pay period that included March 12, in order to correspond with information companies report on their tax returns. However, BRDIS also asks companies to report their domestic R&D employment in terms of full-time equivalent

(FTE) employees—that is, those working full-time on R&D plus the prorated share of employees who work part-time on R&D. Businesses had 1.3 million FTE domestic R&D employees in 2013, 88% of the headcount estimate from the survey (table 2). The difference between headcount and FTE measures of R&D employment is greatest among companies with fewer than 500 employees where the FTE measure is 81% of the headcount measure. These smaller companies tend to have more R&D employees that split their time performing other duties than do larger companies where R&D employees are less likely to be required to perform non-R&D tasks.

FIGURE 2. Female domestic R&D employees, by selected industry: 2013



NAICS = North American Industry Classification System.

SOURCES: National Science Foundation, National Center for Science and Engineering Statistics and U.S. Census Bureau, Business R&D and Innovation Survey, 2013.

## R&D Employee Compensation

Employee compensation (which includes salaries and wages, fringe benefits, and stock-based compensation of employees) is the largest business R&D cost category, according to BRDIS estimates. Companies are estimated to have U.S. R&D employee compensation costs of \$200 billion in 2013, or 55% of the \$366 billion of total domestic business R&D expenditures.<sup>5</sup> This represents \$152,000 in R&D employee compensation per FTE R&D employee in 2013 (figure 3). The industry with the largest employee compensation per domestic FTE R&D employee was pharmaceuticals and medicines (\$251,000). Industries with lower-than-average employee compensation per domestic FTE R&D

employee included scientific R&D services (\$122,000)—which, as noted earlier, employs a lower share of men and R&D scientists and engineers compared to other industries—and machinery manufacturers (NAICS 333) (\$105,000).

## Domestic and Foreign Employment of U.S.-Located R&D-Active Companies

U.S.-located businesses may be parent companies of U.S. multinational enterprises (MNEs), foreign-owned companies, or domestic companies. Although not all R&D-active companies in the United States have employees outside the United States, in aggregate the foreign share of their non-R&D employment is 35% compared with

29% for R&D employment (see table 1 and figure 4). Large companies, which include many very large MNEs, tend to have relatively more of their employees located outside the United States than do small companies. Companies with 500 or more domestic employees were estimated to have 38% of non-R&D workers and 34% of R&D workers overseas. The corresponding figure for companies with fewer than 500 domestic employees was 13% for both their non-R&D and R&D workers (table 1).<sup>6</sup>

Among industry groups performing large amounts of R&D, higher than average shares of foreign R&D employment are estimated for semiconductors and other electronic products (NAICS 3344) (40%), software publishers

TABLE 2. Headcount of domestic R&D employees and number of full-time equivalent domestic R&D employees, by company size: 2013 (Thousands)

Size of company (number of domestic employees)	Headcount of R&D employees <sup>a</sup>	FTE R&D employees <sup>a</sup>					FTE R&D employee share of headcount (%)
		Total FTE R&D employees	Full-time R&D employees	Full-time employees working on R&D part-time	Part-time employees working on R&D	FTE R&D employee share of headcount (%)	
All companies	1,495	1,318	1,171	124 i	22 i	88	
5–499	442	357	295 i	55 i	7 i	81	
5–24	98	80	69 i	8 i	2 i	82	
25–49	72	60	50 i	10 i	1 i	83	
50–99	81	65	52 i	12 i	1 i	80	
100–249	112	87	70 i	15 i	2 i	78	
250–499	79	65	54	10	1 i	82	
500 or more	1,053	961	876	69	14	91	
500–999	68	58	49	8	1	85	
1,000–4,999	240	217	194	19	4	90	
5,000–9,999	141	134	123	9	1 i	95	
10,000–24,999	201	180	164	12 i	4	90	
25,000 or more	403	372	346	21	4	92	

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

FTE = full-time equivalent.

<sup>a</sup> Data recorded on 12 March represent employment figures for the year.

NOTES: 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. Form BRD-1(S) collected total FTE domestic R&D employees but not the detail on numbers of full-time R&D employees vs. employees working part time on R&D. These details were imputed for companies reporting on Form BRD-1(S). Excludes data for federally funded research and development centers. The Business R&D and Innovation Survey does not include companies with fewer than five employees.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, Business R&D and Innovation Survey, 2013.

(NAICS 5112) (38%), and computer systems design services (NAICS 5415) (34%).

## Data Sources and Limitations

The sample for BRDIS was selected to represent all for-profit, nonfarm companies that are publicly or privately held and have five or more employees in the United States. BRDIS defines a company as a business organization located in the United States, either U.S. owned or a U.S. affiliate of a foreign parent, of one or more establishments under common ownership or control. Estimates produced from the survey and presented in this InfoBrief are restricted to companies that perform or fund R&D, either domestically or abroad. Because the statistics from the survey are based on a sample, they are subject to both sampling and nonsam-

pling errors (see technical notes in the survey's detailed statistical tables at <http://www.nsf.gov/statistics/industry/>).

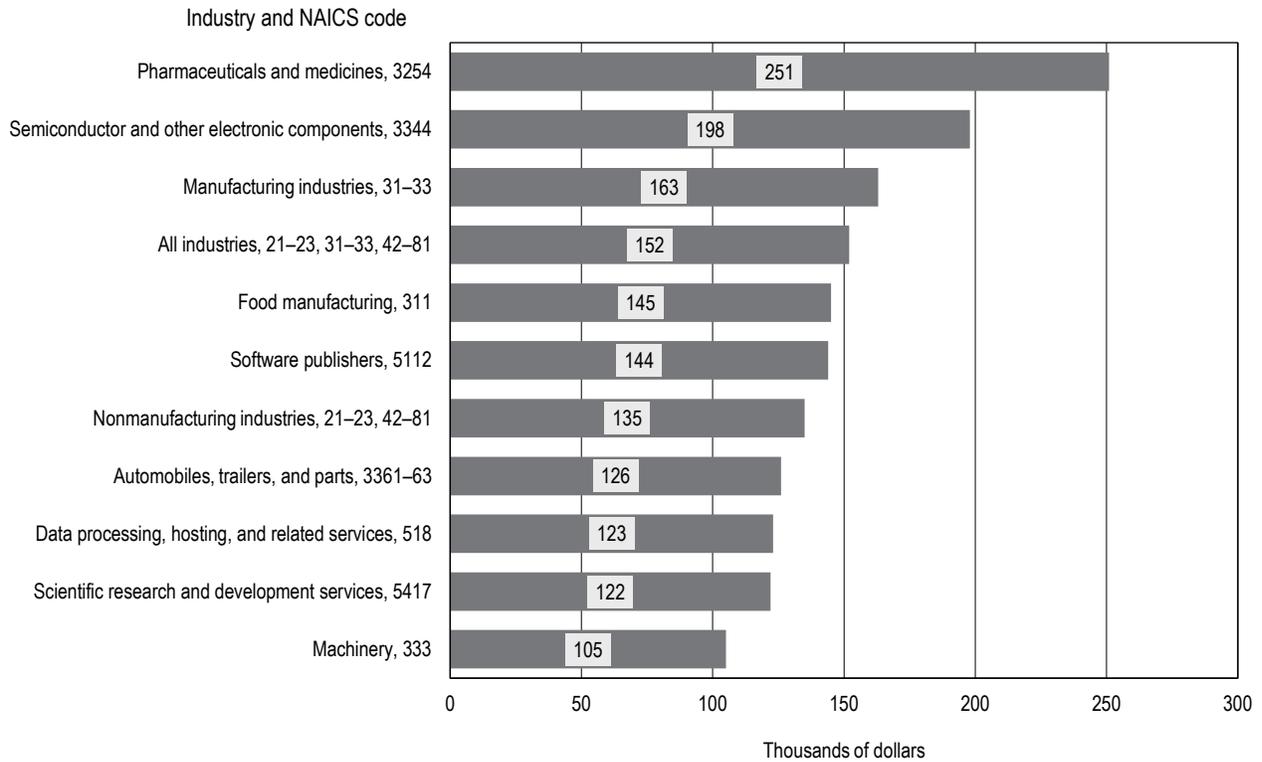
For 2013, a total of 45,089 companies were sampled, representing 1,971,959 companies. The actual numbers of reporting units in the sample that remained within the scope of the survey between sample selection and tabulation were 41,588 for 2013. This lower count represents the number of reporting units that were determined to be within the scope of the survey after all data collected were processed. Reasons for the reduced counts include mergers, acquisitions, and instances where companies had fewer than five paid employees in the United States or had gone out of business in the interim. Of these in-scope reporting units, 73.6% met the 2013 survey response criteria. Industry

classification was based on the dominant business activity for domestic R&D performance where available. For reporting units that did not report business activity codes for R&D, the classification used for sampling was assigned.

BRDIS uses an abbreviated form, Form BRD-1(S), to collect data from companies estimated to have little R&D. Form BRD-1(S) collects counts of total domestic R&D employees on both a headcount and FTE basis, but it does not contain detail on employee occupation or work status (full time versus part time). These details were imputed for companies reporting on Form BRD-1(S).

The full set of detailed tables from this survey are available in the report *Business R&D and Innovation*:

FIGURE 3. Annual employee compensation per domestic full-time equivalent R&D employee, by selected industry: 2013



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

NOTES: Employee compensation comprises salaries and wages, fringe benefits, and stock-based compensation expense. Totals for aerospace products and parts (NAICS 3364) are not reported here because of high nonresponse imputation for this industry.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics and U.S. Census Bureau, Business R&D and Innovation Survey, 2013.

2013 (<http://www.nsf.gov/statistics/industry/>). For further information concerning BRDIS or to request tables with relative standard errors and imputation rates, contact Raymond M. Wolfe ([rwolfe@nsf.gov](mailto:rwolfe@nsf.gov); 703-292-7789).

## Notes

1. Brandon Shackelford is the owner of Twin Ravens Consulting, Austin, TX. Francisco Moris, Senior Analyst, Research and Development Statistics Program, National Center for Science and Engineering Statistics, National Science Foundation, 4201 Wilson Boulevard, Suite 965, Arlington, VA 22230 ([fmoris@nsf.gov](mailto:fmoris@nsf.gov); 703-292-4678).

2. BRDIS estimates exclude the agriculture sector and companies with fewer than five U.S. employees. These companies accounted for 5% of U.S. business employment in 2012, according to the 2012 Economic Census (<http://www.census.gov/econ/census/>). The 2012 Economic Census estimated total business employment in the United States at 115.9 million.

3. From the 2012 Economic Census, the total employment of firms in scope for BRDIS with five or more employees was 109.9 million.

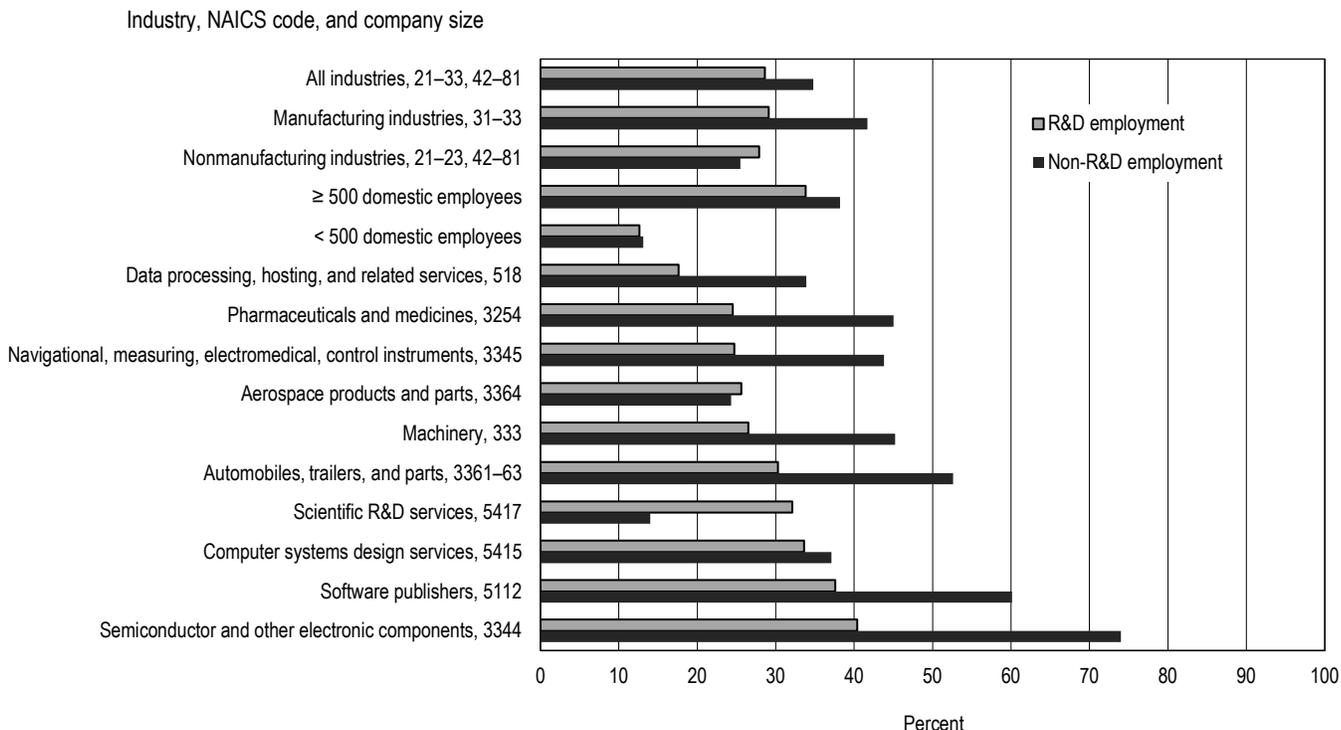
4. See especially the field of degree section of the *Women, Minorities, and*

*Persons with Disabilities in Science and Engineering: 2015* report (NSF/NCSES 2015) at <http://www.nsf.gov/statistics/2015/nsf15311/digest/theme2.cfm>.

5. R&D expenditures reported here include costs paid for by the reporting company (R&D expenses) and costs paid for by customers, grant-making organizations, or partners.

6. U.S. subsidiaries of foreign-owned companies operating in the United States are included in BRDIS estimates, but the foreign parent company of these subsidiaries are not. For example, a U.S. subsidiary of a large foreign

FIGURE 4. Foreign share of employment of U.S.-located R&D-active firms, by type of employment, NAICS industry, and company size: 2013



NAICS = North American Industry Classification System.

NOTE: Foreign share = (foreign employment / worldwide employment) × 100 for U.S.-located R&D-active firms.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics and U.S. Census Bureau, Business R&D and Innovation Survey, 2013.

auto manufacturer would be asked by BRDIS to report only the U.S.-located subsidiary’s R&D and employment, not the R&D and employment of its foreign owner.

### Bibliography

National Science Board (NSB). 2016. Research and Development: National Trends and International Comparisons, Chapter 4. In *Science and Engineering Indicators 2016*. Arlington, VA. Available at <http://www.nsf.gov/statistics/2016/nsb20161/#/report>.

National Science Foundation, National Center for Science and Engineering Statistics (NSF/NCSES). 2015. *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2015*. Special Report NSF 15-311. Arlington, VA. Available at <http://www.nsf.gov/statistics/wmpd/>.

National Science Foundation, National Center for Science and Engineering Statistics (NSF/NCSES). 2016a. *R&D Performance of U.S.-Located Multinational Companies:*

*Results from Multiagency Survey Linking Project*. InfoBrief NSF 16-305. Arlington, VA. Available at <http://www.nsf.gov/statistics/2016/nsf16305/>.

National Science Foundation, National Center for Science and Engineering Statistics (NSF/NCSES). 2016b. *International Investment and R&D Data Link: 2008–10*. Detailed Statistical Tables NSF 16-306. Arlington, VA. Available at <http://www.nsf.gov/statistics/2016/nsf16306/>.

RETURN THIS COVER SHEET TO ROOM P35 IF YOU  
DO NOT WISH TO RECEIVE THIS MATERIAL  OR  
IF CHANGE OF ADDRESS IS NEEDED  INDICATE  
CHANGE INCLUDING ZIP CODE ON THE LABEL (DO  
NOT REMOVE LABEL).

**National Science Foundation**  
ARLINGTON, VA 22230  
OFFICIAL BUSINESS

NSF 17-302