

Where Have All The Women Gone?  
Occupational Retention and Exit among Computer Science Degree Holders

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The need for STEM workers is projected to grow at or above the national growth rate over the next decade (U.S. Commerce Department 2012). Governments have focused much attention on increasing the presence of women and underrepresented minorities in STEM fields. Although women's representation in STEM employment has increased significantly over the past few decades, their presence remains low in fields such as engineering and computer science. Using the National Science Foundation's Scientists & Engineers Statistical Data System (SESTAT), this paper explores the occupational choice of men and women who majored in Computer Science. We focus on whether those graduating with degrees in computer science work in computer science or other occupations, further distinguishing between jobs in STEM or non-STEM fields, and assess the factors shaping retention or exit from STEM employment. Preliminary results reveal that retention in computer science varies in important ways by gender, race/ethnicity/nativity, and graduation cohort.

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Women remain underrepresented in many key labor force sectors. Key among these are science, engineering, and technology occupations. The United States has devoted considerable resources to growing women’s presence in science, technology, engineering, and mathematics (STEM) fields of study (Committee on Prospering in the Global Economy of the 21<sup>st</sup> Century, 2007). Although women now account for over half of all bachelor’s degree recipients in STEM fields (National Science Foundation, 2013), women’s representation in the STEM work force lags behind their educational gains (Michelmores and Sassler, 2016; Xie and Killewald, 2012; Xie and Shauman, 2003). Gender disparities in STEM occupational concentration are not, however, equally distributed across fields. As of the early 21<sup>st</sup> century, women accounted for over half of those majoring and working in the life sciences (Michelmores and Sassler, 2016). But their representation in fields such as engineering and computer science remain low, and in the case of computer science their share has actually fallen in recent years (Corbett and Hill, 2015; Michelmores and Sassler, 2016).

Studies of women’s occupational persistence in professional careers often focus on those professionals who “opt out,” leaving the paid labor force for the home front (Stone, 2007; Percheski, 2008). Qualitative studies have highlighted the challenges professional women face trying to juggle family needs with occupations with rigid workplace norms and entrenched notions of what an “ideal worker” looks like (Blair-Loy, 2003; Stone, 2007; Williams, 2018). But while many qualitative studies focus on those women who leave the paid work force to concentrate on childrearing and the home, the empirical evidence indicates that most women – especially those with college degrees or more -- remain in the paid work force (Percheski, 2008). That is particularly the case for women trained in STEM fields. Glass and colleagues found that women with STEM degrees who initially entered STEM occupations were significantly more likely to leave STEM occupations than were women with training in other professions, such as law or business (Glass, Sassler, Levitte, and Michelmores, 2011). They did not, however, exit the labor force. Rather, they left STEM occupations for other types of jobs. In fact, college educated women are less likely to be out of the labor force than their less educated counterparts (Percheski, 2008).

Sex segregation remains persistent in specific STEM fields – engineering and computer science. Yet the two areas reveal opposing patterns. Engineering, although still heavily male-dominated, has witnessed a ten-fold increase in the representation of women since 1970. As of 2004, 22% of engineering graduates were women – and the share of women working in engineering coincided closely with the share majoring in that field (Michelmores and Sassler, 2016). In computer science, in contrast, the representation of women as a share of degree holders and in the workforce has fallen significantly. By 2013, the share of bachelor’s degrees awarded to women in computer science was only half of what it had been in the peak period in the 1980s (Corbett and Hill, 2015). Furthermore, women with computer science degrees are increasingly less likely to work in STEM occupations (Sassler, Michelmores, and Smith 2017).

Such findings suggest that the barriers to employment for women in computer science differ from those deterring women's representation in other STEM fields. Gender exceptionalism, in other words, is concentrated among computer science occupations among those trained in STEM.

This paper integrates the research on opting out of the paid labor force, and studies of the “leaking pipeline” in STEM occupations, to explore the occupational selection of women trained in computer science. While much attention has been paid to the overall STEM labor force, the field of computer science remains a stubborn outlier. Despite accounting for a substantial share of all STEM jobs, the share of computer science majors who are women has been declining, as has the share of women working in computer science occupations (Sassler, Michelmore, and Smith 2017). Furthermore, while the gender wage gap has narrowed or disappeared in other STEM fields, it has not done so in computer science (Michelmore and Sassler 2016; Meyerhoffer and Sassler 2018). In fact, as the proportion of women working in computer science increases, so does the gender wage gap (Michelmore and Sassler 2016). The challenges facing women in the computer science work force have been well canvassed in the popular media (Dewey 2014; Mundy 2017; Stross 2008). Yet little is known about what happens when women leave computer science occupations. Do they shift to STEM jobs in other fields? Do they leave computer science occupations for better remunerated ones? And do their transitions and the factors associated with retention or exit look similar to their male counterparts?

## **Literature**

A great deal of effort is devoted to encouraging girls to pursue careers in STEM fields. Such efforts are based on the belief that increasing women's representation in STEM occupations is important for the economic well-being of society (Committee on Science, Engineering, and Public Policy 2007). Although women have increased their likelihood of majoring in science, technology, engineering, and mathematics (STEM) fields in college, and their graduation rates in such fields have grown dramatically, their employment in STEM jobs continues to lag that of their male counterparts. That is because women who graduate with degrees in STEM majors are less likely than their male counterparts to enter STEM occupations or remain in them (Glass et al. 2013; Ma and Savas 2014; Man and DiPrete 2013; Sassler et al. 2017).

While sizable proportions of both women and women who hold degrees in STEM fields do not enter into the STEM work force (Sassler et al. 2017), the evidence suggests that women are even more likely than men to exit STEM jobs. But are these women exiting the labor force, or just leaving the STEM work force for jobs that are more amenable? The work of Glass and colleagues (2011) suggests that while women with STEM degrees often leave STEM jobs, they remain in the labor force. Many have suggested that women's exits from STEM jobs are due to family formation, but such assertions are not supported by the research. Family intentions are no longer associated with choice of major (Morgan, Gelbgiser, and Weeden 2013; Cech, Rubineau, Silbey, and Seron 2011). Nor do they appear to be as strongly tied to labor force participation. Glass and colleagues (2013) found in their study of job transitions that women exited STEM occupations within a few years of completing college, generally prior to getting married and

having children. Utilizing the same data set, Hunt (2016) showed that the gendered persistence gap in engineering was almost entirely due to dissatisfaction with pay and promotion, rather than resulting from family constraints. There is also evidence that the association between children and earnings – important in shaping retention -- has changed among segments of workers; among professional women, the association between motherhood and wages has become positive (Buchmann and McDaniel 2016; Michelmore and Sassler 2016; Pal and Waldfogel 2016).

Rather, workplace conditions (as indicated by Hunt) appear to be an increasing focus of study among those studying retention in the STEM workforce. Studies of women employed in STEM fields finds they often report experiencing a “chilly climate” related to their scarcity (Fouad et al., 2011; Gunter & Stambach, 2005; for more on female representation, see Kanter, 1977). Social psychologists are increasingly seeking to better understand how self-perceptions of “belongingness” shape retention in STEM fields. Studying students enrolled in engineering colleges, Cech and colleagues (2011) found that professional role confidence – the belief that one can successfully fulfill the roles, competencies, and identity features of a profession – was lower for women than men, and this reduced their likelihood of remaining in engineering majors and careers, contributing to their attrition from STEM fields before they even entered into them. But would similar factors influence those already employed in STEM occupations? Studying workers in seven technology companies, Wynn and Correll (2017) found that women workers in high technology firms were significantly less likely than their male counterparts to think that they embodied the analytical quantitative skills necessary for workers in high tech, and were therefore less likely to think they had what it took to be successful in their careers. They also were less likely than men to report that their supervisors valued their opinions, though this was linked to their perceptions of cultural alignment with their field. Finally, those who felt less culturally aligned with workplace success stereotypes were significantly more likely to consider switching career fields.

As a result of these factors – the lesser likelihood of majoring in computer science and engineering, lower odds of transitioning into related jobs, and higher odds of transitioning out of these occupations – women remain underrepresented in the areas where most STEM jobs are concentrated. Together, engineering and computer science occupations make up more than 80 percent of all STEM employment in the U.S. (Landivar 2013). The evidence suggests that some engineering colleges have made great strides in increasing women’s representation, and the share of women in engineering occupations has been rising – albeit from a very low level (Sassler, Michelmore, and Smith 2017). But computer science, as a field of study and occupation, has been less successful at welcoming women. For starters, there is no evidence that the gender gap in employment is narrowing among more recent cohorts of college graduates with degrees in computer science (Sassler et al., 2017). Furthermore, the gender wage gap in earnings persists for those working in computer science, and as the proportion of women working in computer science increases, so does the gender wage gap (Michelmore and Sassler 2017) – suggesting that men may not be receptive to increasing women’s representation in computer science occupations. Such has been the underlying story emerging in the popular media, where the

declining share of women and minorities in computer science jobs has been well canvassed (Dewey 2014; Mundy 2017; Stross 2008).

We explore what kinds of jobs are held by those who obtained degrees in computer science. Because many STEM professionals do not work in their field of training, we examine if they leave their degree field for another STEM field of work, or if they exit the STEM workforce for non-STEM occupations. Next, we examine what kinds of jobs are held by those who leave computer science and STEM, how they differ by gender, and if those who leave experience a wage premium or penalty for working in jobs outside of computer science. Our focus is on those who have received bachelor's degrees in computer science. Because the racial and ethnic composition of the STEM workforce is also quite diverse, we pay particular attention to racial, ethnic, and nativity differentials in where those with computer science degrees work, in addition to our gender focus.

## **DATA AND METHODS**

Our analysis relies on data from the National Science Foundation's (NSF) Scientists and Engineers Statistical Data System (SESTAT). We incorporate data from six waves of the SESTAT data collection: 1995, 1997, 1999, 2003, 2006, and 2008. We are currently adding in data from the two most recent waves, 2008 and 2013. SESTAT is comprised of three ongoing surveys designed to create a nationally representative sample of science and engineering college degree holders. We utilize the integrated data, drawn from the National Survey of College Graduates Science and Engineering Panel, the National Survey of Recent College Graduates, and the Survey of Doctoral Recipients. SESTAT participants have all received at least a bachelor's degree and have at least one degree in science or engineering, or are individuals holding any college degree that work in a science or engineering occupation. The restricted SESTAT data include detailed information regarding labor force participation, occupation categories, educational attainment, and demographic characteristics.

We treat the data as repeated cross-sections, although some respondents appear in the SESTAT data in more than one wave. To reduce concerns of non-independent sampling, we restrict our analysis to one observation per person, choosing a survey wave at random for individuals represented in multiple waves. We further limit our analysis to men and women who received a bachelor's degree in computer science and math (henceforth denoted as degree in computer science) between 1970 and 2004. Since data are collected between 1995 and 2008, this cohort restriction limits the sample to working-aged individuals (aged 22 to 60). We further limit our sample to individuals who are working full-time, excluding individuals who are unemployed, in school, out of the labor force, or working less than 35 hours per week. This restriction reflects our interest in understanding the factors that determine men and women's decisions to work in STEM occupations relative to other non-STEM occupations. Results from our analysis of the gender gap in STEM can therefore be interpreted as the difference in men and women's propensity to work in STEM compared to employment in other STEM fields (such as engineering) or employed outside of STEM occupations. Labor force participation is quite high among this sample. Our final sample consists of 14,397 men and women working (in any occupation) with bachelor's degrees in computer science.

**Measurement:** Our dependent variable of interest is an indicator for whether the individual worked in a computer science occupation, another STEM occupation, or worked in a non-STEM occupation at the time of the interview. The SESTAT data contain detailed occupation codes for all employed individuals in the survey. Individuals working in computer science and math (henceforth denoted as working in computer science) occupations were distinguished from those working in other STEM occupations (engineering, life sciences, or physical sciences). Respondents who majored in computer science but were working, for example, as engineers or life scientists, were considered working in another STEM occupation. Those who obtained their degree in computer science but at the time of their interview worked outside of STEM field were classified as not working in STEM; jobs in management, sales, and as teachers accounted for the largest share of occupations outside of computer science or STEM.

**Independent variables:** Our key independent variable of interest is the gender of the respondent. We are also interested in race, ethnicity, and nativity. Initial models include dummy variables capturing whether respondents were White, Black, Hispanic, or Asian. Given the large foreign-born representation in the STEM work force, and particularly in computer science (Meyerhoffer and Sessler 2018; Sana 2010) we also include a dummy variable indicating whether respondents were born outside of the United States. In subsequent analyses we further refine our measures of race, ethnicity, and nativity, disaggregating those who are U.S. born by race (U.S. born Whites, Blacks, Asians, and Hispanics) from those who are foreign-born (foreign-born Whites, Blacks, Asians, and Hispanics). We also differentiate race, ethnic, and nativity groups by sex.

A number of controls are incorporated to account for the age and year of degree receipt of our sample. We begin with a linear control for the survey year of the SESTAT data, which is included in order to account for the variations in the propensity to work in STEM over time. We also make use of a linear control for age, so as to allow for the propensity to work in STEM or outside of STEM to vary by age. We also construct five-year college cohort indicators to account for the fact that the propensity to work in STEM may differ across college cohorts between 1970 and 2004; we use the 1980-1984 cohort as the comparison group.

We also include various measures of human capital, such as whether the respondent obtained an advanced degree, differentiating among those with a master's degree in a STEM field, a PhD in a STEM field, and a non-STEM advanced degree. We anticipate that individuals with graduate degrees in STEM will be more likely to remain working in STEM compared to those with only a bachelor's degree or an advanced degree in a non-STEM field. Finally, we incorporate a set of controls for family characteristics. Separate indicators are constructed indicating whether the respondent is in a coresidential union, distinguishing between whether the respondent is married and cohabiting, as cohabitators express less traditional views regarding gender roles than do marrieds (Clarkberg et al. 1995). We also include a control for whether the respondent has any children, or any pre-school aged children (under the age of six), as these are the most time-intensive years. We include interactions of all family characteristics with gender, to allow the association between family characteristics and the propensity to work in computer science, another STEM field, or outside of STEM occupations differs for men and women. We expect family characteristics to be negatively associated with women's propensity to work in computer science, relative to working in non-STEM occupations; whether family characteristics

are associated with work in computer science relative to another STEM field is uncertain, and we therefore do not hypothesize the expected direction.

Our analysis proceeds as follows. First, we describe differences in observed characteristics between men and women graduating with bachelor's degrees in computer science. We then examine how respondents who majored in computer science are arrayed in occupations, differentiating by gender and exploring other factors (such as earnings) associated with transitions out of computer science occupations. Next, we turn to our multivariate analyses, using multinomial logistic regression models to test whether differences between men and women in background characteristics, educational attainment, and family formation can account for disparities in employment in computer science occupations. Our tables present both the coefficients and the odds ratios (the exponentiated coefficients, which can be interpreted as the change in the odds of graduating from high school associated with a one unit increase in the independent variable). An odds ratio greater than 1.0 indicates that the specified variable (e.g., being a racial or ethnic minority) is associated with greater odds of working in a non-STEM occupation relative to the reference category (working in a computer science occupation), while an odds ratio less than 1.0 denotes the odds of experiencing the event of interest is lower relative to the odds of the reference group.

We first assess the impact of our broad racial and ethnic groups, before disaggregating by race, ethnicity, and nativity to determine whether race and ethnicity operate similarly for men and women. We also run our multinomial models by sex, to explore if the effect of background characteristics, educational attainment, and family formation differ within gender. Finally, we examine how the large demographic shifts in the composition of computer science degree recipients may have affected the gender gap in working in computer science, other STEM occupations, or exiting the STEM work force to work in non-STEM occupations. We do this by running our models by ten-year graduation cohorts. This analysis is designed to clarify whether the large demographic shifts in the race and gender composition of computer science over the last several decades has correlated with changes in the gender gap in remaining in computer science jobs, transitioning into other STEM occupations, or leaving the STEM labor force to work in non-STEM occupations.

## **PRELIMINARY RESULTS**

Descriptive statistics of those who majored in computer science and are working full-time are presented in Table 1, separately by gender. Underlined coefficients indicate significant differences in characteristics between men and women. [Must get data approved for release from NORC].

Even though our sample is limited to those who obtained degrees in computer science, our descriptive results reveal that women are less likely to be working in both computer science occupations and other STEM occupations than are men. **Figure 1** depicts the occupations where computer science majors are employed at the time of their interview. The graph shows that, overall, only half of those who obtained degrees in computer science were currently working in a computer science occupation. But this average masks considerable gender variation. Women holding degrees in computer science are significantly more likely than men to work in non-

STEM occupations, 54% versus 43% of men. Men who have computer science degrees are somewhat more likely than their female counterparts to be employed in another STEM field (4% versus 3%), but this is not a significant difference.

Perhaps it is the opportunity to earn considerably more that draws more women out of computer science jobs? A quick look at earnings by occupation and gender suggests that women do not leave computer science for better paying jobs. Figure 2 depicts the mean salaries of computer science majors, by sex and occupational field. Of note is the high mean earnings of those with computer science degrees. Among the total sample, computer science degree holders who work in computer science have the highest mean earnings, followed by those working in other STEM occupations, and last by those working outside of STEM. But these patterns differ by gender. Among men holding computer science degrees, those working in non-STEM jobs have the highest annual earnings, though they do not differ significantly from men working in computer science jobs (or jobs in other STEM fields). Among women, on the other hand, the highest annual earnings were found among those working in computer science occupations, followed by women who worked in other STEM fields. Women who exited STEM fields to work in non-STEM jobs, however, exhibited the lowest mean annual earnings. Women are not leaving computer science, then, for the money, as they experience a wage penalty for leaving computer science (and STEM) jobs.

### **Multivariate Results**

Results from our multivariate analyses are presented in Table 2. Our multivariate results indicate that among those holding college degrees in computer science, “opting out” of computer science occupations is significantly greater for women than for men. The odds of working in a non-STEM job among women is 2.3 times that of men who obtained a degree in computer science; women are no more (or less) likely to work in a different type of STEM occupation relative to computer science jobs than are men. We also find evidence that computer science jobs are not amenable to racial minorities who obtained degrees in the field. Blacks who obtained degrees in computer science, for example, have odds of working in non-STEM jobs relative to computer science jobs that are 37.6% greater than Whites with computer science degrees, while the odds of working outside of STEM are 26.6% greater for Hispanics relative to Whites. The coefficient for Asians working in non-STEM jobs is negative, but not significant.

Turning to our other measures, it is evident that there is little that predicts working in other STEM jobs over computer science. The only measure to significantly increase the likelihood of working in another STEM occupation over computer science jobs are those for educational attainment. Respondents who obtain a PhD in either a STEM field or outside of STEM are significantly more likely to work in other STEM occupations than in computer science. In fact, respondents who obtained a PhD in a STEM field have odds of working in a STEM field other than computer science that are more than twice that of those who obtain only a bachelor’s degree in computer science; perhaps those who are doing well in computer science occupations do not feel the need to invest in more schooling, but those that do seek additional schooling seem on a trajectory to exit computer science for alternative STEM occupations. This



is the one case where respondents are more likely to work in another STEM occupation over a non-STEM one. On the other side of the picture, investing in a non-STEM advanced degree, such as an MBA, elevates the odds of both working in another STEM occupation as well as a non-STEM job, relative to remaining employed in computer science, but in this instance respondents are significantly more likely to work in non-STEM occupations.

Results pooled by gender reveal a time trend in how respondents with degrees in computer science utilize their credentials. Those graduating in the 1970s have odds of working in non-STEM occupations that are more than two times greater than the reference cohort (those graduating in the early 1980s). But among more recent graduates, the likelihood of remaining in computer science jobs has increased. In fact, for graduates of the late 1990s, the odds of working in computer science relative to non-STEM jobs are 1.65 times that of those who graduated in the early 1980s ( $OR = 1/.604$ ), while those graduating with computer science degrees in the new millennium (2000-2004) have odds that are 1.48 times greater. These findings suggest either that the returns to working in computer science have increased among recent cohorts, or that the climate in computer science may have improved over time, though whether these patterns hold for both men and women cannot be determined with this analysis.

As for the impact of family characteristics, our indicators of union formation did not reach statistical significance, suggesting it is not marriage or cohabitation, per se, that results in transitions out of computer science jobs. However, respondents with any children had odds of working in non-STEM jobs that were 23.1% greater than computer science graduates who were childless. We see no significant effect for having preschool aged children. To sum up, gender, race and ethnicity but not nativity, and having obtained advanced schooling, as well as graduation cohort and being a parent all shape computer science degree holders' odds of working in their field of training.

Do similar patterns hold after differentiating race and ethnicity by nativity and gender? Additional analyses (not shown) reveal that compared to White men born in the United States, U.S. born White, Black, and Hispanic women were substantially more likely to be working in non-STEM occupations, as were U.S. born Black men. No significant differences are observed among foreign-born women as well as other men, relative to native-born White men. Opting out of working in Computer Science jobs, then, is greatest among women and racial/ethnic minorities. Sex differentiated models (not shown) further reveal greater heterogeneity among women; foreign-born white and Asian women are actually significantly more likely to remain working in computer science jobs rather than in non-STEM jobs, relative to White women. Among men, there are no nativity or race variations in the likelihood of opting out of computer science jobs, though foreign-born Black men with computer science degrees are significantly more likely to work in computer science than in other STEM jobs. Our sex-differentiated models also reveal interesting cohort differences in occupational placement. Our earlier findings, that more recent cohorts are more likely to remain in computer science jobs than to work in non-STEM occupations, is driven largely by men. Finally, the sex-differentiated models reveal that children – specifically pre-school aged children – reduce only women's but not men's

occupational choices. Women with minor children were significantly more likely to work in other STEM jobs relative to computer science occupations – suggesting that other STEM jobs may be more family friendly than computer science is (or is perceived to be).

### **Future Work**

Of course, those who exit the STEM workforce, and computer science in particular, may be pulled into other jobs because of better wages or improved job flexibility, or pushed out of computer science and STEM occupations because of other factors, such as parental status or a chilly climate for women. Preliminary analysis of what kinds of occupations those with computer science degrees who work outside of STEM fields hold reveal that there are an array of positions, but that men are most likely to exit computer science and STEM occupations for managerial positions, whereas women leave for primary and secondary teaching jobs. Both men and women who exit the STEM workforce, then, transition into occupations that contain more women – men in occupations that are more gender balanced, and women into occupations that are predominantly female. Future work will explore which occupations computer science majors enter into when they exit the STEM work force and differences by 10-year cohorts. We will then examine the association between earnings and occupational field.

We are currently awaiting the release of several tables from the NORC Data Enclave. We are also adding in the two latest waves of data (from 2010 and 2013), and can then utilize the full range of data from 2008). This will provide a more up-to-date snapshot of the computer science workforce in a time period where it has experienced various booms and busts. Given that computer science is a relatively young field, it also allows us to explore the occupation over its life course, from its inception to the present time.

## References

- Blair-Loy, Mary. 2003. *Competing Devotions: Career and Family among Women Executives*. Harvard University Press.
- Buchmann, Claudia and Anne McDaniel. 2016. "Motherhood and the Wages of Women in Professional Occupations." *RSF: The Russell Sage Journal of the Social Sciences*. 2(4):128-1150.
- Cech, Erin, Brian Rubineau, Susan Silbey, and Carroll Seron. 2011. "Professional Role Confidence and Gendered Persistence in Engineering." *American Sociological Review* 75:641-666.
- Clarkberg, Marin, Ross M. Stolzenberg, and Linda J. Waite. 1995. "Attitudes, Values, and Entrance into Cohabitational versus Marital Unions." *Social Forces* 74:609-32.
- Committee on Prospering in the Global Economy of the 21st Century: An Agenda for American Science and Technology, 2007. *Rising above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*. Washington, D.C.: National Academies Press.
- Committee on Science, Engineering, and Public Policy. 2007. *Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering*. Washington, D.C.: National Academies Press.
- Corbett, Christianne and Catherine Hill. 2015. "Solving the Equation: The Variables for Women's Success in Engineering and Computer Science." The American Association of University Women, Washington, DC, ISBN 978-1-879922-45-7.
- Dewey, Caitline. 2014. The Only Guide to Gamergate You Will Ever Need to Read. *The Washington Post*. October 14. Available online: <https://www.washingtonpost.com/news/the-intersect/wp/2014/10/14/>.
- Fouad, Nadya, Mary Fitzpatrick, and Jane P. Liu. 2011. "Persistence of Women in Engineering Careers: A Qualitative Study of Current and Former Female Engineers." *Journal of Women and Minorities in Science and Engineering* 17:69-96.
- Glass, Jennifer, Sharon Sassler, Yael Levitte, and Katherine M. Michelmore. 2013. "What's So Special about STEM? A Comparison of Women's Retention in STEM and Professional Occupations." *Social Forces* 92:723-766.
- Gunter, Ramona and Amy Stambach, 2005. "Differences in Men and Women Scientists' Perceptions of Workplace Climate." *The Journal of Women and Minorities in Science and Engineering* 11:97-116.
- Hunt, Jennifer. 2016. "Why Do Women Leave Science and Engineering?" *ILR Review* 69:199-226.

- Kanter, Rosabeth Moss. 1977. *Men and Women of the Corporation*. New York: Basic Books.
- Landivar, Christin Liana. 2013. "Disparities in STEM Employment by Sex, Race, and Hispanic Origin." American Community Survey Reports. Washington, D.C. U.S. Census Bureau
- Ma, Yingyi and Gokhan Savas. 2014. "Which is More Consequential: Field of Study or Institutional Selectivity?" *Review of Higher Education* 37(2):221-47.
- Mann, Allison and Thomas DiPrete. 2013. "Trends in Gender Segregation in the Choice of Science and Engineering Majors." *Social Science Research* 42(6):1519-41.
- Meyerhoffer, Pamela and Sharon Sassler. 2018. "Diverse Returns: The Role of Race and Nativity in the Computer Science Gender Wage Gap." Poster presented at the 2018 annual meeting of the Population Association of America, Denver, CO.
- Micheltmore, Katherine and Sharon Sassler. 2016. "Explaining the Gender Earnings Gap in STEM: Does Field Group Size Matter?" *The Russell Sage Foundation Journal of the Social Sciences*. Issue: The Changing Status of Women and Its Effects on Society, 2(4):194-215.
- Morgan, Stephen, Gelbgiser, Dafna, Weeden, Kim, 2013. Feeding the pipeline: gender, occupational plans, and college major selection. *Soc. Sci. Res.* 42, 989-1005.
- Mundy, Liza. 2017. "Why is Silicon Valley So Awful to Women?" *The Atlantic* 319, 60-73.
- National Science Foundation, National Center for Science and Engineering Statistics, 2013. Women, Minorities, and Persons with Disabilities in Science and Engineering table 9-2. Special Reprt NSF 13-304. Arlington, VA. Available at. <http://www.nsf.gov/statistics>
- Pal, Ipshita and Jane Waldfogel. 2016. "The Family Gap in Pay: New Evidence for 1993 to 2013." *The Russell Sage Foundation Journal of the Social Sciences* 2: 104-27.
- Percheski, Christine. 2008. "Opting Out? Cohort Differences in Professional Women's Employment Rates from 1960 to 2005." *American Sociological Review*. 73(3):497-517.
- Sassler, Sharon, Jennifer Glass, Yael Levitte, and Katherine Micheltmore. 2017. "The Missing Women in STEM? Gender Differentials in the Transition to First Jobs in STEM." *Social Science Research*. 63:192-208.
- Sassler, Sharon, Katherine Micheltmore, and Kristin Smith. 2017. "A Tale of Two Majors: Explaining the Gender Gap in STEM Employment among Computer Science and Engineering Degree Holders." *Social Sciences*. 6, 69: doi:10.3390/socsci6030069.
- Stone, Pamela. 2007. *Opting Out; Why Women Really Quit Careers and Head Home*. Berkeley: University of California Press.

Stross, Randall. 2008, "What Has Driven Women Out of Computer Science?" *The New York Times*, November 15, p. BU4.

Williams, Christine. 2018. "The Deserving Professional: Instability and Inequality in the Oil and Gas Industry." Paper presented at the 2018 annual meeting of the American Sociological Association, Philadelphia, PA.

Wynn, Alison T. and Shelley J. Correll. 2017. "Gendered Perceptions of Cultural and Skill Alignment in Technology Companies." *Social Sciences* 6, 45.

Xie, Yu and Alexandra A. Killewald, 2012. *Is American Science in Decline?* Harvard University Press.

Xie, Yu and Kimberlee A. Shauman, 2003. *Women in Science: Career Processes and Outcomes* Harvard University Press.

Figure 1. Are Computer Science Majors Working in Computer Science Jobs? Variation by Gender

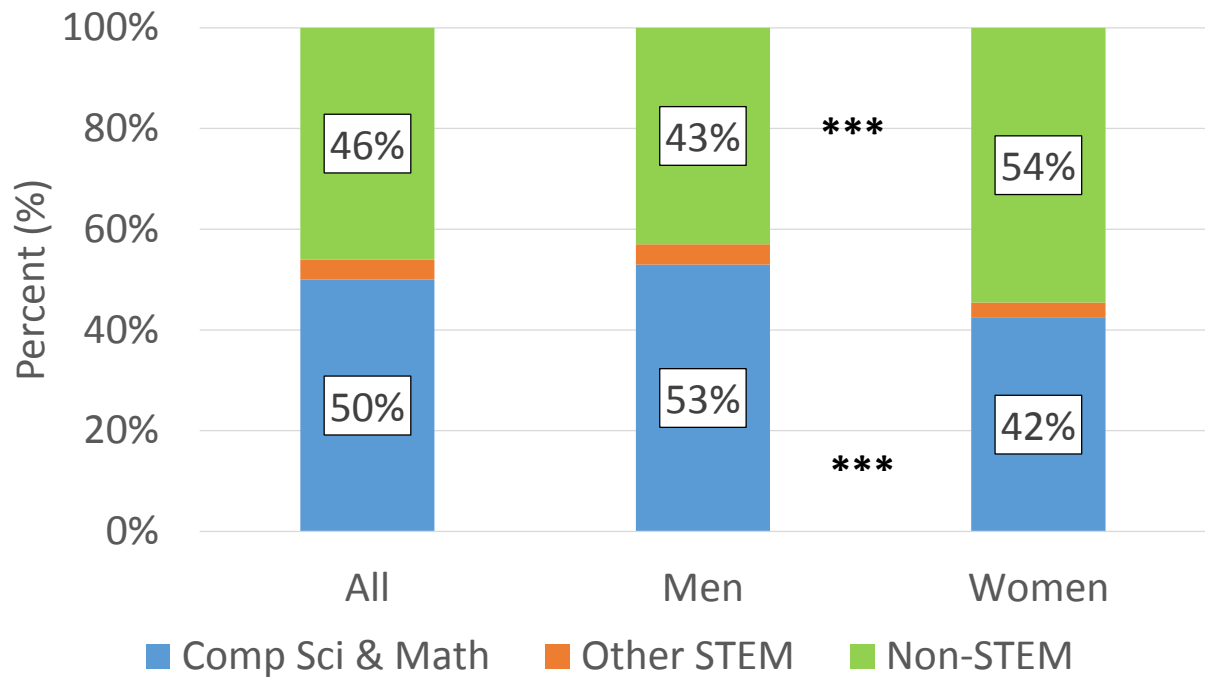


Figure 2. Mean Salaries of Computer Science Majors,  
by Occupation & Gender\*

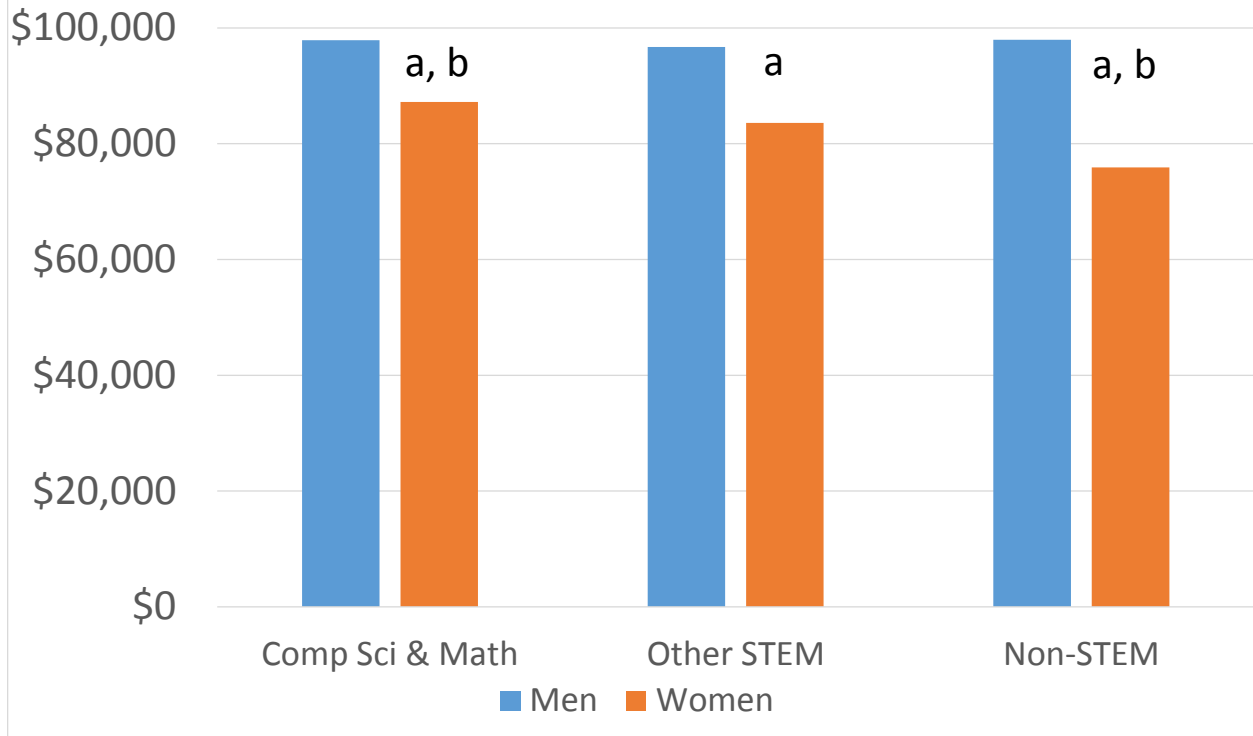


Table 2. Models predicting STEM employment among CS & Math Majors Employed Full-time

	Occupations		
	Other STEM vs. CS		Non-STEM vs. CS
Female	<u>-0.012</u>		<u>0.434</u> ***
White (ref)			
Black	<u>-0.165</u>		<u>0.319</u> **
Hispanic	<u>-0.372</u>		<u>0.236</u> *
Asian	0.157		-0.188
Foreign born	-0.178		-0.097
Reference year	-0.025		-0.017 *
Age	0.018		-0.003
<b>BA cohort (ref: 1980-84)</b>			
1970-74	<u>0.106</u>		<u>0.908</u> ***
1975-79	0.074		0.296 *
1985-89	-0.071		-0.209
1990-94	0.099		-0.165
1995-99	<u>0.313</u>		<u>-0.503</u> ***
2000-04	-0.038		-0.392 **
<b>Advanced degree (ref: BA only)</b>			
STEM Master's	<u>0.240</u>		<u>-0.796</u> ***
STEM PhD	<u>0.821</u> ***		<u>-1.313</u> ***
Non-STEM advanced degree	1.038 ***		1.131 ***
<b>Marriage and family</b>			
Married	-0.033		-0.125
Cohabiting	<u>-0.449</u>		<u>0.211</u>
Has children	-0.079		0.208 *
Has children under 6	0.171		-0.127
Constant	46.164		34.218 *
N	14,397		
Wald Chi-Square	1019.430		
Note: * p-value < .05; ** p-value <.01 ***; pvalue <.001.			
Note: Underlined coefficients indicate significant differences between working in Other STEM vs. Non-STEM (p < .05).			



Table X. What Kinds of Jobs Do Computer Science Degree Holders Working Outside of STEM Hold?

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	<b>Total</b>	<b>Male</b>	<b>Female</b>
Manager	27%	30%	22%
Teacher	19%	14%	27%
Sales	9%	9%	8%
Other, STEM-related	24%	28%	20%
Other, non-STEM	21%	20%	22%