

Wage Inequality among Ethnic Groups in United States in the 1990s: A Regression Analysis Using NLSY79 Dataset

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Abstract. Based on the wage gap between white and black men in the United States in the early 1990s, this study uses ordinary least squares (OLS) regression analysis to explore the effects of factors such as race, education, work experience, and cognitive test scores on wages. Research shows that black-white differences in education, work experience, and abilities account for about 72% of the black-white log wage gap. The interaction term analysis revealed that, while the difference in log wage growth between the two racial groups resulting from more experience was not statistically significant, black men continued to lag behind white men in obtaining high-paying jobs despite having equivalent educational attainment, suggesting that educational advancements alone were insufficient to close the racial wage gap. Reducing the pay gap not only promotes social fairness and aids in future economic growth, but it also helps to reduce poverty and increase economic efficiency, which is why this research is important. A 1979 National Longitudinal Survey of Youth subsample served as the primary source of data. The results support the creation of the policies required to close the pay gap and offer broad perspectives on the examination of racial wage disparity.

Keywords: Wage inequality, ethnic group, education.

1. Introduction

The information technology revolution and economic globalization have propelled the United States economy into a decade of consistent growth since the 90s of the 20th century. The rapid development of digitization and technological innovation has fueled economic growth and globalization has made it possible for American businesses to have wider access to international markets, create more jobs, and possibly raise wages. However, the "New Economy" revolution shifted the corporate focus from reinvestment to shareholder payouts, exacerbating income inequality and the decline of traditional industries [1].

Although wage disparity is a widespread occurrence, it has varying effects on different racial groups. In the early 1990s, more than half of the wage gap between blacks and whites in United States could be explained by differences in human capital accumulation between races [2]. As a result, black families have lower incomes when education is restricted. The number of years of education and race have an interaction effect: blacks are most affected by the returns to education, followed by other races, and then whites [3]. Education is particularly important in breaking down the socio-economic barriers faced by certain ethnic groups, and it has become an important way for these groups to improve their economic well-being. In addition to educational factors, disparities in work prospects, racial discrimination, and insufficient rules and regulations could also lead to racial wage differences.

While the 1954 Brown v. Board of Education decision and the Civil Rights Act of 1964 improved blacks' education and employment possibilities, which also reduced racial segregation and discrimination, these progresses did not fully convert into economic benefits for black men [4]. During this time, the disparity in earnings between blacks and whites had narrowed, but blacks' educational attainment and skill upgrades remain limited, affecting their position and income levels in the labor market. This indicates that income inequality among different races and ethnic groups remains a persistent issue in the United States in spite of various initiatives and legal frameworks aimed at promoting equality and fairness.

The main goal of this study is to examine the wage gap between black and white men in the 1990s in the U.S. through investigating the underlying determinants using regression model. The analysis

places emphasis on the impact of educational attainment and personal capabilities in order to gain a deeper understanding of the dynamics of racial wage inequality and possible policy responses.

2. Literature Review

The 1990s marked a period of significant economic expansion in the United States, often hailed as a time of prosperity and low unemployment. The U.S. labor market became the envy of the world, with unemployment rates dropping to levels that many economists considered optimal for non-inflationary growth, which referred to as reaching the “NAIRU” (Non-Accelerating Inflation Rate of Unemployment) [5]. Yet behind the superficial economic boom lies a profound social issue – income inequality.

Economic and sociological frameworks including social dominance theory, human capital theory, and labor market segmentation theory can be used to investigate the underlying reasons of racial income disparity. Social dominant theory states that social class structures are maintained through legitimized beliefs and ideologies, including racial bias and gender inequality, which help certain groups, like whites, maintain their superiority in areas such as employment and education, while black groups are subjected to structural inequalities [6]. According to human capital theory, educational attainment and skills training are able to enhance an individual's productivity and earning potential [7]. But from the perspective of labor market segmentation, individuals with high human capital may find it difficult to enter the labor market due to market barriers such as trade union power, recruitment policies and occupational licensing, which can hinder the optimal allocation of human capital and increase income inequality. All these theories offer a strong theoretical foundation for the analysis of inequality.

Numerous existing studies have been done on the subject of the racial wage gap and its various influencing factors such as education level and racial discrimination etc. adopting different approaches. Neal and Johnson examined the relationship between years of schooling and educational quality and racial wage disparities using regression model and data from the National Longitudinal Adolescent Health Survey (NLSY), controlling for pre-market variables including cognitive test scores [8]. The findings imply that disparities in educational attainment play a significant role in racial wage disparities and that, despite having the same amount of schooling, black men are nevertheless paid less than white males. Candidates with white names were more likely to be interviewed, according to a field experiment conducted by Bertrand and Mullainathan that exposed racial discrimination in hiring practices [9]. This discovery has significance for the development of anti-discrimination laws and offers an empirical foundation for comprehending implicit bias in the labor market.

In this research, the study employs econometric regression models to explore the impact of educational attainment, cognitive testing, and personal experience on racial wage disparities.

3. Methodology

3.1. Applications of Economic and Statistical Theory

In this study, a multivariate linear regression model was utilized to assess the influence of educational attainment, work experience, and cognitive ability tests on wage disparities, with the incorporation of control variables. Moreover, dummy variable was constructed to quantify the effects of distinct categories of variables, thereby providing a nuanced measurement of their contributions to the wage differentials. And interaction term was used to test the statistically difference of the variable and capture the combined effect of the predictors. The validity of these predictors were verified by hypothesis testing.

3.2. Data Sources and Overview

Subsample of National Longitudinal Survey of Youth 1979 (NLSY79) is used as the main data source of this research, sponsored by the Bureau of Labor Statistics (BLS) of the U.S. Department of Labor. NLSY79 Cohort tracks the lives of a sample of young Americans who were born between 1957 and 1964. When the cohort was first polled in 1979, there were 12,686 respondents in total, ages 14 to 22. Additionally, the NLSY79 was created to support policymakers and researchers in their assessment of the increased youth job and training initiatives.

The chosen dataset for this study contains 2260 respondents. The sample consisted solely of males, with 1,465 white males making up 64.82 percent of the total and 795 black males making up 35.18 percent. The average number of years of schooling is 13.36 years.

3.3. Selection of Variable

The present study identifies and examines five key variables—income, race, education, experience, and cognitive test scores—with the latter four serving as the independent variables in the regression analysis, thereby establishing them as determinants of income.

Dependent variable is the log wages in the 1990s, which is denoted as “lwage”. The utilization of logarithmic transformation enhances the precision of calculating the marginal percentage change within the dependent variable. The variable “race” is recreated as a dummy variable called “black,” which has a value of 1 for a black person and 0 for a white person. Ashenfelter and Rouse evaluated the contribution of years of schooling to salaries using multivariate regression analysis, controlling for genetic effects using a sample of identical twins [10]. They discovered that education level had a significant positive impact on wages. So “edu” is included, meaning the highest grade completed. In addition, experience is also a crucial factor that affects salary as there is a significant positive correlation between experience and relative pay within grade levels [11]. The variable “test” provides the person's percentile score from the initial survey (1979) that assessed their verbal and math skills. The cognitive test scores taken in adolescence have large influence on future income [12].

3.4. Research Design and Result

3.4.1. Model Setting

Regression analysis is a tool that David Neumark utilizes to account for a variety of productivity-related factors, which enables him to calculate the salary gap that is directly related to race [13]. This provides support for the empirical part of the model in this paper. By employing a stepwise regression control variable approach and applying the interaction terms, the direct effects of race factors can be quantified and recognized.

3.4.2. The Average Racial Wage Gap

The following regression is estimated as:

$$lwage_i = \beta_0 + \beta_1 black + \varepsilon_i \quad (1)$$

The STATA outputs are shown in Table 1.

Table 1. Regression of lwage and black.

lwage	Coefficient	Std. err.	t	P> t	[95% conf.	interval]
black	-.2947565	.0219616	-13.42	0.000	-.3378235	-.2516895
_cons.	2.694699	.0130254	206.88	0.000	2.669155	2.720242

According to the data, the expected log wages for black men can be expressed as:

$$E(lwage_i | black_i = 1) = \beta_0 + \beta_1 \quad (2)$$

The expected log wages for white men are

$$E(lwage_i | black_i = 0) = \beta_0 \quad (3)$$

So the difference between log wages of blacks and whites is :

$$E(lwage_i | black_i = 1) - E(lwage_i | black_i = 0) = \beta_0 + \beta_1 - \beta_0 = \beta_1 \quad (4)$$

Thus, by regressing “lwage” on “black”, the coefficient of black dummy variable β_1 is the average gap in earnings between blacks and whites in the sample.

This can also be calculated as percentage change:

$$100 \times (e^{-0.29} - 1) = -25.17 \quad (5)$$

On average, black men make 25.17% less money than white males. Individual productivity traits like education level, work experience, abilities, etc., may be correlated with inequalities in income. Discrepancies in income might also be caused by racial prejudice. The fact that black men continue to earn less than white men on equal conditions even after accounting for productivity characteristics is one way that racial discrimination is evident in wage decisions. In order to accurately assess the impact of racial discrimination on income disparity, it is essential to control for all possible productivity-related factors to ensure the accuracy and reliability of the analysis results. Therefore, the study cannot directly interpret the coefficient difference for black males as evidence of racial discrimination.

3.4.3. The Effect of Education and Experience on Wage Gap

Adding variables “education” and “experience” into the regression:

$$lwage_i = \beta_0 + \beta_1 black_i + \beta_2 edu_i + \beta_3 exp_i + \varepsilon_i \quad (6)$$

STATA results are shown in Table 2:

Table 2. Regression of the effect of education and experience on wage gap.

lwage	Coefficient	Std. err.	t	P> t	[95%conf. interval]
black	-.1768224	.0209686	-8.43	0.000	.2179422 -.1357025
edu	.097086	.0047605	20.39	0.000	.0877506 .1064214
exp	.0409678	.0033841	12.11	0.000	.0343315 .0476041
exp	1.035954	.0808449	12.81	0.000	.8774159 1.194492

After examining data on the difference in income between white and black males, the study discovered that, even when experience and education levels were held constant, black men made 16.4% less money overall than white men, which can still be calculated as:

$$100 \times (e^{-0.18} - 1) = -16.47 \quad (7)$$

Comparing the coefficients for black men across two regression analysis leads us to the conclusion that racial variations in experience and education account for roughly 41% of the salary gap. This can be calculated as the part of the difference explained by the educational and empirical variables is $0.29 - 0.17 = 0.12$, which accounts for about 41% of the original difference of 0.29 ($0.12 / 0.29 \approx 0.41$).

3.4.4. The Interaction Term Test of Education and Experience

To test whether there is a statistically significant difference in the return on education and experience between white and black men, the study needs to re-estimate the regression model, generating two interaction terms: $gen\ eduXblack = edu \times black$, $gen\ expXblack = exp \times black$. The new regression would be:

$$lwage_i = \beta_0 + \beta_1 black_i + \beta_2 edu_i + \beta_3 eduXblack_i + \beta_4 exp_i + \beta_5 expXblack_i + \varepsilon_i \quad (8)$$

Where β_3 is the difference between returns to education of blacks and whites, and β_5 represents how black men and white men differ in their returns to experience. The outputs shown in Table 3.

Table 3. Regression of interaction term.

lwage	Coefficient	Std. err.	t	P> t	[95% conf. interval]
black	-.5722087	.1616431	-3.54	0.000	-.8891935
edu	.0884113	.005813	15.21	0.000	.077012
eduXblack	.0288261	.0103613	2.78	0.005	.0085074
exp	.0390796	.0043167	9.05	0.000	.0306145
expXblack	.002326	.0070006	0.33	0.740	-.0114024
_cons	1.169711	.1015617	11.52	0.000	.9705468

To test whether there is statistically difference in terms of return to education, hypothesis testing is conducted as following: $H_0: \beta_3 = 0$, $H_1: \beta_3 \neq 0$

$$t = \frac{0.0288261}{0.0103613} = 2.78 > 1.96 \quad (9)$$

As $|t| > 1.96$, the study rejects the null hypothesis that there is no difference between the return to education of blacks and whites. Similarly, for return to experience: $H_0: \beta_5 = 0$; $H_1: \beta_5 \neq 0$

$$t = \frac{0.002326}{0.0070006} = 0.33 < 1.96 \quad (10)$$

The study cannot reject the null hypothesis that there is no difference between the return to experience among racial.

3.4.5. The Effect of Test Score on Wage Gap

The study then adds the new variable test score into the regression:

$$lwage_i = \beta_0 + \beta_1 black_i + \beta_2 edu_i + \beta_3 exp_i + \beta_4 test_i + \varepsilon_i \quad (11)$$

The STATA outputs shown in Table 4.

Table 4. Regression of the effect of test score on wage gap.

lwage	Coefficient	Std. err.	t	P> t	[95% conf. interval]
black	-.0837972	.0238171	-3.52	0.000	-.1305029
edu	.0685709	.005928	11.57	0.000	.0569459
exp	.0362389	.0033926	10.68	0.000	.029586
test	.003715	.0004711	7.89	0.000	.0027911
_cons	1.255934	.0845081	14.86	0.000	1.090213

The coefficient on test indicates that, holding all factors equal, a one percentile increase in test score is associated with a 0.3% rise in pay. If test scores are used as a stand-in for ability, then the absolute value of the coefficient on black falls even more when the test is included in the regression, indicating that variations in ability between black and white people also contribute to the black and white pay difference. When education, experience, and test scores are taken into account, the coefficient's absolute value decreases from 0.29 to 0.08, $(0.29-0.08)/0.29=0.72$, which means that roughly 72% of the disparities between black and white workers' log wages may be explained by the difference in education, experience, and abilities.

4. Limitation and Future Outlook

Although the case study method used in this study provides us with a basic understanding of the phenomenon, it fails to dig deeper insights due to its methodological limitations. First, omitted variable bias still occurs as unobserved variables that correlated with the existing independent variables are not included, such as the discrimination at workplace, and may cause inconsistent estimation of the coefficients. Second, the initial survey-derived test scores may not precisely mirror

individuals' contemporary skill sets or human capital. Finally, the data in this study are mainly derived from existing data and secondary analysis, and lack of direct field research support.

Future investigations should consider about broadening the study's focus to include: how macroeconomic conditions, shifts in the labor market policies, industrial structure, and other factors affect wage differentials. Furthermore, the study looks into gender discrimination in the workplace instead of single gender study. The study takes into account the return on education and experience in various industries, as well as the effect that regional economic imbalances have on salary differences. Also, to be more precise in determination of wage, quantile regression can be adopted to see the specific change of each part of the wage distribution.

5. Conclusion

Our study's primary conclusion, which comes from a thorough examination of how education and job experience affect salary differences, is that black males are still paid less than white men, even after adjusting for these traditional human capital factors. This ongoing pay disparity implies that, in addition to education and experience, race has a big impact on income differences. Such discrepancies suggest the possibility of racial discrimination or structural obstacles in the labor market that are insurmountable.

Through the use of interaction term analysis, the study holds that even with the same amount of education as white males, black men had less prospects to obtain higher-paying positions in the labor market. This shows that closing the pay gap across races requires more than just increasing educational attainment. It's important to focus on education's equality and quality and make sure that the educational achievements of various racial groups are fairly recognized in the job market. Finally, although skill differences do play a role in the wage disparity, they are not a major one.

More comprehensive measures should be taken to alleviate the problem. For example, to guarantee sufficient and fair distribution of resources for education, the US federal government allocated \$68.6 billion for education in 2015. This is a \$1.3 billion (1.9%) increase over 2014. In the future, equitable educational opportunities for all students and the ability of the educational system to adapt to changing social and economic requirements should be ensured by a number of laws, policies, and financial aid programs.

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