The Existence of Labour Market Discrimination

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Abstract

This study focuses on labour market discrimination across cross-sections of race and gender. The signaling theory of education serves as the theoretical backbone. Models measuring both education and wage conditional on ability are used to establish the occurrence of inequality. Due to employers' difficulty assessing the productivity of minorities, they are incentivized to provide observable signals such as education. If individuals have higher education attainment, they are rewarded with a higher wage. Relative to White men, marginalized groups are anticipated to have higher wages. The findings of this study are indicative of labour market discrimination for Black women, Black men, and White women relative to White men.

I. Introduction

In the United States, the demographics of the labour market have evolved over time. There are more women and minorities entering the workforce than ever. An influx of different people contributes new ideas and sparks innovation. Diverse people joining together can also spur prejudice. Consequently, several companies have adopted initiatives embracing the diversity of people and thought. With these programs in place, are there issues with discrimination in the labour market based on race, gender, or both?

Employers have imperfect information about applicants. It is the employer's job to assess the quality of a potential employee. Likewise, jobseekers try to convey their skills and attributes to potential employers. There are a multitude of observable and unobservable signals a jobseeker can provide to communicate their qualifications. Education is a prominent example of an observable signal. The value of a bachelors degree is growing, the number of degree holders as risen from 4.6% in 1940 to 37% in 2017 (US Census, 2017). Compared to someone without a degree, employers might perceive a degree holder as more productive. This is the signaling theory of education, which is elaborated on later.

If education acts as a signal to employers, degree holders will be rewarded with a higher wage relative to those without a degree. There are instances when employees are not rewarded for their higher educational attainment, when would this be the case? Employers have difficulty assessing the productivity of women and people of color, which could result in compensation established on race and gender (Lundberg & Startz, 1983). Previous research examines discrimination of Black men and White women relative to White men, this paper attempts to expand these groups. In order to glean insights of individuals' distinctive experiences, Black women, Hispanic women, White women, Black, men and Hispanic men will all be explored relative to White men. Each cross-section has their unique experiences and are perceived differently. This is to answer the question, is there discrimination in the labour market based on race, gender or both?

In doing so, policymakers can specify programs directed to addressing inequality. Certain groups could be affected more than others. This study finds that labour market discrimination impacts Black women, Black men, and White women, relative to White men. This necessitates further research on discrimination in the labour market, policies mitigating inequality, and complexity of race and gender experiences.

II. Literature Review

The literature on the labour marketing discrimination is robust. Studies from a multitude of disciplines have been conducted to examine wage differentials across race and gender. In the United States, much of the research emphasizes differences between Black and White men or White wo/men. Data from the National Longitudinal Survey of Youth (NLSY) is a common source for these studies. Typically, White men act as a control group. Selection bias between races and genders are potential problems for analysis. As demographics change, this is becoming less of a problem than it was 20 years ago but remains an issue.

Theories from a sociological perspective rationalize why wage gaps may occur. The glass ceiling is a popularized theory explaining the barriers that women and people of color have advancing in the workplace. Cotter et. al (2001) defines the glass ceiling concept and outlines the basis for labour market discrimination. For it to occur, the observed differences between races and genders cannot be explained by relevant specified job requirements. This encompasses observable and unobservable characteristics such as motivation, experience, and education. Relative to White men, this study finds that Black wo/men and White women have varying earnings percentiles.

Lundberg & Startz (1983) theorize that employers have difficulty measuring the productivity of marginalized groups. The paper represents productivity, or marginal productivity of labour (MP), as a function of a test score. This test score measures the innate and developed ability of the individual. Lundberg & Startz (1983) examine the relationship between these test scores and wages, they find that the weight on testing scores is higher for White Americans. This demonstrates that test scores, or MP, is a better indicator of productivity for White Americans than Black Americans. Factors besides innate and learned ability are used to perceive an individual's productivity, this can be attributed to discrimination. Minority groups are incentivized to attain more education because it acts as a signal of productivity to employers. Lundberg & Startz (1983) and Cotter et. al (2001) findings support inequality in the labour market between Black and White individuals. However, there are a variety of studies that negate this conclusion.

One such example is Neal & Johnson (1996), their research shows that the Black and White wage gap is derived from skill. Wage differentials are attributed to premarket factors such as family upbringing, rather than discrimination. Imperfect information between employers and

potential employees is not racially biased. Using data from NLSY79 Neal & Johnson (1996) measure wages as a function of ability (Armed Forces Qualifications Test (AFTQ)), race and age. Their approach reveals that discrimination in the labour market does not occur between Black and White Americans. One critique of this study comes from Lang & Manove (2011) stating that wage differentials are conditional on ability.

Lang & Manove (2011) examine the wage gap between Black and White males using the same data source as Neal & Johnson (1996). Before assessing the relationship between wage and ability and race, they determine the relationship between education levels and ability first. This framework is a signaling model. Education acts as signal to employers, it demonstrates desirable qualities such as perseverance, grit, and a strong work ethic. These traits are compensated with a higher income (Lang & Manove, 2011). For this reason, Lang & Manove (2011) utilize two models that focus on Black men relative to White men. Model 1 measures education conditional on ability and Model 2 measures log of wages conditional on ability. The ability variable is AFQT which is derived from the Armed Service Vocation Aptitude Battery test (ASVAB) it measures innate and acquired ability. Their approach shows that relative to White men, Black men have higher educational attainment at intermediate levels of ability. However, Black men do not have a relationship with log of wage conditional on ability. These findings infer that labour market discrimination occurs for Black men at intermediate levels of ability. Compared to White men, Black men have a lower return on education, thus, they are not being rewarded for higher education in the labour market.

While the scope of this paper was Black and White males, this approach has been applied to other studies. Nielsson & Steingrimsdottir (2015) examine inequality between genders. They substitute the race variables for gender in the framework from Lang and Manove (2011). The first model establishes that conditional on ability, women are more educated than men. The expected result from the second model is that conditional on ability, women have higher log of wage than men. The findings do not support this hypothesis, signifying discrimination between genders. The models reveal that gender gaps for minorities are larger but require more research. The White gender gap is best explained by the Lang & Manove's (2011) signaling model. This suggests there are more contributing factors besides labour market discrimination in the gender wage gap of minorities.

Since these studies were conducted, the National Survey of Youth has released a new survey spanning from 1997-2018 (NLSY97). Lang & Manove (2011) show discrimination between White and Black males, Nielsson & Steingrimsdottir (2015) show discrimination between men and women. Yet, there is no study using NLSY data focused on examining a variety race and gender cross-sections relative to White men. Since the labour market has become more diverse over time, the data from NLSY97 will be better equipped than NLSY79 to research these cross-sections. In this paper, the framework from Lang & Manove is applied to Black wo/men, Hispanic wo/men, and White females relative to White men. This provides the opportunity to understand labour market discrimination for a range of people and understand how inequality has evolved.

III. Empirical Framework

Empirical Methodology

There is a consensus among economists that education is rewarded in the labour market. Individuals who obtain additional years of education tend to have higher income. Research has shown that employers have difficultly assessing the productivity of marginalized groups (Lundberg & Startz, 1983). As a result, those individuals are incentivized to provide observable signals of productivity when feasible. Education is an example of an observable signal, therefore, women and people of color are motivated to attain additional education (Lang & Manove, 2011). At intermediate levels of ability, being a women or person of color is associated with a higher education and thus a higher wage. The population regressions to test these hypotheses are:

Model 1.1: $Education_i = \beta_{0+} \beta_1 Ability_i + \beta_2 Ability^2_i + \beta_3 Black_i + \beta_4 Black_i * Ability_i + \beta_5 Black_i * Ability^2_i + \beta_6 Hispanic_i + \beta_7 Hispanic_i * Ability_i + \beta_8 Hispanic_i * Ability^2_i + \beta_9 Female_i + \beta_{10} Female_i * Ability_i + \beta_{11} Female_i * Ability^2_i + \mathbf{Z}_i + \varepsilon_i$

Model 2.1: $log(Wage)_i = \beta_0 + \beta_1 Black_i + \beta_2 Black_i * Ability_i + \beta_3 Black_i * Ability^2_i + \beta_4 Hispanic_i + \beta_5 Hispanic_i * Ability_i + \beta_6 Hispanic_i * Ability^2_i + \beta_7 Female_i + \beta_8 Female_i * Ability_i + \beta_9 Female_i * Ability^2_i + \mathbf{Z}_i + \varepsilon_i$

Model 1.2: $Education_i = \beta_0 + \beta_1 Ability_i + \beta_2 Ability^2_i + \beta_3 Black\_F_i + \beta_4 Black\_F_i * Ability_i + \beta_5 Black\_F_i * Ability^2_i + \beta_6 Hisp\_F_i + \beta_7 Hisp\_F_i * Ability_i + \beta_8 Hisp\_F_i * Ability^2_i + \beta_9 White\_F_i +$

$$\beta_{10}White\_F_i*Ability_i + \beta_{11}White\_F_i*Ability^2_i + \beta_{12}Black\_M_i + \beta_{13}Black\_M_i*Ability_i + \beta_{14}Black\_M_i*Ability^2_i + \beta_{15}Hisp\_M_i + \beta_{16}Hisp\_M_i*Ability_i + \beta_{17}Hisp\_M_i*Ability^2_i + \mathbf{Z}_i + \varepsilon_i$$

Model 2.2: $log(Wage)_i = \beta_0 + \beta_1 Black\_F_i + \beta_2 Black\_F_i*Ability_i + \beta_3 Black\_F_i*Ability^2_i + \beta_4 Hisp\_F_i + \beta_5 Hisp\_F_i*Ability_i + \beta_6 Hisp\_F_i*Ability^2_i + \beta_7 White\_F_i + \beta_8 White\_F_i*Ability_i + \beta_9 White\_F_i*Ability^2_i + \beta_{10} Black\_M_i + \beta_{11} Black\_M_i*Ability_i + \beta_{12} Black\_M_i*Ability^2_i + \beta_{13} Hisp\_M_i + \beta_{14} Hisp\_M_i*Ability_i + \beta_{15} Hisp\_M_i*Ability^2_i + \mathbf{Z}_i + \varepsilon_i$

Where *Education* is the highest graded ever completed and the *log(wage)* is hourly wage including tips, bonuses, overtime, and commission. The median wage is used to account for selection bias between White men and the cross-sections of race and gender (Lang & Manove, 2011). *Ability* is a score derived from the Armed Service Vocation Aptitude Battery (ASVAB) test. The squared *Ability* terms explain the non-linear relationship between *Ability* and *Education* or *log(wage)*. **Z** represents several control variables: age at interview, teacher interest, parent education, urban or rural setting, mental health, drug use, general health, citizenship at birth, relationship with guardians, and student teacher ratio.

This is a cross-sectional dataset, the regressions are an OLS analysis. The predicted results from models 1.1 and 1.2 are a positive correlation between the education achieved and Black fe/males, Hispanic fe/males & White females. Because of the anticipated results of 1.1 and 1.2, it is expected that the log of wage will be higher for these groups as well. Potential issues for these models are multicollinearity, heteroskedasticity and omitted variable bias. The tests used for heteroskedasticity are White test, Breusch-Pagan / Cook-Weisberg, and Breusch-Pagan LM test. If heteroskedasticity is a problem, robust standard errors will be used. Variance inflation factor (VIF score) and correlations matrices are used to assess multicollinearity. Multicollinearity is not expected with the given variables, if an issue arises, the problematic variables will be dropped and replaced.

Data and Descriptive Statistics

While the data is pulled from a longitudinal survey, the dataset used in this analysis is cross-sectional. Accordingly, the models are OLS regressions. The majority of the variables do not change over time such as ability, highest grade completed, log of wage, and race. The variables that vary across time are from 1999, when the ASVAB test was administered.

Examples of these variables are student teacher ratio, drug use, and mental health. Most of the variables in this study are dummy variables. The log of median wages is taken for *log(wage)* and other descriptive variables are discrete. The exception to this is *Ability* which is continuous. This variable is calculated using the ASVAB scores and has been modified using sampling weights and percentile scores to liken the AFQT variable from Lang & Manove (2011). ASVAB measures mathematical knowledge, arithmetic reasoning, word knowledge, and paragraph comprehension.

Tables 3 and 4 show the correlation matrices for the four models above. Note that the first two variables (log of wage and education) are both dependent variables. The correlation matrices do not foresee issues with multicollinearity. Tables 3 and 4 do not depict a strong relationship with the independent and dependent variables besides, ability. The descriptive statistics, depicted in Table 2, do not reveal issues with outliers. The dataset has been cleaned prior to analysis, as many variables had negative inputs indicating skipped responses. These observations have been deleted, otherwise the entries would be unreasonable. The education variables had a maximum of 95 which is coded for ungraded years, these have been removed as well.

IV. Results

Models measuring wage and education are needed to unpack labour market discrimination. A significant relationship between race, gender, and education would infer an association between race, gender, and wage. The four population regressions are utilized to test this hypothesis. Across the four models, the two measuring education (1.1 & 2.1) have better explanatory power of their dependent variable. The regression output in Table 5 shows that the adjusted R^2 of the wage models (1.2 & 2.2) are both about 7%. This indicates that about 7% of the variance in the log of wage can be explained by ability, gender, and race. Nevertheless, the F statistic in all four models is 0, signifying that at least one variable in the models is relevant.

As part of the reliability of the results, the four regressions were tested for heteroskedasticity and multicollinearity. Models 1.1 and 2.1 rejected the null for heteroskedasticity at the 5% level for all 3 tests. Models 1.2 and 2.2 reported constant variance for the White test and inconstant variance for the Breusch Pagan / Cook Weisberg and Breusch Pagan LM test. This indicates heteroskedastic residuals in all regressions. To resolve this, the residuals are recalibrated using robust standard errors. The VIF score did not show

multicollinearity, no variables had a VIF > 2. Lastly, the correlation matrices support the VIF results. No correlation coefficient was above |.5|. There is no multicollinearity or heteroskedasticity with the data used in this study.

Recall that Model 2.1 is a detailed view of 1.1 and Model 2.2 is a detailed view of 1.2. The education models found that being a Black fe/male and White female has a positive association with educational achievement at a 5% significance. For these groups, the coefficients align with the hypothesis. Conditional on ability, the education of a Black fe/male and White female is higher relative to a White male. While Model 1.1 shows that being a female is positively associated with education, 1.2 shows that Hispanic females do not have a relationship with education. One reason Hispanic women do not impact the significance of women as a group is the small number of observations. There are 1,990 observations for women, 159 of those being Hispanic. Both Hispanic females and males did not have a relationship with education. This finding is not concurrent with the hypothesis, which anticipates that Hispanic fe/males are incentivized to further education when feasible. The result of Hispanic fe/males may be biased by race definitions in the United States. There is no Latinx or Hispanic race category, the variables for Hispanic fe/males is created using both race and ethnicity reports. This could have resulted in race being assigned inaccurately.

The results of Black fe/males and White females from Models 1.1 & 2.1 support the hypothesis. Models 1.2 & 2.2 can now be utilized to assess the association between these groups and log of wages. Conditional on ability, White females and Black Males have a positive relationship with log of wage at 5% significance. This outcome supports the hypothesis. Table 5, Model 2.2 shows that being a White woman relative to a White man is associated with a .46 decrease plus a .08 increase in log of wage for a 1 point increase of ability. Conditional on ability, being a Black fe/male is not significant with log of wage. This does not align with the hypothesis and is indicative of labour market discrimination. In the models measuring log of wage, being a Black female is associated with a .45 decrease. This is contrary to the hypothesis which assumes individuals with higher educational attainment receive a higher wage.

A closer examination of Black fe/males and White females is necessary to explore their relationship with education. The model shows that Black men are more educated compared to white men at all but extremely low levels of ability. Both Black and White women are more educated at all levels of ability. Black women are associated with the largest White male

education differential. The coefficients on ability, race, and gender from Table 5, Model 2.1 can be used to calculate the wage differentials between minority groups and White men. At an ability of 7.6 (on a scale of 1 to 10), Black women have an education differential of 4.8 more years relative to White men. In comparison, Black men's greatest education differential is 3.2 more years at an ability level of 7.2 and White women's largest differential is 4.1 more years at an ability of 10. All the coefficients for Hispanic wo/men were insignificant in measuring education.

The subgroups other than Hispanic wo/men are expected to have a relationship with wage conditional on ability as well. The outcome of White women and Black men affirm this notion. From Table 5, Model 2.2 the coefficients reveal that being a White woman is associated with a higher log of wage at an ability > 5.9. This number is derived from graphing relationship between log of wage and ability for White women: log(wage) = -.45 + .08*ability. This is indicative of labour market discrimination because White women report higher education at ability levels. If they are rewarded for their education, they will have a higher log of wage at all ability levels. Black males reveal higher log of wage relative to White men at intermediate levels of ability. This also depicts labour market discrimination because Black are more educated at all but low levels of ability. Black females have no relationship with wage conditional on ability. This infers labour market discrimination akin to White women and Black men. The signaling model suggests that individuals are rewarded for furthering their education. For these groups, it is expected that log of wage increases as ability goes up.

There are small number of control variables for each model. Four variables were significant in all of them. These were: relationship to guardian, age at interview, general health, and drug use. Age at interview is surprising, the participants in NLSY 97 were 15-19 years old at the first interview. It is unexpected that the participant's age in 1999 would be significant with the highest grade the participant ever completed. The direct relationship between drug use and log of wage is surprising as well. This indicates that increased drug use is associated with an increase in log of wage. The highest education level of either parent is significant in determining the participant's education achievement, but marginally significant at 10% for determining log of wage. This is unexpected because parents' education influences their children's desire to complete school, and higher education is rewarded with increased wage. The most unexpected outcome for the control variables is student teacher ratio. This variable is significant for the wage

models, but not the education models. More of the control variables are significant for the models measuring education rather than the models measuring wage. This is not surprising when you look at the adjusted R^2 of the four models. Those measuring education have greater explanatory power than those measuring wage.

The results of the four regressions detail discrimination in the labour market for marginalized groups. Black women, Black men, and White women have a lower return on education relative to White men. The findings support this claim by revealing a positive relationship between higher education conditional on ability. As a result, wage is expected to have a significant relationship between race and gender conditional on ability. The outcome of Model 2.2 does not validate this hypothesis. This concludes that inequality remains an issue in the United States. The results suggest that measures of productivity are biased by race, gender or both.

V. Conclusion

How an employer perceives productivity can influence their decision to hire an individual. Is race or gender factored into that perception? The answer can be uncovered by assessing the relationship between race, gender, education, and log of wages conditional on ability. This study finds that labour market discrimination occurs for Black men at high levels of ability, White women at low to average levels of ability, and Black women at all levels of ability. The findings are not indicative of labour market discrimination for Hispanic wo/men. These outcomes have implications for the labour market in the United States. Initiatives to eradicate discrimination such as Affirmative Action receive backlash. Those who oppose these policies often question the extent at which discrimination actually occurs. Significant results affirming this inequality help to dispel misconceptions. Knowing that race, gender, or both can bias an employer's hiring decision can aid policymakers. This informs them on who is being affected by these issues. In regard to labour market discrimination, Black women appear to be impacted the most, followed by Black men, then White women.

Improvements and further research can be done to advance this discussion. Since NLSY97 was released recently, there is not access to the same controls used in Lang & Manove's (2011) models. Substitutes are available for most variables except for a limited numbers of school inputs. There are factors accounting for disparities in wage for Hispanics that not covered in this model. Hispanic women require further research on wage-differentials as it

could not be explained by the signaling approach. Another perspective that could assist policymakers is discrimination across careers. STEM or science, technology, engineering and mathematics are thought to have greater issues with race and gender. Research on this topic can specify the disciplines and careers with the largest inequalities. While labour market discrimination is an expansive topic, steps to mitigate the impacts are possible.

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Appendix:

Table 1: Variable Definitions and Sources

Variable	Definition	Source
Log(Wage)	Log of the median wage, average of 2006 & 2007	NLSY 97
Education	The highest grade of education completed	NLSY 97
Ability	Math and verbal score percent derived from the Armed Services Vocational Aptitude of Battery. 1-10 score	NLSY 97
Black Female	1 if respondent identifies as a black female	NLSY 97
Black Male	1 if respondent identifies as a black male	NLSY 97
White Female	1 if respondent identifies as white female	NLSY 97
Hispanic Female	1 if respondent identifies as a Hispanic female	NLSY 97
Hispanic Male	1 if respondent identifies as a Hispanic male	NLSY 97
Relation to Guardians	Scale of 1-10 of respondents relationship with guardians	NLSY 97
Age at Interview	Age of the respondent in 1999	NLSY 97
Citizenship	Born citizenship of the respondent. 1 for the U.S. 0 otherwise	NLSY 97
Urban Home	1 if respondent lived in an urban setting	NLSY 97
Drug Use	Self reported drug use of the respondent	NLSY 97
Teacher Interest	Scale of 1-4 on how students perceive teachers interest. 1 being the highest	NLSY 97
Parent Education	Highest education of both biological parents	NLSY 97
Mental Health	Self reported mental health	NLSY 97
General Health	Self reported general health	NLSY 97
Student Teacher Ratio	Student teacher ratio in current school	NLSY 97

Table 2: Descriptive Statistics, 3977 observations

Variables	Mean	St. Dev.	Minimum	Maximum
Education	14.50	2.88	6	20
Log(wage)	7.42	0.73	4.69	10.10
Teacher Interest	1.89	0.64	1	4
Citizenship	1.20	0.58	1	3
Student Teacher Ratio	2.24	1.01	1	4
General Health	1.93	0.90	1	5
Age at Interview	16.82	1.42	14	20
Relationship to Guardians	2.73	2.49	1	10
Urban Home	0.76	0.50	0	2
Drug Use	1.16	1.11	0	3
Mental Health	15.39	2.40	5	20
Ability	5.02	2.92	0	10
Parent Education	2.99	1.66	0	7
Female	0.50	0.50	0	1
Black	0.23	0.42	0	1
Hispanic	0.09	0.29	0	1
Black Female	0.12	0.33	0	1
Black Male	0.11	0.31	0	1
Hispanic Female	0.04	0.20	0	1
Hispanic Male	0.05	0.22	0	1
White Female	0.32	0.47	0	1

Note: Data from the National Survey of Youth 1997 (2019).

Table 3: Correlation Matrix for Model 1.1 and Model 2.1

	log(Wage)	Education	Ability	Female	Black	Hispanic	Relationship to Guardians	Age at Interview	Citizenship	Urban Home	Drug Use	Teacher Interest	Parent Edcuation	Mental Health	General Health	Student Teacher Ratio
log(Wage)	1.000															
Education	0.177	1.000														
Ability	0.205	0.548	1.000													
Female	-0.059	0.161	0.037	1.000												
Black	-0.096	-0.111	-0.346	0.046	1.000											
Hispanic	-0.032	-0.074	-0.124	-0.034	-0.172	1.000										
Relationship to Guardians	-0.075	-0.192	-0.183	0.054	0.179	-0.009	1.000									
Age at Interview	0.081	0.016	0.006	0.027	0.028	0.030	0.192	1.000								
Citizenship	-0.010	-0.014	-0.086	-0.002	-0.103	0.349	-0.024	0.002	1.000							
Urban Home	0.023	0.010	-0.012	0.004	0.051	0.113	0.074	0.024	0.123	1.000						
Drug Use	0.063	-0.114	0.080	0.012	-0.198	0.006	0.050	0.191	-0.028	0.022	1.000					
Teacher Interest	-0.002	-0.099	-0.122	0.042	0.089	0.010	0.089	0.155	-0.013	-0.002	0.106	1.000				
Parent Edcuation	0.099	0.243	0.335	-0.035	-0.162	-0.194	-0.083	-0.014	-0.201	0.011	0.064	-0.052	1.000			
Mental Health	0.038	0.015	0.043	-0.199	-0.002	-0.007	-0.043	0.008	-0.016	-0.003	-0.117	-0.053	0.034	1.000		
General Health	-0.104	-0.142	-0.102	0.123	0.016	0.003	0.078	0.011	0.023	0.023	0.120	0.108	-0.065	-0.147	1.000	
Student Teacher Ratio	0.039	-0.025	-0.040	-0.003	-0.074	0.121	-0.027	0.013	0.179	0.117	-0.020	0.044	-0.020	0.031	0.010	1.000

Note: Data from the National Survey of Youth 1997 (2019).

Table 4: Correlation Matrix for Model 1.2 and 2.2

	log(Wage)	Education	Ability	Black Female	Black Male	White Female	Hispanic Female	Hispanic Male	Relationship to Guardians	Age at Interview	Citizenship	Urban Home	Drug Use	Teacher Interest	Parent Edcuation	Mental Health	General Health	Student Teacher Ratio
log(Wage)	1.000																	
Education	0.177	1.000																
Ability	0.205	0.548	1.000															
Black Female	-0.089	0.004	-0.215	1.000														
Black Male	-0.035	-0.156	-0.243	-0.130	1.000													
White Female	0.008	0.162	0.209	-0.257	-0.235	1.000												
Hispanic Female	-0.045	-0.023	-0.069	-0.077	-0.070	-0.139	1.000											
Hispanic Male	-0.001	-0.077	-0.101	-0.086	-0.079	-0.156	-0.047	1.000										
Relationship to Guardians	-0.075	-0.192	-0.183	0.143	0.092	-0.041	-0.005	-0.007	1.000									
Age at Interview	0.081	0.016	0.006	0.027	0.009	0.008	0.002	0.038	0.192	1.000								
Citizenship	-0.010	-0.014	-0.086	-0.071	-0.064	-0.078	0.244	0.239	-0.024	0.002	1.000							
Urban Home	0.023	0.010	-0.012	0.044	0.023	-0.066	0.067	0.088	0.074	0.024	0.123	1.000						
Drug Use	0.063	-0.114	0.080	-0.155	-0.105	0.120	0.003	0.005	0.050	0.191	-0.028	0.022	1.000					
Teacher Interest	-0.002	-0.099	-0.122	0.094	0.021	-0.041	0.041	-0.024	0.089	0.155	-0.013	-0.002	0.106	1.000				
Parent Edcuation	0.099	0.243	0.335	-0.122	-0.091	0.102	-0.130	-0.137	-0.083	-0.014	-0.201	0.011	0.064	-0.052	1.000			
Mental Health	0.038	0.015	0.043	-0.081	0.083	-0.116	-0.078	0.060	-0.043	0.008	-0.016	-0.003	-0.117	-0.053	0.034	1.000		
General Health	-0.104	-0.142	-0.102	0.067	-0.050	0.070	0.030	-0.022	0.078	0.011	0.023	0.023	0.120	0.108	-0.065	-0.147	1.000	
Student Teacher Ratio	0.039	-0.025	-0.040	-0.056	-0.042	-0.006	0.069	0.097	-0.027	0.013	0.179	0.117	-0.020	0.044	-0.020	0.031	0.010	1.000

Note: Data from the National Survey of Youth 1997 (2019).

Table 5: Regression Output

	Dependent: Education		Dependent: Wage	
Variables	Model 1.1	Model 2.1	Model 1.2	Model 2.2
Ability	0.391***	0.411***		
	[0.078]	[0.085]		
Ability^2	0.010	0.009		
	[0.007]	[0.008]		
Female	0.396*		-0.332***	
	[0.206]		[0.062]	
Female * Ability	0.283***		0.038	
	[0.096]		[0.026]	
Female * Ability^2	-0.028***		0.002	
	[0.009]		[0.002]	
Black	-0.534**		-0.255***	
	[0.219]		[0.069]	
Black * Ability	0.636***		0.074**	
	[0.119]		[0.038]	
Black * Ability^2	-0.065***		-0.003	
	[0.014]		[0.004]	
Hispanic	-0.288		-0.118	
	[0.361]		[0.095]	
Hispanic * Ability	0.145		0.011	
	[0.180]		[0.048]	
Hispanic * Ability^2	-0.010		-0.001	
	[0.018]		[0.005]	
Black Female		-0.017		-0.469***
		[0.308]		[0.088]
Black Female * Ability		0.829***		0.035
		[0.167]		[0.051]
Black Female * Ability^2		-0.080***		0.008
		[0.019]		[0.006]
Black Male		-0.689**		-0.393***
		[0.274]		[0.084]
Black Male * Ability		0.668***		0.146***
		[0.165]		[0.048]
Black Male * Ability^2		-0.075***		-0.012**
		[0.020]		[0.006]
White Female		0.282		-0.455***
		[0.329]		[0.086]
White Female * Ability		0.280**		0.077**
		[0.133]		[0.033]
White Female * Ability^2		-0.028**		-0.002
		[0.012]		[0.003]
Hispanic Female		-0.017		-0.548***

		[0.574]		[0.140]
Hispanic Female * Ability		0.289		0.070
		[0.278]		[0.068]
Hispanic Female * Ability^2		-0.021		0.001
		[0.028]		[0.007]
Hispanic Male		-0.299		-0.074
		[0.448]		[0.119]
Hispanic Male * Ability		0.229		-0.007
		[0.233]		[0.064]
Hispanic Male * Ability^2		-0.022		-0.001
		[0.024]		[0.007]
Control Variables				
Relationship to Guardians	-0.126***	-0.125***	-0.013***	-0.013***
	[0.016]	[0.016]	[0.005]	[0.005]
Age at Interview	0.131***	0.131***	0.043***	0.043***
	[0.026]	[0.026]	[0.008]	[0.008]
Citizenship	0.238***	0.250***	0.010	0.010
	[0.066]	[0.066]	[0.022]	[0.022]
Urban Home	0.077	0.078	0.034	0.032
	[0.074]	[0.074]	[0.023]	[0.023]
Drug Use	-0.387***	-0.386***	0.023**	0.024**
	[0.035]	[0.035]	[0.011]	[0.011]
Teacher Interest	-0.089	-0.088	0.025	0.023
	[0.061]	[0.061]	[0.019]	[0.019]
Parent Education	0.162***	0.160***	0.014*	0.014*
	[0.024]	[0.024]	[0.007]	[0.007]
Mental Health	-0.020	-0.024	0.001	0.002
	[0.015]	[0.016]	[0.005]	[0.005]
General Health	-0.261***	-0.258***	-0.071***	-0.070***
	[0.042]	[0.042]	[0.013]	[0.013]
Student Teacher Ratio	-0.039	-0.035	0.028**	0.026**
	[0.036]	[0.037]	[0.011]	[0.011]
Constant	10.465***	10.522***	6.682***	6.703***
	[0.540]	[0.554]	[0.161]	[0.162]
Observations	3,997	3,997	3,997	3,997
Adjusted R-Squared	0.381	0.378	0.073	0.073
F-test	144.118	112.026	17.758	13.801
Prob > F	0.000	0.000	0.000	0.000
Root MSE	2.264	2.270	0.701	0.701

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Note: Data from the National Survey of Youth 1997 (2019).