# Evaluating Mincer's Equation: Unraveling the Gender Gap in Employment and Earnings

**June 2023**

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**Abstract**

This report investigates the necessity of incorporating additional terms into the standard Mincer's equation by analyzing filtered data from the "Current Population Survey" spanning the years 2003 to 2014. By conducting regression analyses using various models, we aim to determine the significance of augmenting the conventional Mincer's equation with gender and ethnic terms. Through our analyses, we evaluate the significance of these augmented terms in explaining variations in earnings. Based on our results, we conclude that augmenting the standard Mincer's equation with extra terms in regard to gender is necessary to capture the nuanced relationships between education, experience, and earnings.

# 1 Introduction

The Mincer equation, developed by Jacob Mincer, has been widely used in labor economics due to its simplicity and practicality (Lemieux, 2006). It primarily focuses on the influence of experience and schooling on hourly wages. However, as society evolves and becomes more inclusive, it is essential to recognize that wages are impacted by factors beyond education and experience alone. In this report, we explore the necessity of augmenting the Mincer equation with additional variables related to gender and ethnicity to provide a more comprehensive evaluation of wages.

# 2 Theoretical background and method

The rich literature on Human capital theory suggests that women acquire less human capital then men, and therefore are paid less (Baker and Jacobsen , 2007). Baker and Jacobsen (2007) assumed that initially, women invest less in human capital than men because of the anticipated division of labor in the family and that after forming a family union, they acquire less human capital because of the actual division of labor between the spouses. They further argue that women economize on the effort they expand on the market by searching for less demanding jobs. Mincer and Polacheck (1974) have also done crucial work in highlighting the importance of labor experience and education in explaining the wage differentials between men and women. Mincer put forward an equation for determining the wages, which included the years of education and work experience. This would be known as the Mincer equation. Mincer and Polachek (1974) suggested that women anticipate more discontinuous work lives, and are therefore less incentivized to invest in formal education and on the job training. Pissarides (1985) also said that if women anticipated more discontinuous work, their job search would be shorter and they are more likely to settle for low paying jobs.

# 3 Data

The dataset that was used for this research is a cross-section of the "Current Population Survey" for the years 2003 - 2014, made available by the American National Bureau of Economic Research (NBER, 2014). The file only included a limited number of variables corresponding

to those in Björklund and Kjellström (2002). We restricted our sample to employed respondents only by assuming the employed status to be equivalent to a positive hourly wage. We also mention the self-reported nature of the data that suggests potential measurement errors, both in the "hourly wage" variable and in the "years of education" variable. Furthermore, we could not distinguish between employed and self-employed respondents. We further assumed the minimum years of experience a person can have to be zero. In contrast to Björklund and Kjellström (2002), there was no selection based on gender, approximately 46 % of respondents in our data being females (see Table 1). We end this section by noticing the distribution of the years of schooling amongst the respondents of our sample in comparison to older studies of the Mincer equation (Appendix: Table 3). It is no surprise that more than 92% of them have reported at least 12 years of education.

Table 1: Means and standard deviations

| | mean | sd |
|---|---|---|
| log of hourly wage | 2.764825 | .4593745 |
| Years of schooling | 13.11137 | 2.523271 |
| Years of experience | 22.88257 | 13.73468 |
| female | .4587004 | .49836 |
| Observations | 3632 | |

# 4 Results

Firstly, investigating the gender effect on earnings by adding a gender dummy (1 for female, 0 for male) to the classical Mincer's equation, and controlling for ethnicity groups by including dummies. We only consider ethnic groups with a large number of observations: 1,2,3,4, so the dummies that will be included are for the groups 2,3,4, and the group 5 which represents the rest of the ethnic groups, while group 1 is the reference group. The model is therefore:

$$log(\text{wage}) = \beta_1 + \beta_2 \text{educ} + \beta_3 \text{exper} + \beta_4 \text{exper}^2 + \beta_5 \text{female} + \sum_{i=2}^{5} \beta_{4+i} \text{ethngroup}_i + \varepsilon \quad (1)$$

The regression output of this model is displayed in Table 2, Model 1. As expected, the coefficient $b_5$ of the gender dummy does have a significant t-statistic that rejects the null hypothesis of $\beta_5 = 0$, which implies that gender does have an effect on wages. Specifically, females earn $e^{b_5} - 1 = -0.1254$, which is $12.54$% less compared to males (ceteris paribus). The ethnicity groups 2,3 have significant coefficients. Next, the interaction effects between gender and schooling and gender with work experience will be added:

$$log(\text{wage}) = \beta_1 + \beta_2 \text{educ} + \beta_3 \text{exper} + \beta_4 \text{exper}^2 + \beta_5 \text{female} + \quad (2)$$

$$+\beta_6 \text{female*educ} + \beta_7 \text{female*exper} + \beta_8 \text{female*exper}^2 + \sum_{i=2}^{5} \beta_{7+i} \text{ethngroup}_i + \varepsilon \quad (3)$$

From the regression output of this model in Table 2, Model 2, the difference in earnings

| **Table 2** | **Model 1** | **Model 2** |
|---|---|---|
| | (1) | (2) |
| VARIABLES | log of hourly wage | log of hourly wage |
| Years of schooling | 0.0721*** | 0.0620*** |
| | (0.00314) | (0.00399) |
| Years of experience | 0.0241*** | 0.0294*** |
| | (0.00168) | (0.00243) |
| Years of experience squared / 100 | -0.0350*** | -0.0449*** |
| | (0.00342) | (0.00496) |
| female | -0.134*** | -0.374*** |
| | (0.0137) | (0.0911) |
| c.female#c.educ | | 0.0257*** |
| | | (0.00636) |
| c.female#c.lexp | | -0.0104*** |
| | | (0.00333) |
| c.female#c.lexp2 | | 0.0195*** |
| | | (0.00679) |
| ethnicity = 2 | -0.0678*** | -0.0658*** |
| | (0.0219) | (0.0220) |
| ethnicity = 3 | -0.172*** | -0.170*** |
| | (0.0420) | (0.0421) |
| ethnicity = 4 | 0.0358 | 0.0370 |
| | (0.0321) | (0.0317) |
| ethnicity = 5 | -0.0251 | -0.0236 |
| | (0.0526) | (0.0535) |
| Constant | 1.588*** | 1.666*** |
| | (0.0444) | (0.0569) |
| Observations | 3,632 | 3,632 |
| R-squared | 0.212 | 0.219 |
| Adj R squared | 0.210 | 0.217 |
| Log Likelihood | -1895 | -1879 |

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

between females and males can be calculated as

$$\Big(exp\{b_5 + (b_2 + b_6)educ + (b_3 + b_7)exper + (b_4 + b_8)exper^2\} - 1\Big)100\% = \quad (4)$$

$$= \Big(exp\{ -0.374 + 0.087educ + 0.0191exper - 0.0254exper^2\} - 1\Big)100\% \quad (5)$$

Note that both the coefficients of the interaction terms have significant p-values, which demonstrates the strong joint effect of gender with schooling and experience on earnings.

# 5 Conclusion

Two regression analyses examined gender and earnings. The first regression showed females earn 12.54% less on average than males, suggesting a gender-based earnings disparity. The second regression included interaction terms for gender, schooling, and experience, revealing a significant joint effect on earnings. This highlights the influence of gender and these factors on income levels.

# 6 Appendix

**Table 3:Years of education**

| no. years | freq | percentage |
|---|---|---|
| -7 | 87 | 2.395374 |
| 8 | 26 | .715859 |
| 9 | 55 | 1.514317 |
| 10 | 45 | 1.238987 |
| 11 | 59 | 1.624449 |
| 12 | 1423 | 39.17952 |
| 13 | 713 | 19.63106 |
| 14 | 497 | 13.68392 |
| 16 | 572 | 15.7489 |
| 18 | 121 | 3.331498 |
| 24 | 34 | .9361233 |
| Total | 3632 | 100 |
| Observations | 3632 | |

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