Does marriage across genders affect earnings?

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Introduction

Marriage is often related to feelings of love and commitment, not of earnings and specializations. However, for Economists, learning why certain individuals have higher earnings than others is important- thus marriage cannot be excluded as a potential factor. There have been economics papers written on the topic of marriage as it relates to earnings. In fact, according to a paper written in 2002 by Chiodo and Owyang, married men were found to earn approximately 11 percent more per hour than men who have never been married (Chiodo & Owyang, 2002). We will investigate this question: why does this earnings premium occur with marriage? Possibilities might include employer discrimination, married men are more productive, or more productive men are more likely to be married.

Many previous studies have addressed the possibility of wage discrimination between males and females. We will also address this question: is gender discrimination in earnings still prevelant when analyzing married individuals? It may be possible that an employer has bias towards married men because they are seen as more stable or are more likely to give raises to men that have a family to support. On the other hand, it is possible that married women are seen in a negative light by their employers. Discrimination is hard to prove, but with economic analysis, the correlation between genders and marital status can be examined. This paper aims to answer the questions posed above- how do earnings vary by marital status, and is that effect the same across genders?

In order to answer these questions, our paper splits the data into four subsamples based on gender and marital status. This allows us to investigate the differences in earnings between groups. In addition, we use a log-level transformation of earnings in order to visualize the percentage differences among groups rather than the absolute value differences using the Ordinary Least Squares (OLS) estimation method.

Our model indicates the estimated earnings premium to be higher among married individuals than single individuals. This observation is consistent in both married men and women. For instance, married men with higher education make, on average, 146% more than those without a high school degree. Single men with higher education make, on average, 116% more than those without a high school degree. The difference between married men and married women is negligible when comparing educational attainment, but not when analyzing an individual's race. White and Asian men make significantly more than White and Asian women regardless of marital status. This suggests that some employers may be discriminating across marital groups on the basis of an individual's race and gender.

Data

The data used was extracted from the 2017 American Community Survey (ACS). The full data set includes 74,695 observations as a representative sample for Washington State. We used the population records instead of the housing records in order to properly analyze individuals and their earnings. The ACS has data regarding occupations, educational attainment, marital status, race, earnings, demographic characteristics, age, etc. which factor into our analysis on the earnings premium associated with marriage.

Since the ACS contains hundreds of variables that could affect earnings, we had to enforce strict selection criteria in order to make the model more applicable to our research questions. To do this, we restricted entries to only allow full-time workers. We defined a full-time worker as any individual who has worked more than or equal to 35 hours per week on average in 2017, and had a wage rate that is greater than or equal to the minimum wage in Washington for that year. For an individual to be considered in our sample, they would need an annual earning amount greater than or equal to $20,020 in the past year.

We can minimize erroneous entries by excluding individuals that do not fit our selection criteria, which was selected with the research questions in mind. Our cleaned dataset consists of 9,583 married men, 4,715 single men, 5,623 married women and 4,179 single women, equating to a total sample size of 24,100 individuals.

Table 1: Descriptive Statistics by Gender and Marital Status.

	Men		Women	
Parameter Estimate	Married	Not Married	Married	Not Married
Earnings in US $, M (SD)	97,127 (87,590)	65,239 (57,699)	70,743 (60,865)	56,869 (42,338)
Educational Attainment (%)				
High School	41.8	52.9	35.4	42.2
College Degree	36.6	33.0	39.7	41.6
Higher Education	18.0	8.8	22.7	14.0
Race / Ethnicity (%)				
White	81.6	78.5	80.3	77.8
Black	2.3	4.0	1.8	3.8
Asian	9.1	6.2	11.5	8.2
Age in years, M (SD)	46.6 (11.8)	39.4 (13.5)	46.1 (11.4)	41.9 (14.0)
Sample Size	9,583	4,715	5,623	4,179

Note: M represents the mean, followed by the standard deviation (SD) for their respective categories.

Table 1 displays descriptive statistics by gender and marital status for our selected sample. We notice that the average earnings increase for a married person within the same gender. On average, married men earn $97,127 compared with $65,239 for unmarried men. Similarly, married women earn an

average of $70,743, whereas women who are not married only earn $56,869. It is also important to note that, on average, men earn more than women when they are in the same marital status group.

Browsing down the rows, the next three rows include our categorized variables on education. By looking at the means, we can see what the distribution of each group is in our sample. The largest group is those with a high school degree, which ranges from 35.4% to 52.9% in each group of the data, and the lowest are those with higher education, making up 8.8% to 22.7% of each group. The same relationship between means can be applied to the race variables. White individuals make up the majority of the distribution or 81.6% of the married men subsample. This is in stark contrast to the distribution of black individuals, which makes up only 2.3% for married men and has the lowest proportion of 1.8% in the married women group.

Lastly, we have a dummy variable for married individuals, which shows that the dataset is very evenly distributed, with 63.1% of individuals being married. 40.7% are female and 23.3% are female and also married. Age has a mean of around 44 years, ranging from 39.4 to 46.6 years, in all four subsamples, showing that the majority of the individuals our sample are likely to be in the middle of their career.

Econometric Model & Estimation Method

As other labor economics papers have done prior, the dependent variable in our model is the natural logarithm of annual earnings. This functional form, known as a log-level model, corrects for skewness in the earnings distributions. Instead of analyzing earnings in absolute values, we will be analyzing the percentage differences in the dependent variable (eg. earnings) across our different groups (eg. education, marriage, race, age, gender).

Our model includes two measures of human capital: educational attainment and potential experience. We include education, categorized by individuals that have no degree, high school or equivalent, a college degree (bachelors or associates), and higher education (masters or PhD). In the absence of a better measure for actual labor market experience, our model includes age for potential labor market experience. Although there may be some differences between actual experience and age, we avoid potential endogeneity with experience if those with higher earnings gain more experience.

The other variable we add is age in the quadratic form. Since age may have a non-linear relationship with earnings, we had to include age squared (AgeSQ) as well. Including age squared allows us to see the diminishing relationship of age on earnings over time, which has been discussed in many economics papers prior.

Our model also distinguishes among races to control for earning disparities between White, Black, Asian, and other races. We also include an interaction term for married females. The reason we include an interaction term is because the associated values of earnings may not be the same across genders (Chiodo & Owyang, 2002, 2003). When interpreting the results of our model we will be able to discuss the statistical significance of the relationship between marital status and gender, and whether there is any practical significance.

Thus, we estimate a model of the form:

$$\ln(\text{Earnings}) = \alpha + X'\beta + Z'\gamma + \varepsilon,$$

where X represents a vector of dummy variables indicating educational attainment, and Z represents a vector consisting of age, age squared, dummy variables indicating race, gender, and marital status.

We estimate the log earnings equation with the Ordinary Least Squares (OLS) method. We estimate four earnings equations on our sample of full-time workers, creating subsamples for men and women, and their respective marital status. However, upon a discovery of the residual terms and using the Breusch-Pagan-Godfrey test, we reject the null hypothesis of homoscedasticity and acknowledge heteroskedasticity exists in our model. In order to combat heteroskedasticity, we calculate robust standard errors and report them in our results.

Results

Table 2: Estimated Log (Earnings)Equations by Gender and Marital Status.

	Men		Women	
Parameter Estimate	Married	Not Married	Married	Not Married
Intercept	8.92*** (0.09)	9.43*** (0.09)	8.93*** (0.11)	9.36*** (0.09)
Educational Attainment				
High School	0.28*** (0.03)	0.16*** (0.03)	0.30*** (0.04)	0.20*** (0.04)
College Degree	0.62*** (0.03)	0.44*** (0.03)	0.61*** (0.04)	0.47*** (0.04)
Higher Education	0.90*** (0.03)	0.77*** (0.04)	0.93*** (0.04)	0.77*** (0.05)
Potential Experience				
Age (years)	0.07*** (0.00)	0.04*** (0.00)	0.06*** (0.00)	0.04*** (0.00)
Age squared	-0.0007*** (0.00)	-0.0003*** (0.00)	-0.0006*** (0.00)	-0.0004*** (0.00)
Race / Ethnicity				
White	0.20*** (0.02)	0.10*** (0.02)	0.07** (0.03)	0.04 (0.02)
Black	-0.10* (0.04)	-0.04 (0.04)	0.03 (0.06)	-0.003 (0.04)
Asian	0.17*** (0.03)	0.14*** (0.04)	0.09* (0.03)	0.09** (0.03)
Sample Size	9,583	4,715	5,623	4,179

Note: Estimates are obtained using generalized estimating equations. Robust standard errors are in parentheses.
*p < .05. **p < .01. ***p < .001.

Table 2 presents estimates of our log earnings equations on each of the four subsamples. For each of these subsamples, our R-squared value hovers between the ranges of 0.21 and 0.26. This measure indicates that our models account for approximately only 21% to 26% of the variance in earnings. However, this low of an R-squared value is predictable in the case of labor economics because we are trying to explain human behavior. Earnings might be influenced by employer discrimination on factors of marriage and gender, but there are a lot of factors such as how driven an individual is to achieve higher earnings which are not measurable. Thus, there is a lot of unexplained variance in the model that would be next to impossible to capture.

Our model indicates that the estimated earnings premium for each level of educational attainment relative to the group with no degree, is higher among married men and women than their unmarried counterparts. Looking at our parameter estimates, among married men, those with higher education earn on average approximately 146% more than those without a high school degree after controlling for age and race. Among single men, those with higher education earn on average approximately 116% more than those without a degree. The difference between these two groups shows the positive premium effect that marriage has on earnings and is statistically significant ($p < .05$).

Although the results for different levels of educational attainment are surprisingly similar across genders in the same marital status, the differences in earnings across races are more vast. For example, married white men receive the largest benefit across all genders and their respective marital status. On average, they earn 22.1% more than other races in the married men sample. White married women receive a much lesser effect, earning only 7.3% more than other races in that sample. This seems to negate the near equal coefficients for educational attainment across categories. Married men earn a lot more than other groups, but only when they are either white or asian. These effects are statistically significant across categories ($p < .05$).

Another important coefficient to note is an individual's age. In our samples for men and women, predicted earnings increases at a decreasing rate until approximately 50 years old, then begins to decrease at an increasing rate. This effect is also statistically significant ($p < .05$). It is important because regardless of which variables we analyze, age will always be a factor and we have previously found in the data section of this paper that most individuals in this dataset are around the pinnacle of earnings. This means most people in the sample are earning the most they will in their career, holding everything else constant.

Conclusion

At the beginning of this paper we set out to answer two questions: what is the premium of earnings associated with marriage and how does that premium vary by gender? There is a noticeable difference across marital statuses for both genders. This can be seen by looking at levels of educational attainment. Married men with higher education earn on average 146% more than those without a high school degree after controlling for age and race. Among single men, those with higher education earn on average 116% more than those without a high school degree. This difference is similar among women as well. However, when we compare married groups of men and women, education does not have any

practical differences. Larger differences in earnings across genders are more prevalent when analyzing race. For example, married white men earn 22.1% more than other races holding everything else constant. This is quite a large difference when compared to married white women, who only earn 7.3% more than other races on average.

That being said, our model still has its limitations. They include not being able to properly measure work-force experience, productivity of an individual, and other such variables that are not included in the model but will affect earnings. We included age as a proxy for experience, which helps to make up for these excluded variables, but is not the perfect substitute. Since we cannot measure things like productivity, as there will always be limitations associated with models attempting to explain earnings across groups of individuals. This is ultimately due to our inability to fully explain human behavior. In addition, ACS is a self-administered survey, thus it is possible self-selection bias or a type of non-sampling error could have biased the data.

Limitations aside, our research brings to question whether employer discrimination does in fact exist. Of course, married men and women may be more productive before or after getting married, but there is seemingly no difference across genders. This 'productivity increase' associated with marriage is likely seen by employers as equal for both men and women when considering their education. However, when considering race, we see that asian and white men, whether married or not, make a lot more on average than asian and white women. This brings up questions of race, and whether employers discriminate on the basis of whether an individual is white or asian. In the future it would be enlightening to research what degrees and fields these men and women work in, grouping them by race and gender. Perhaps then we may uncover some more information that will help us understand why the earnings disparity between different races exists.

WC: 2275

One-Sentence Summary of Each Group Member's Contributions

Free - Organized around due dates and made sure we were on track throughout the course of the project.

Mai - Contributed to the data section and R files- did a lot with selection criteria and helping subsample the data into our four equations.

Alan - Helped write the results section and add in final touches- was in control of the data dictionary and helped choose original variables.

We all worked actively on the final paper, starting as early as after the midterm to ensure that this project got as much attention as it deserved. Thanks to the use of Google Docs we were able to edit each other's work in real-time and make comments whenever there was any confusion.

Works Cited

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