A DISCUSSION ABOUT THE IMPACT OF HAVING SCIENCE MAJORS

OR STEM OCCUPATIONS IN NARROWING THE GENDER WAGE GAP

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**Abstract**

Stereotype about intellectual ability, in addition to occupational prestige, especially when it comes to gender prestige at work, has long been believed to be one of the real roots of the wage gap. In this paper, I attempt to empirically explain the difference in the total person’s income of science versus non-science majors, STEM versus non-STEM workers, and whether the two factors play an important role in narrowing the gender wage gap for women, after controlling for different individuals’ and households’ characteristics. The empirical model indicates that having a science degree or a STEM job significantly increase an individual’s total income, at $5,050 and $7,190 annually on average respectively, holding everything else constant. While the two factors might be statistically significant for female in narrowing the wage gap, we still see that the gap persists. While a female with a science major and a STEM job only earn $2,766 less than a male with non-science major, non-STEM job, the complete extreme case happens when we switch the roles of the two individuals. The male with a science major and a STEM job could earn up to $23,000 more than a female with non-science major, non-STEM job. The result from this paper could be used as a support to the ongoing conversations about ways to narrow the wage gap, and to increase the diversity in areas that have a low representation of women such as the Science fields[[1]](#footnote-1).

1. **Introduction**

For decades, there have always been an invisible line that differentiate how men and women are rewarded in life, and it is undeniable that women have earned less than their male counterparts. In 2002, women earned only 74.3 cents for every dollar earned by men (Bureau of Labor Statistics, 2003). In 2016, full-time, year-round female workers were paid only 80.5 cents for every dollar paid to men, which showed a wage gap of about 20 percent[[2]](#footnote-2) (Gender Wage Gap, 2016). The statistics show that despite the substantial efforts to eliminate gender bias in the workplace, wage gap due to gender difference still prevails, even after controlling for some of the factors that are believed to have a positive effect on the total income, such as having a science degree, having an occupation in the STEM fields, or have a higher education at minimum.

* 1. *Influences of Education*

Education has been believed to be one of the most influential factors on earning. On average, a full time working college millennial earned, about $17,500[[3]](#footnote-3) more annually than those who only had their high school diplomas (Kurtzleben, 2014). Additionally, when we break the college graduates group down by majors: STEM and non-STEM, the figures are even more surprising. Overall, when sample 17,000 college graduates of the Class of 2007 and Class of 2008 four years after leaving college, STEM majors earned $65,000, and non-STEM majors earned $49,500, only considering the full-time workers. (Cataldi, 2014)[[4]](#footnote-4). Even though there has been an observed differential in total earnings of full-time college graduates and high school graduates, there is even a larger gap in the same level of education. Carnevale, Strohl and Melton (2014) from the Center on Education and the Workforce at Georgetown University have shown that “Not all Bachelor’s degrees are the same”. They pointed out that the gap between the highest earning and lowest earning majors can be as large as $91,000 (comparing Petroleum Engineering and Counseling Psychology). While all 10 of the highest-paying majors are in STEM fields (with middle-career income ranging from $87,000 to $136,000[[5]](#footnote-5)), the lowest-paying majors are in education, arts, and social work fields (with the lowest salary being for $39,000 for Early Childhood Education).[[6]](#footnote-6) The literature review has inspired us to restrict the sample size of our study to only include the individuals with a Bachelor’s or higher, which can eliminate any large biased difference caused by the level of education.

*1.2. Influences of Age*

In our model of interest, we also control for other variables that could be an influential factor on wage, such as Age. In 2015, even though women earned 80% of what men earned, women from 25 to 34 earned 90 cents for every dollar a man in the same age group earned (Brown and Patten, 2017). The literature review about the Age factor has influenced us to not only use Age as one variable to control for, but also as a criterion to restrict our sample size to only working-age population for the purpose of elimination potential biases and outliers. We also believe that there is a non-linear relationship between Age and Income, as suggested by Elkins, 2017. As Age increase, the income will in turn increase, but it will reach a peak at some points (39 years old for women and 48 years old for men).

*1.3. Influences of Races*

Another controversial topic when it comes to the wage gap, is the influence of Races. The racial difference has been a debatable topic in not only wage gap, but also many other different fields. Using the data from the U.S. Census Bureau (CPS), Hegewisch and Williams-Baron (2018) showed that even though the within-race gaps were narrower for both the Black and Hispanic workers (compared with the group of White and Asian), both sexes of the Black and the Hispanic or Latina earned considerably less than the completely excluded groups (the White, and the Asian). McCall (2011) discussed the potential explanations of wage inequality, which included but not limited to: Industrial Restructuring, Immigration, Black Population concentration, and the factors of the new economy emerging over the 1980s, which “negatively affect the relative positions of blacks and Latinos. Hegewisch and Williams-Baron (2018) added the influence of gender difference when examining the impact of races, and highlighted that Hispanic women earned just 54.4 percent (unchanged from 2015) and Black women earned only 62.5 percent (down from (63.3 percent in 2015) of White men’s median annual earnings in 2016.

Consequently, there is large research literature that has considered either several, or all major categories mentioned above, which in turn answer a wide range of questions related to the different aspect of the wage gap. One issue that hasn’t been widely discussed is the effect of college majors and the representation of women in that majors on wage. As a result, I will focus mainly on these two key independent variables, controlling for different individuals’ and households’ characteristics. This paper was inspired by the published journal article *Explaining the Gender Wage Gap in STEM: Does Field Sex Composition Matter?* (Michelmore and Sassler, 2016). Using the NSF’s SESTAT data, they estimated a model using logged hourly wage for individuals who have all received at least a bachelor’s degree and have at least one degree in science or engineering, or anyone holding any college degree who work in a science or engineering occupation, between 1970 and 2004. The dependent variable was the hourly wage of the individual, and the key independent variable was the gender, broken down into four racial groups: whites, blacks, Hispanics, and Asians. They have found that even though there is a significant gender wage gaps among women working in STEM occupations, these differences are smaller than those in the broader workforce. There are also differences in earning in the STEM field itself: women tend to concentrate in the lower paid fields (the life and physical sciences), while they observed a highest concentration of males in higher paid fields (computer science and engineering). Their research has inspired us to conduct this study that look at the effect of both Majors and Occupations (in contrast to Occupations only) on the gender wage gap.

1. The calculated figures can be found in Table 14 [↑](#footnote-ref-1)
2. See the full online Report from the Institute for Women’s Policy Research at https://iwpr.org/wp-content/uploads/2017/04/C456.pdf [↑](#footnote-ref-2)
3. The article was published on U.S. News in 2014. The data used was originally from a study by The Pew Research Center. Millennials were defined as ages from 25 to 32. [↑](#footnote-ref-3)
4. See the full report “Baccalaureate and Beyond: A First Look at the Employment Experiences and Lives of College Graduates at https://nces.ed.gov/pubs2014/2014141.pdf [↑](#footnote-ref-4)
5. The earning was aggregated using information from “prime-age workers” in their mid-career, which was defined as those between the ages of 25 and 59. [↑](#footnote-ref-5)
6. See the full report “The Economic Values of Majors” at https://cew.georgetown.edu/wp-content/uploads/Exec-Summary-web-B.pdf [↑](#footnote-ref-6)