Heterogeneity in Returns to College Major

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U N I V E R S I T Y

Motivation

- Many choose their college major based on the following:
    - Expectations of future earnings
    - Preferences
    - Ability and preparation
- About 35 percent of today's jobs require a Bachelor's degree or higher.
- Recent college graduates' annual wages vary from $27,000 to $50,000 depending on major choice.
- Used 2009 American Community Survey data to answer the following questions:
    - How do different fields of bachelor's degree affect hourly wage outcomes?
    - How do wage outcomes differ by gender?

Literature

- Altonji, Blom, and Meghir (2012) used the same data set to analyze labor market returns on college major and high school coursework.
- Daymont and Andrisani (1984) used data from the National Longitudinal studies of the High School Class of 1972 to analyze the gender gap in earnings among recent college graduates.
- Georgetown University (2015) used Census Data to analyze wages for 137 college majors.

Summary Statistics

Variable	Mean	Std. Dev.	Min	Max
Age	42.862	15.293	16	70
Education	17.852	3.522	1	24
Income	36408.34	51561.21	0	1288000
Annual Hours Worked	1778.78	793.21	7	5049
Hourly Wage	22.49	78.2	0	53571.43

n=1270870

Top 5 Majors Categories for Each Gender

Table: Top 5 Male Dominated Major Categories

Major Category	% Male
Business	56
Social Sciences	52
Engineering	65
Science	56
Computers	80

Table: Top 5 Female Dominated Major Categories

Major Category	% Female
Education	76
Medical/Health Services	84
Liberal Arts	69
Psychology	69
Art	63

Income Dispersion by Major
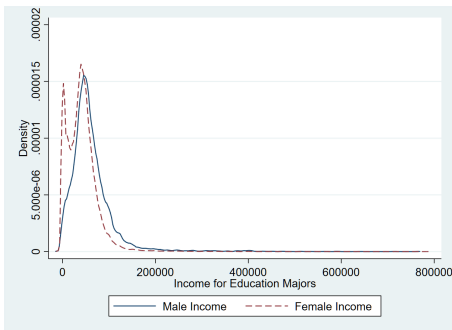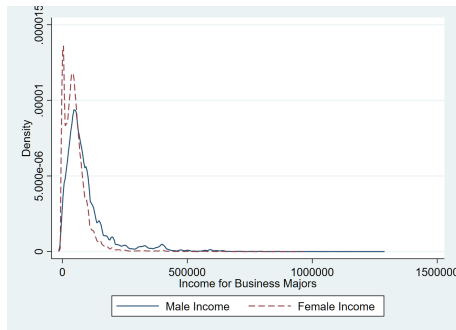
Specification

Consider the wage equation:

$$\ln(Y_i) = \beta_0 + \beta_1 X_i + \beta_2 E_i + \beta_3 R_i + \beta_4 F_i + \beta_5 M_i + \epsilon_i \qquad (1)$$

- Y_i is the hourly wage.
- X_i is the set of major dummies with Business Majors being set as the base.
- E_i is higher degree levels including masters, professional degree, and PhD.
- R_i is the set of races.
- F_i is a female dummy variable.
- M_i is dummy variable that denotes marital status.
- ϵ_i is other factors not accounted for.

Results: Wage Heterogeneity

- This table compares hourly wages to the hourly for Business Majors. Business Majors have a mean hourly wage $36.15 per hour.

Major	Full Sample ($)	Males Only ($)	Females Only ($)
No bachelor's degree	-15.65***	-18.28***	-11.57***
Computers	0.83	-1.59	4.47***
Mathematics	2.12**	1.78	2.38***
Education	-9.99***	-12.38***	-5.53***
Engineering	5.07***	2.33***	7.05***
Liberal Arts	-8.30***	-9.05***	-4.98***
Medical/Health Services	-0.94*	-1.10	2.86***
Philosophy and Religion	-15.88***	-20.05***	-9.27***
Psychology	-9.23***	-9.59***	-6.09***
Social Sciences	-4.13***	-4.31***	-3.32***

***$p < 0.01$ **$p < 0.05$ *$p < 0.1$

Note: Female dummy had a coefficient of -5.06 in the full sample.

Results: Female Wage Differences

- To test for wage heterogeneity for gender by major, I run the following regression:

$$\ln(Y_i) = \beta_0 + \beta_1 F_i + \beta_2 X_i + \beta_3 X_i * F_i + \epsilon_i \qquad (2)$$

Major	Female Hourly Wage Difference (%)
Business	-6.31***
Computers	3.82**
Mathematics	-6.21***
Education	9.15***
Engineering	0.62
Liberal Arts	-1.98**
Medical/Health Services	-0.93
Philosophy and Religion	11.03***
Psychology	-4.70***
Science	-13.76***
Art	5.31***

***$p < 0.01$ **$p < 0.05$ *$p < 0.1$

Note: Female dummy had a coefficient of -0.22 implying that females make 22% less than men on average.

Conclusion

- Engineering majors have the highest hourly wage returns on average.
- Philosophy and Religion majors have the lowest hourly wage returns on average.
- Female wages are lower the male wages in most of the majors, however Females with an Art, Education, Computer, or Philosophy major have higher wages than men with those majors.
- A Chow Test was conducted and returned an F-statistic of 2996.41 which gives a P-value less that 0.01 implying that hourly wages are different for men and women in each major category with high statistical significance.

Thank you!