U.S. Department of Commerce
Economics and Statistics Administration
Office of the Chief Economist

Women in STEM: 2017 Update

By
Ryan Noonan

ESA Issue Brief
#06-17

November 13, 2017

Executive Summary

In March, the Office of the Chief Economist (OCE) released the first in a series of reports updating and expanding our previous work examining the science, technology, engineering, and math (STEM) workforce. That first report, "STEM Jobs: 2017 Update," provided an overview of STEM workers and their earning power. This second report provides a more detailed look at the gender dynamics of the STEM economy.

America's STEM workforce is crucial for generating new ideas, receiving and commercializing patents, and providing the flexibility and critical thinking required in the modern economy. While women continue to make gains across the broader economy, they remain underrepresented in STEM jobs and among STEM degree holders. Crafting policy to tap into the potential of women to contribute further in this vital sector requires an understanding of how gender is currently related to participation and success in STEM jobs.

Key findings in this report, which are consistent with previous research, including research done by OCE, are the following.

- Women filled 47 percent of all U.S. jobs in 2015 but held only 24 percent of STEM jobs. Likewise, women constitute slightly more than half of college educated workers but make up only 25 percent of college educated STEM workers.
- Women with STEM jobs earned 35 percent more than comparable women in non-STEM jobs — even higher than the 30 percent STEM premium for men. As a result, the gender wage gap is smaller in STEM jobs than in non-STEM jobs. Women with STEM jobs also earned 40 percent more than men with non-STEM jobs.
- While nearly as many women hold undergraduate degrees as men overall, they make up only about 30 percent of all STEM degree holders. Women make up a disproportionately low share of degree holders in all STEM fields, particularly engineering.
- Women with STEM degrees are less likely than their male counterparts to work in a STEM occupation; they are more likely to work in education or healthcare.

What is STEM?

The acronym STEM — science, technology, engineering, and math — is defined more or less broadly depending on the source of the definition. There is a strong consensus that STEM, or science, technology, engineering, and math, workers should be defined to include core occupations in the hard sciences, engineering, and mathematics. However, there is often less consensus about whether to include other positions such as educators, managers, technicians, health-care professionals, or social scientists.

Following our March 2017 report, our definition of STEM includes, in addition to the core occupations, professional and technical support occupations in the fields of computer science and mathematics, engineering, and life and physical sciences, as well as three management occupations with direct connections to STEM.[1] Our STEM list contains 56 specific occupation codes as classified by the Standard Occupational Classification (SOC) (see Appendix Table 1).[2,3] Because of data limitations, we could not include STEM educators.[4] We also elected not to include social scientists.[5]

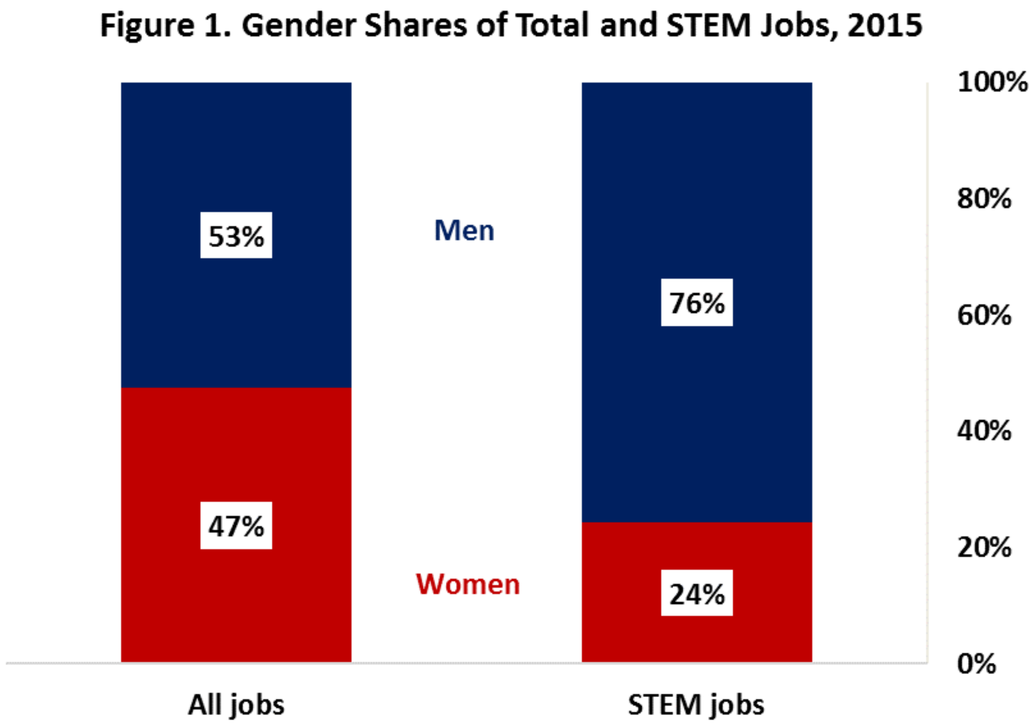
In 2015, there were 8.6 million workers in STEM jobs, or 5.7 percent of the workforce.[6] To put the 8.6 million STEM workers into context, we divide STEM occupations into four categories: computer and math, engineering and surveying, physical and life sciences, and STEM managerial occupations.[7] Across all levels of educational attainment, the largest group of STEM jobs is within the computer and math fields, which account for close to half (49 percent) of all STEM employment. Second are engineering and surveying occupations with 30 percent of all STEM employment, while 12 percent are in the physical and life sciences and 9 percent in STEM management jobs.

Women are Underrepresented in STEM Jobs

Data from the Census Bureau's American Community Survey (ACS) shows that women comprise 47 percent of all workers but just 24 percent of STEM workers.[8] In other words, a STEM worker is about half as likely to be a woman as a member of the overall workforce (see Figure 1).[9]

---

[1] These occupations are computer and information systems managers, engineering managers, and natural sciences managers.
[2] This is an increase from 50 in our 2011 report. With one exception, this increase merely reflects a change in the amount of occupation detail available in our primary data sources. However, we have added actuaries to the list of STEM jobs for this report despite their exclusion in previous work. Their inclusion does not substantially change our findings.
[3] The 2010 Standard Occupational Classification (SOC) system is used by Federal statistical agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data. All workers are classified into one of 840 detailed occupations according to their occupational definition. To facilitate classification, detailed occupations are combined to form 461 broad occupations, 97 minor groups, and 23 major groups. Detailed occupations in the SOC with similar job duties, and in some cases skills, education, and/or training, are grouped together. For more information, see: https://www.bls.gov/soc/.
[4] Although our principal data source, the 2015 American Community Survey (ACS), collects detailed information on workers' occupations, it does not break out educators by their specific field. As a result, it is not possible to distinguish math and science teachers and professors from other teachers and professors. Data from the Bureau of Labor Statistics' Occupational Employment Statistics program show that there are roughly 200,000 postsecondary teachers in STEM fields, and their exclusion is unlikely to materially affect our results.
[5] The Census Bureau and the National Science Foundation count social scientists among "science and engineering jobs." Following Xie and Killewald, we have opted to exclude social scientists from the definition of STEM. As the authors point out, undergraduate degrees in social science are not closely linked to careers in social science. Using data from the American



Source: OCE calculations using American Community Survey public-use microdata.
Note: Estimates are for employed persons age 16 and over.

The proportions of women in the overall workforce and in the STEM workforce are little changed from our previous report on women in STEM.[10] As shown in Table 1, the share of women in the overall workforce has fallen from 48 percent to 47 percent, while the share of women in the STEM workforce has held constant. In addition, women now make up a slight majority of workers with at least a

---

Community Survey, we find that, in 2015, over 97 percent of workers with social science degrees worked in non-social science jobs, compared to 65 percent of workers with STEM degrees working in non-STEM jobs. In addition, recipients of such degrees are less likely to pursue graduate education in science (including social science), and universities produce a very large number of social science degrees that skew any analysis of STEM education or the STEM workforce. For more on this topic, see Xie, Yu, and Alexandra Killewald. *Is American Science in Decline?* Cambridge, MA: Harvard University Press, 2012.

[6] For purposes of this report, we use the primary job identified by respondents to the American Community Survey to determine whether a worker is in a STEM field. In order to produce better time series analysis, our previous report used data from the Current Population Survey, which showed that there were 9.0 million STEM workers in 2015, accounting for 6.1 percent of the overall workforce.

[7] The distinction between "scientists" and "science occupations" is more than just semantic. "Science occupations" covers not just scientists but also science technicians. Likewise, engineering and surveying occupations include engineering technicians and drafters, and computer occupations range from computer support specialists to computer software engineers.

[8] For more information about the American Community Survey, see: https://www.census.gov/programs-surveys/acs/.

[9] Note that in this section we are focusing on persons with STEM *jobs*; while there is a lot of overlap between persons with STEM jobs and persons with STEM undergraduate majors, the two sets are not identical. Later we talk about persons with STEM degrees and the jobs they hold.

[10] For our previous report, "Women in STEM: A Gender Gap to Innovation," see: http://esa.doc.gov/reports/women-stem-gender-gap-innovation.

bachelor's degree; their share in the college-educated STEM workforce has ticked up slightly, from 24 percent to 25 percent.

Table 1. Total and STEM Employment by Gender and Educational Attainment, 2009 and 2015
(thousands of workers)

	Male		Female		Percent Female	
	2009	2015	2009	2015	2009	2015
All workers	73,580	79,067	67,058	71,506	48%	47%
College-educated	22,167	24,991	21,433	25,431	49%	50%
STEM workers	5,640	6,520	1,790	2,100	24%	24%
College-educated	3,259	4,469	1,199	1,497	24%	25%

Source: OCE calculations from Census 2009 and 2015 American Community Survey public-use microdata.
Note: Estimates are for employed persons age 16 and over. College-educated workers are those with at least a bachelor's degree.

However, as shown in Table 2, the concentration of women varies across the types of STEM occupations. The largest share of women is in the physical and life sciences and this share rose from 40 percent to 43 percent. For computer science and math jobs, the share of women decreased slightly from 27 percent in 2009 to 26 percent in 2015. The share of women in engineering (at 14 percent) and STEM management jobs (at 25 percent) held steady over this period.

Table 2. Employment in STEM Occupations, 2009 and 2015
(thousands of workers)

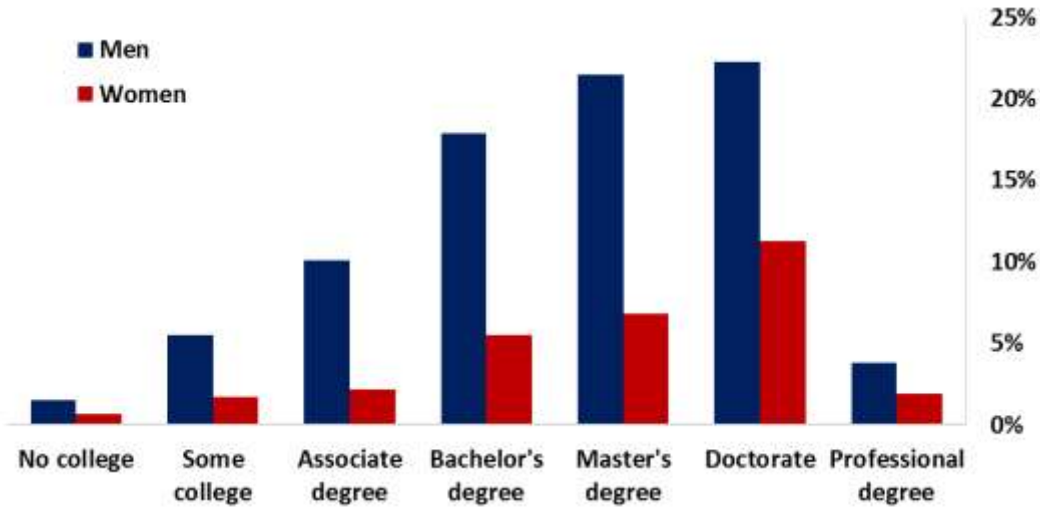
	Male		Female		Percent Female	
	2009	2015	2009	2015	2009	2015
STEM total	***5,640***	***6,520***	***1,790***	***2,100***	***24%***	***24%***
Computer science and math	2,534	3,162	929	1,101	27%	26%
Engineering	2,079	2,195	330	364	14%	14%
Physical and life sciences	553	595	374	448	40%	43%
STEM managers	474	568	157	187	25%	25%

Source: OCE calculations from Census 2009 and 2015 American Community Survey public-use microdata.
Note: Estimates are for employed persons age 16 and over.

Higher levels of educational attainment are associated with higher likelihood of having a STEM job for both men and women, but Figure 2 shows that women are less likely than men to have a STEM job across all levels of attainment. While the gap lessens somewhat at the doctoral level, women with PhD degrees remain about half as likely as men with similar levels of educational attainment to hold a STEM job.[11]

[11] Few persons with professional degrees work in STEM jobs because such persons typically have jobs that we do not characterize as STEM (e.g., dentists, physicians, and lawyers).

Figure 2. Share of Workers in STEM Jobs by Gender and Educational Attainment, 2015



Source: OCE calculations using American Community Survey public-use microdata.
Note: Professional degrees include medical, dental, veterinary, and law degrees. Estimates are for employed persons age 16 and over.

STEM Worker Earnings and Gender

There is robust evidence across the economic literature of a gender wage gap—women earn less than men, even after controlling for a wide range of characteristics such as education and age. In our recent report, "STEM Jobs: 2017 Update," we showed that STEM workers earn a significant premium over their non-STEM counterparts.[12] Figure 3 illustrates the intersection of these two findings by showing the average hourly earnings of full-time, year-round workers in STEM and non-STEM jobs. On average, men and women earn $37.69 and $31.59 per hour, respectively, in STEM jobs—higher than the $22.56 and $18.17 that they earn, on average, in non-STEM occupations. For every dollar earned by a man in STEM, a woman in STEM earns 84 cents, a gender wage gap of 16 percent, slightly larger than the 14 percent wage gap we found using 2009 data but smaller than the 19 percent gender wage gap in non-STEM jobs. This STEM/non-STEM difference has narrowed from 7 percentage points in 2009 to 3 percentage points in 2015 because, while the gender gap in STEM jobs grew, the gender gap in non-STEM jobs shrank from 21 percent to 19 percent.

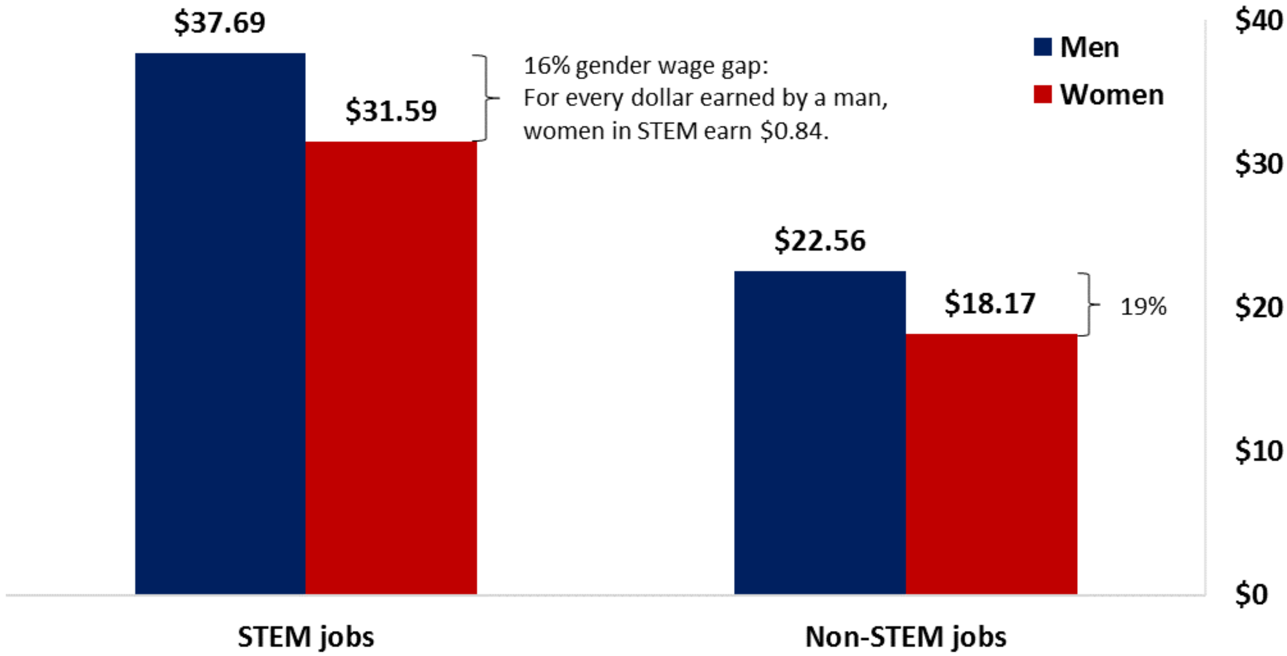
This simple comparison of average earnings can disguise other factors that affect worker earnings, especially age and educational attainment. We use a regression analysis to control for several demographic and geographic characteristics and attempt to get a more precise measure of the gender

---

[12] For our previous report, see: http://esa.doc.gov/reports/stem-jobs-2017-update.

earnings gap in STEM.[13] The results from these regressions clarify the magnitude of both the STEM earnings premium and the gender earnings gap (see Appendix Table 3).[14]

Figure 3. Average Hourly Earnings by Gender and Type of Occupation, 2015



Source: OCE calculations using American Community Survey public-use microdata.
Note: Estimates are for full-time, year-round wage and salary workers age 16 and over.

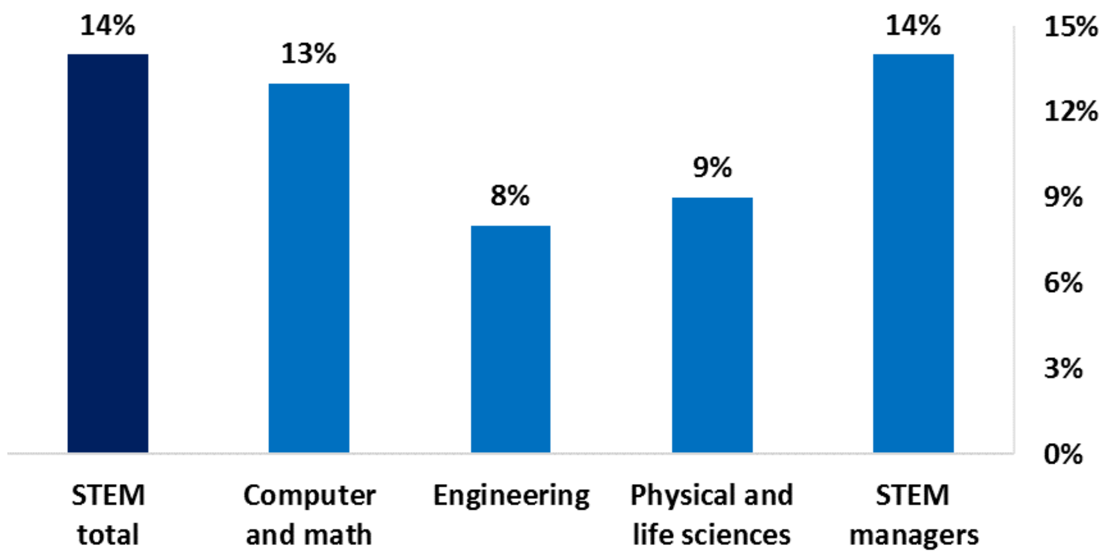
We find that, all else being equal, women in STEM earn 35 percent more than their female peers in non-STEM jobs, while the STEM premium for men is 30 percent. Both of these premiums are larger than those we found in 2009 (33 percent for women and 25 percent for men), suggesting a growing wage gap between STEM and non-STEM earnings.

Given that the STEM premium for women is higher than for men, we would expect women in STEM to face a smaller gender earnings gap than women in non-STEM occupations, consistent with the data in Figure 2. However, because the difference between the female and male STEM premiums has declined

[13] The earnings regressions measure the natural log of wages as a function of age (up to a fourth degree polynomial of age), gender, marital status, race and Hispanic origin, nativity and citizenship, education, veteran status, region, major industry, and whether a worker is in a STEM occupation. This specification was run for the overall population of private sector full-time year-round wage and salary workers age 16 and over as well as for men and women separately. Additionally, the specification was run for college-educated workers age 25 and over in each of the four major STEM occupational groups. The exponential function was used to convert the results for presentation. Additionally, a second set of regressions was run to estimate the impact of having children at home on the gender wage gap, but it did not affect the overall results of the regressions shown here.
[14] Because these regressions use American Community Survey microdata, they are not strictly comparable to the results in our previous report, which used Current Population Survey microdata.

since 2009, we would also expect the gender earnings gap has become more similar across STEM and non-STEM occupations, which is also consistent with our findings. At the same time that STEM jobs have become higher-paying with respect to non-STEM jobs, the gender earnings gap has become more consistent across both kinds of jobs.

Figure 4. Regression-adjusted Gender Wage Gap of College-educated STEM Workers by Occupation, 2015



Source: OCE calculations using American Community Survey public-use microdata.
Note: Estimates are for full-time, year-round private wage and salary workers age 25 and over.

Looking at more specific groups of STEM workers allows us to make more precise comparisons of male and female wages within the sector (see Appendix Table 4). Among college-educated STEM workers, the gender wage gap shrinks to 14 percent (compared to 12 percent in 2009), and it is even smaller within some of the major STEM categories (see Figure 4). The most male-dominated STEM occupational group — engineers— has the smallest gender earnings gap (8 percent), while the most gender-balanced group — physical and life sciences — has the second smallest (9 percent). Across all groups, the gender earnings gap has increased at least somewhat since 2009, though STEM managers have seen a much larger increase, from 9 percent to 14 percent.

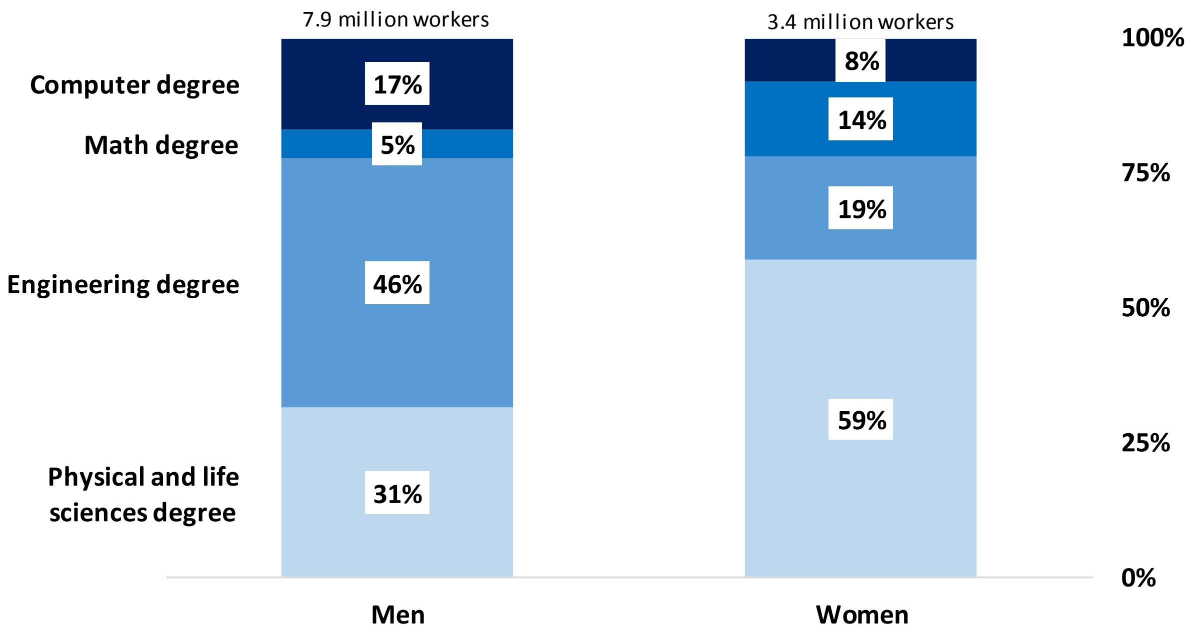
STEM Degrees and Fields of Study by Gender

Parallel to our list of STEM occupations, we also identify a set of STEM undergraduate degree fields that span computer science and mathematics, engineering, and life and physical sciences (see Appendix Table 2). We define STEM degree holders as persons whose primary or secondary undergraduate major was in a STEM field. Following similar logic to that used in our occupation selection, we exclude business, healthcare, and social science majors.

Because STEM degrees are a common path to a STEM job, and because policy conversations around STEM often focus on education, it is useful to examine the educational choices made by women and men in STEM. In our March 2017 report, we found that there are 6.0 million STEM workers with at least a four-year college degree, and 69 percent of these workers have a degree in a STEM field (though often not the same field as their job).

Data from the 2015 ACS shows that women now make up half of all employed college graduates age 25 and over; there were 25.0 million women and 25.0 million men who were employed and had bachelor's degrees. However, in 2015, there were 3.4 million college educated working women with STEM degrees, about 30 percent of all working STEM-degree holders, and 7.9 million men.

Figure 5. College-educated Workers with a STEM Degree by Gender and STEM Degree Field, 2015



Source: OCE calculations using American Community Survey public-use microdata.
Note: Estimates are for employed persons age 25 and over. The shares for men do not add to 100% due to rounding.

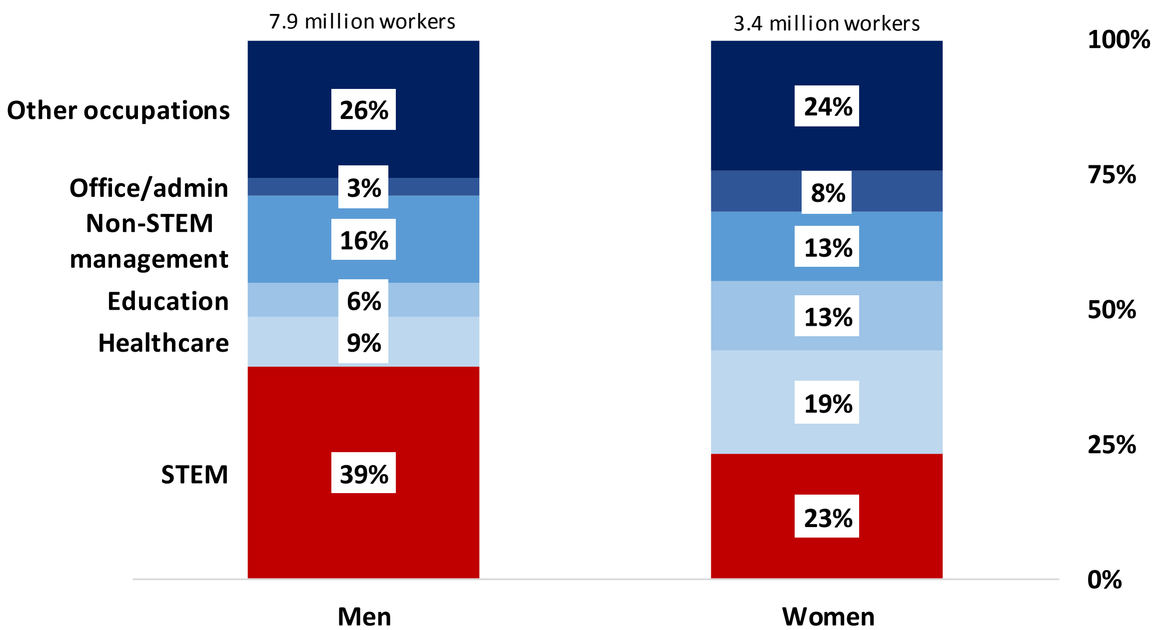
Among STEM majors, the distribution of men and women differs significantly. As shown in Figure 5, more than half (59 percent) of all women who major in STEM fields choose a degree in the physical and life sciences, compared to less than one-third (31 percent) of men. Women are also more likely than men (14 percent versus 5 percent) to choose a math major. Engineering is the most popular STEM field of study for working men (46 percent), more than double the share of STEM working women with engineering degrees. Computer science, which had roughly equal shares of men and women in 2009 (15 percent and 14 percent, respectively), has become far more male-dominated over the past six years, with employed men more than twice as likely as women to have computer degrees.

STEM Degrees and Careers by Gender

We have seen that college educated women are much less likely than men to major in STEM fields, but even women who choose such majors have very different career paths from their male counterparts.

Overall, women with STEM degrees make up about 20 percent of all STEM-degree holders working in STEM jobs. About 40 percent (3.1 million) of men with STEM degrees work in STEM jobs, whereas only 23 percent (0.8 million) of women with STEM degrees work in STEM fields (see Figure 6). While the share of such men has held steady since 2009, the share of women with STEM degrees who choose STEM occupations has fallen from 26 percent.

FIgure 6. College-educated Workers with a STEM Degree by Gender and STEM Occupation, 2015

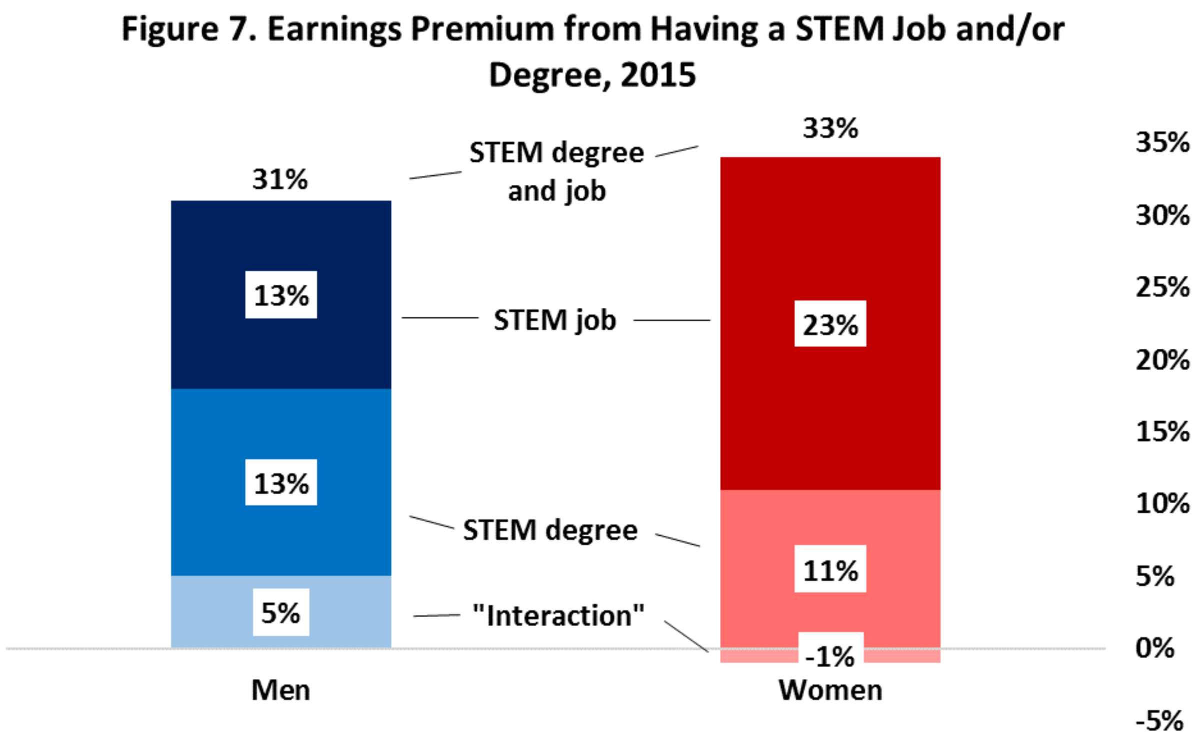


Source: OCE calculations using American Community Survey public-use microdata.
Note: Estimates are for employed persons age 25 and over. The shares for men do not add to 100% due to rounding.

Men with STEM degrees are somewhat more likely to have non-STEM management jobs than women, 16 percent versus 13 percent. This represents a narrowing of the gap we found in 2009, when only 11 percent of women with STEM degrees were in such occupations. By contrast, STEM-educated women are substantially more likely than STEM-educated men to work in healthcare or education. Nearly one in five (19 percent) women with STEM degrees works in healthcare, compared to about one in ten (9 percent) men. Likewise, 13 percent of female STEM majors and 6 percent of male STEM majors work in education.

STEM Degree Premiums and Gender

We have already seen that workers in STEM jobs enjoy an earnings premium over workers in non-STEM jobs, regardless of gender. Figure 7 shows the results of extending that analysis to understand the earnings premium enjoyed by men and women of having either a STEM job, a STEM degree, or both (see Appendix Table 5).



Source: OCE calculations using American Community Survey public-use microdata.
Note: Estimates are for full-time, year-round private wage and salary workers with at least a bachelor's degree who are age 25 and over.

Specifically, when we control for whether or not women have STEM degrees, we find that college-educated women (regardless of choice of undergraduate major) earn 23 percent more in STEM jobs than elsewhere. This is nearly double the 13 percent premium that college-educated men realize working in STEM. On the other hand, female STEM degree holders earn 11 percent more than women with other degrees, regardless of job, while the STEM degree premium for men is slightly larger at 13 percent.

The largest STEM-related earnings premiums go to men and women who both major in a STEM field and choose a STEM job. A notable finding of our analysis is that men receive an additional 5 percent premium for having both a STEM degree and a STEM job, while women see a small but slightly negative “interaction” effect.[15] Despite the lack of an “interaction” benefit, the STEM degree/STEM job career

[15] The wage premium benefits associated with having either a STEM job or a STEM degree are statistically significant at the 99 percent confidence level for both men and women. The interaction effect significant for men at the 99 percent level, though it is only significant at the 90 percent level for women.

path nets women 34 percent higher hourly earnings, on average, than those who have neither a STEM degree nor a STEM job, a few points higher than the corresponding 31 percent premium for men.

Conclusion

This report demonstrates that women are underrepresented both in STEM jobs and among those with undergraduate STEM degrees. Moreover, we find that there has been little overall change in this underrepresentation since our last report using 2009 data. The relatively few women who receive STEM degrees are concentrated in the physical and life sciences, while men with STEM degrees are concentrated in engineering. Perhaps reflecting this difference in concentration, women who receive STEM degrees are less likely than their male counterparts to work in STEM jobs, instead opting for more careers in the healthcare and education sectors. For those women who do work in STEM, we find a somewhat smaller gender earnings gap than for the overall labor force.

While this report does not — and cannot — explain why gender differences in STEM exist, its aim is to provide data and insight to help guide more informed policymaking. STEM jobs are crucial to the competitiveness, innovation, and flexibility of the modern economy. The findings of this report provide clear evidence that there is an opportunity to expand the number of women in STEM, even as the gender balance of the overall labor force nears equality.

Appendix Table 1. Detailed STEM occupations and Standard Occupational Classification (SOC) codes

Occupation	SOC code	Occupation	SOC code
Computer and math occupations			
• Computer scientists and systems analysts	15-10XX	• Network systems and data communications analysts	15-1081
• Computer programmers	15-1021	• Actuaries	15-2011
• Computer software engineers	15-1030	• Mathematicians	15-2021
• Computer support specialists	15-1041	• Operations research analysts	15-2031
• Database administrators	15-1061	• Statisticians	15-2041
• Network and computer systems administrators	15-1071	• Miscellaneous mathematical science occupations	15-2090
Engineering and surveying occupations			
• Surveyors, cartographers, and photogrammetrists	17-1020	• Materials engineers	17-2131
• Aerospace engineers	17-2011	• Mechanical engineers	17-2141
		• Mining and geological engineers, including mining safety engineers	17-2151
• Agricultural engineers	17-2021		
• Biomedical engineers	17-2031	• Nuclear engineers	17-2161
• Chemical engineers	17-2041	• Petroleum engineers	17-2171
• Civil engineers	17-2051	• Engineers, all other	17-2199
• Computer hardware engineers	17-2061	• Drafters	17-3010
• Electrical and electronic engineers	17-2070	• Engineering technicians, except drafters	17-3020
• Environmental engineers	17-2081	• Surveying and mapping technicians	17-3031
• Industrial engineers, including health and safety	17-2110	• Sales engineers	41-9031
• Marine engineers and naval architects	17-2121		
Physical and life sciences occupations			
• Agricultural and food scientists	19-1010	• Physical scientists, all other	19-2099
• Biological scientists	19-1020	• Agricultural and food science technicians	19-4011
• Conservation scientists and foresters	19-1030	• Biological technicians	19-4021
• Medical scientists	19-1040	• Chemical technicians	19-4031
• Astronomers and physicists	19-2010	• Geological and petroleum technicians	19-4041
• Atmospheric and space scientists	19-2021	• Nuclear technicians	19-4051
• Chemists and materials scientists	19-2030	• Other life, physical, and social science technicians	19-40XX
• Environmental scientists and geoscientists	19-2040		
STEM managerial occupations			
• Computer and information systems managers	11-3021	• Natural sciences managers	11-9121
• Engineering managers	11-9041		

Appendix Table 2. Detailed STEM undergraduate majors

Computer majors

- Computer and information systems
- Computer programming and data processing
- Computer science
- Information sciences
- Computer administration management and security
- Computer networking and telecommunications

Math majors

- Mathematics
- Applied mathematics
- Statistics and decision science
- Mathematics and computer science

Engineering majors

- General engineering
- Aerospace engineering
- Biological engineering
- Architectural engineering
- Biomedical engineering
- Chemical engineering
- Civil engineering
- Computer engineering
- Electrical engineering
- Engineering mechanics physics and science
- Environmental engineering
- Geological and geophysical engineering
- Industrial and manufacturing engineering
- Materials engineering and materials science
- Mechanical engineering
- Metallurgical engineering
- Mining and mineral engineering
- Naval architecture and marine engineering
- Nuclear engineering
- Petroleum engineering
- Miscellaneous engineering
- Engineering technologies
- Engineering and industrial management
- Electrical engineering technology
- Industrial production technologies
- Mechanical engineering related technologies
- Miscellaneous engineering technologies
- Military technologies

Physical and life sciences majors

- Animal sciences
- Food science
- Plant science and agronomy
- Soil science
- Environmental science
- Biology
- Biochemical sciences
- Botany
- Molecular biology
- Ecology
- Genetics
- Microbiology
- Pharmacology
- Physiology
- Zoology
- Miscellaneous biology
- Nutrition sciences
- Neuroscience
- Cognitive science and biopsychology
- Physical sciences
- Astronomy and astrophysics
- Atmospheric sciences and meteorology
- Chemistry
- Geology and earth science
- Geosciences
- Oceanography
- Physics
- Nuclear, industrial radiology, and biological technologies

Appendix Table 3. Regression Results (Overall)

VARIABLES	Description	All Workers ln_hourly_earnings	Women Only ln_hourly_earnings	Men Only ln_hourly_earnings
1.stem_job	STEM job	0.310***	0.303***	0.262***
		(0.00276)	(0.00543)	(0.00331)
AGEP	Age	0.0960***	0.154***	0.0514***
		(0.00537)	(0.00815)	(0.00722)
c.AGEP#c.AGEP	Age (squared)	-0.00144***	-0.00336***	7.40e-05
		(0.000183)	(0.000278)	(0.000247)
c.AGEP#c.AGEP	Age (cubed)	6.52e-06**	3.27e-05***	-1.42e-05***
#c.AGEP		(2.65e-06)	(4.02e-06)	(3.58e-06)
c.AGEP#c.AGEP	Age (4^{th} power)	2.11e-09	-1.21e-07***	9.99e-08***
#c.AGEP#c.AGEP		(1.38e-08)	(2.10e-08)	(1.88e-08)
1.married	Married	0.156***	0.0896***	0.184***
		(0.00174)	(0.00244)	(0.00245)
1.race_eth	Black non-Hispanic	-0.147***	-0.0972***	-0.181***
		(0.00288)	(0.00385)	(0.00428)
2.race_eth	Asian non-Hispanic	-0.0378***	0.0204***	-0.0675***
		(0.00440)	(0.00636)	(0.00600)
3.race_eth	Other race non-Hispanic	-0.0819***	-0.0571***	-0.0947***
		(0.00561)	(0.00814)	(0.00762)
4.race_eth	Hispanic	-0.130***	-0.103***	-0.150***
		(0.00279)	(0.00405)	(0.00376)
1.foreignborn	Foreign-born citizen	-0.0363***	-0.0426***	-0.0364***
		(0.00353)	(0.00497)	(0.00487)
2.foreignborn	Non-citizen	-0.160***	-0.186***	-0.163***
		(0.00363)	(0.00578)	(0.00464)
1.educ	High school diploma	0.159***	0.178***	0.166***
		(0.00330)	(0.00547)	(0.00407)
2.educ	Some college	0.305***	0.362***	0.303***
		(0.00333)	(0.00543)	(0.00418)
3.educ	Bachelor’s degree	0.663***	0.705***	0.668***
		(0.00364)	(0.00575)	(0.00471)
4.educ	Graduate degree	0.930***	0.945***	0.952***
		(0.00417)	(0.00635)	(0.00552)
1.veteran	Veteran	0.0371***	-0.0173*	-0.0258***
		(0.00337)	(0.00969)	(0.00369)
2.DIVISION	Middle Atlantic	-0.0211***	-0.0244***	-0.0216***
		(0.00414)	(0.00581)	(0.00568)
3.DIVISION	East North Central	-0.134***	-0.152***	-0.119***
		(0.00397)	(0.00562)	(0.00542)
4.DIVISION	West North Central	-0.163***	-0.177***	-0.145***
		(0.00459)	(0.00645)	(0.00629)
5.DIVISION	South Atlantic	-0.125***	-0.131***	-0.119***
		(0.00391)	(0.00550)	(0.00537)
6.DIVISION	East South Central	-0.222***	-0.241***	-0.205***
		(0.00481)	(0.00679)	(0.00656)
7.DIVISION	West South Central	-0.102***	-0.144***	-0.0718***
		(0.00425)	(0.00601)	(0.00579)
8.DIVISION	Mountain	-0.104***	-0.113***	-0.101***

		(0.00460)	(0.00651)	(0.00627)
9.DIVISION	Pacific	0.0121***	0.00919	0.0101*
		(0.00407)	(0.00579)	(0.00553)
1.secnum	Agriculture, mining, and construction	0.185***	0.105***	0.125***
		(0.00287)	(0.00709)	(0.00325)
2.secnum	Manufacturing	0.111***	0.0750***	0.0756***
		(0.00208)	(0.00358)	(0.00257)
Constant		0.704***	0.0234	1.212***
		(0.0562)	(0.0853)	(0.0754)
Observations		738,167	317,837	420,330
R-squared		0.373	0.351	0.396

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix Table 4. Regression Results (Occupation-specific)

VARIABLES	Description	All STEM workers ln_hourly_earnings	Computer and math ln_hourly_earnings	Engineering ln_hourly_earnings	Physical and life sciences ln_hourly_earnings	STEM managerial ln_hourly_earnings
1.female	Female	-0.147***	-0.139***	-0.0812***	-0.0978***	-0.148***
		(0.00689)	(0.00955)	(0.0136)	(0.0188)	(0.0200)
AGEP	Age	0.0633*	0.0921	-0.0418	0.195	0.264***
		(0.0333)	(0.0749)	(0.0479)	(0.131)	(0.0946)
c.AGEP#c.AGEP	Age (squared)	-0.000350	-0.00132	0.00252*	-0.00452	-0.00592**
		(0.00107)	(0.00255)	(0.00152)	(0.00433)	(0.00282)
c.AGEP#c.AGEP	Age (cubed)	-6.24e-06	6.22e-06	-4.04e-05**	5.44e-05	6.19e-05*
#c.AGEP		(1.47e-05)	(3.75e-05)	(2.06e-05)	(6.17e-05)	(3.60e-05)
c.AGEP#c.AGEP	Age (fourth	4.81e-08	-7.90e-09	2.00e-07**	-2.75e-07	-2.67e-07
#c.AGEP#c.AGEP	power)	(7.35e-08)	(2.01e-07)	(1.01e-07)	(3.20e-07)	(1.65e-07)
1.married	Married	0.110***	0.0862***	0.121***	0.0818***	0.109***
		(0.00680)	(0.00947)	(0.0119)	(0.0212)	(0.0219)
1.race_eth	Black non-Hispanic	-0.127***	-0.152***	-0.120***	0.0205	-0.189***
		(0.0163)	(0.0208)	(0.0339)	(0.0534)	(0.0468)
2.race_eth	Asian non-Hispanic	0.0146	0.000548	0.00132	0.0429	-0.0508
		(0.0101)	(0.0140)	(0.0177)	(0.0285)	(0.0336)
3.race_eth	Other race non-Hispanic	-0.0524***	-0.0733**	-0.0177	-0.0282	-0.103
		(0.0203)	(0.0287)	(0.0318)	(0.0571)	(0.0725)
4.race_eth	Hispanic	-0.123***	-0.141***	-0.0790***	-0.156***	-0.116***
		(0.0136)	(0.0201)	(0.0206)	(0.0482)	(0.0338)
1.foreignborn	Foreign-born citizen	0.0247**	0.0578***	-0.0220	-0.0101	0.102***
		(0.0104)	(0.0144)	(0.0189)	(0.0315)	(0.0299)
2.foreignborn	Non-citizen	0.0238**	0.0779***	0.00128	-0.179***	0.0681*
		(0.0115)	(0.0156)	(0.0215)	(0.0321)	(0.0376)
1.grad_degree	Graduate degree	0.122***	0.126***	0.150***	0.230***	0.110***
		(0.00600)	(0.00868)	(0.0101)	(0.0201)	(0.0163)
1.veteran	Veteran	-0.0558***	-0.0638***	-0.0582***	0.0193	-0.0357
		(0.0122)	(0.0176)	(0.0197)	(0.0651)	(0.0312)
2.DIVISION	Middle Atlantic	0.00282	-0.0229	-0.0146	0.0301	0.0110
		(0.0130)	(0.0183)	(0.0231)	(0.0348)	(0.0401)
3.DIVISION		-0.103***	-0.124***	-0.0924***	-0.0900**	-0.108***

	East North Central	(0.0124)	(0.0172)	(0.0225)	(0.0362)	(0.0382)
4.DIVISION	West North Central	-0.113***	-0.131***	-0.0947***	-0.158***	-0.0904**
		(0.0152)	(0.0210)	(0.0268)	(0.0474)	(0.0440)
5.DIVISION	South Atlantic	-0.0327***	-0.0352**	-0.0521**	-0.0276	-0.0934**
		(0.0124)	(0.0169)	(0.0229)	(0.0352)	(0.0383)
6.DIVISION	East South Central	-0.184***	-0.233***	-0.109***	-0.239***	-0.249***
		(0.0178)	(0.0268)	(0.0295)	(0.0474)	(0.0541)
7.DIVISION	West South Central	0.0337**	-0.0891***	0.149***	0.0747	0.0401
		(0.0142)	(0.0196)	(0.0248)	(0.0469)	(0.0412)
8.DIVISION	Mountain	-0.0298**	-0.0589***	-0.0121	0.0236	-0.0736
		(0.0142)	(0.0198)	(0.0251)	(0.0450)	(0.0452)
9.DIVISION	Pacific	0.129***	0.133***	0.120***	0.103***	0.0788**
		(0.0123)	(0.0172)	(0.0220)	(0.0326)	(0.0398)
1.secnum	Agriculture, mining, and construction	0.0899***	0.0524**	0.0562***	0.315***	0.0888*
		(0.0141)	(0.0233)	(0.0193)	(0.0459)	(0.0461)
2.secnum	Manufacturing	0.0397***	0.0538***	0.00311	0.206***	0.0631***
		(0.00601)	(0.0111)	(0.0101)	(0.0199)	(0.0177)
Constant		1.925***	1.703**	3.290***	-0.0107	-0.567
		(0.374)	(0.797)	(0.540)	(1.428)	(1.143)
Observations		40,874	19,714	12,154	4,330	4,676
R-squared		0.211	0.195	0.221	0.352	0.205

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix Table 5. Regression Results (STEM Job and Degree Interaction Effects)

VARIABLES	Description	Women Only ln_hourly_earnings	Men Only ln_hourly_earnings
1.stem_job	STEM job	0.206***	0.126***
		(0.00929)	(0.00724)
1.stem_degree	STEM degree	0.107***	0.119***
		(0.00714)	(0.00612)
1.stem_interaction	STEM job and STEM degree	-0.0248*	0.0262***
		(0.0140)	(0.00964)
AGEP	Age	0.179***	-0.000884
		(0.0224)	(0.0251)
c.AGEP#c.AGEP	Age (squared)	-0.00365***	0.00233***
		(0.000720)	(0.000810)
c.AGEP#c.AGEP# c.AGEP	Age (cubed)	3.16e-05***	-4.95e-05***
		(9.91e-06)	(1.12e-05)
c.AGEP#c.AGEP# c.AGEP#c.AGEP	Age (fourth power)	-1.05e-07**	2.82e-07***
		(4.94e-08)	(5.65e-08)
1.married	Married	0.111***	0.225***
		(0.00439)	(0.00513)
1.race_eth	Black non-Hispanic	-0.125***	-0.277***
		(0.00779)	(0.0105)
2.race_eth	Asian non-Hispanic	0.0459***	-0.0414***
		(0.00937)	(0.00920)
3.race_eth	Other race non-Hispanic	-0.0724***	-0.131***
		(0.0150)	(0.0156)
4.race_eth	Hispanic	-0.156***	-0.218***
		(0.00840)	(0.00924)
1.foreignborn	Foreign-born citizen	-0.0564***	-0.0582***
		(0.00850)	(0.00904)
2.foreignborn	Non-citizen	-0.188***	-0.131***
		(0.0115)	(0.0104)
1.grad_degree	Graduate degree	0.219***	0.241***
		(0.00445)	(0.00466)
1.veteran	Veteran	-0.0508***	-0.0721***
		(0.0172)	(0.00784)
2.DIVISION	Middle Atlantic	0.0207**	0.0177*
		(0.00918)	(0.00958)
3.DIVISION	East North Central	-0.140***	-0.134***
		(0.00907)	(0.00934)
4.DIVISION	West North Central	-0.175***	-0.164***
		(0.0108)	(0.0110)
5.DIVISION	South Atlantic	-0.104***	-0.0860***
		(0.00883)	(0.00905)
6.DIVISION	East South Central	-0.236***	-0.234***
		(0.0125)	(0.0125)
7.DIVISION	West South Central	-0.102***	-0.0403***
		(0.0102)	(0.0103)
8.DIVISION	Mountain	-0.135***	-0.141***
		(0.0110)	(0.0110)

9.DIVISION	Pacific	0.0468***	0.0484***
		(0.00923)	(0.00928)
1.secnum	Agriculture, mining,	0.0843***	0.0102
	and construction	(0.0134)	(0.00896)
2.secnum	Manufacturing	0.141***	0.0428***
		(0.00723)	(0.00523)
Constant		0.197	2.158***
		(0.250)	(0.281)
Observations		113,659	140,002
R-squared		0.164	0.202

Robust standard errors in parentheses
*** p<0.01, ** p<0.05,* p<0.1

Acknowledgments

The author would like to thank the following persons who provided comments, suggestions, and other contributions to this report. Any errors in the report are solely the authors' responsibility.

Robert Rubinovitz, Deputy Chief Economist
David Langdon, Economist
David Beede, Economist
Jessica Nicholson, Economist

Suggested citation:
Noonan, Ryan. Office of the Chief Economist, Economics and Statistics Administration, U.S. Department of Commerce. (November 13, 2017). Women in STEM: 2017 Update (ESA Issue Brief #06-17). Retrieved from https://www.esa.gov/reports/women-stem-2017-update.

U.S. Department of Commerce
Economics and Statistics Administration
Office of the Chief Economist
Room 4848
1401 Constitution Ave., NW
Washington, DC 20230
[esa.doc.gov](esa.doc.gov)

Technical inquiries:
Office of the Chief Economist
(202) 482-3523

Media inquiries:
Office of Communications
(202) 482-3331