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DETERMINANTS OF THE EARNINGS GAP BETWEEN BLACKS AND

WHITES: A HUMAN CAPITAL APPROACH

by

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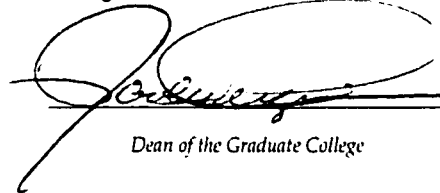
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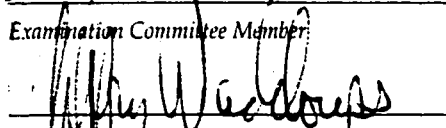
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ABSTRACT

Determinants of the Earnings Gap Between Blacks and Whites: A Human Capital Approach

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The persistence of wage differences between blacks and whites has provided economists a perplexing topic for debate. It has been proposed that this gap can be attributed in great part to a disparity in educational attainment between the two groups. This study looks specifically at whether a college degree diminishes the wage differential. The empirical findings suggest that although a higher level of education increases the average wage for both blacks and whites it does not diminish the wage differential between the two groups. The results also reveal the possibility that the wage gap is in part due to the persistence of racial discrimination.

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CHAPTER 1

INTRODUCTION

Earnings differences between blacks and whites have been a prominent feature of

the American economic experience. In 1995, for example, the median income of black

families was $25,970 while the comparable figure for white families was $42,646 – a

difference of some $16,600. Black families in 1995, in other words, received about 61

percent of the income of their counterpart white families.[1] In an attempt to explain why

such a difference exists this study focuses on the relationship between earnings and levels

of educational attainment. In particular, it addresses whether receipt of a baccalaureate

education among blacks has an effect on the black-white earnings differential. This

matter is investigated using multiple regression analysis of 41,168 individuals reported in

the National Bureau of Economic Research's extract of <u>Current Population Survey</u>

<u>Outgoing Rotation Group, 1996</u>.

The measurement of the black-white earnings differential as it relates to

educational attainment is important for two reasons. First, it affords a quantitative look at

the magnitude of the earnings disparity between blacks and whites. Second, it highlights

the importance of the role of education in eliminating the earnings gap. If the results of

the study show that the achievement of bachelor's degree clearly reduces the earnings

differential then public policies directed toward reducing the gap can focus on how to

allow more individuals the opportunity to pursue higher education. If however, it is revealed that despite the increased levels of education the earnings gap still exists, then policy can be aimed at other factors that might be the cause.

The remainder of this study is organized into four chapters. Chapter 2 contains a historical note on selected black experiences in the United States and a review of human capital (schooling) research on earnings differences. Chapter 3 includes a description of the data and models employed in the study. Chapter 4 presents the empirical results of the study. Chapter 5 provides the summary and concluding remarks.

Notes

1 *Economic Report of the President* Council of Economic Advisors 1997, Table B-3, P.336.

CHAPTER 2

HISTORY AND LITERATURE REVIEW

This chapter focuses on two background matters related to this study. The first is a comment on the historical experience of blacks in the United States, which reveals a pattern of separation and discrimination resulting in economic and social differences between themselves and whites. The second is a review of human capital research related to earnings differences and education.

Historical Experience

The social and economic progression of blacks in this country has been obstructed by mistreatment that can be traced from their existence as slaves to the racism and bigotry they face in today's society. From the post Civil War tyranny of Jim Crow laws, through Supreme Court decisions upholding segregation, and violent clashes of the civil rights movement, blacks have faced barriers that deprived them of opportunities for advancement. The result of these deterrents can be observed in earnings discrepancies among blacks and whites as well as differences in attainment of education.

The saga of the black existence in the United States began in 1619 when Dutch seamen brought twenty blacks to Jamestown, Virginia (Webster, p. 2). This event marked the beginning of slavery in this country. It would not officially end until 1865.

Over the two hundred forty year period that the institution existed, the number of blacks confined to slavery continued to grow. By 1790, over 700,000 enslaved blacks were in the United States (Webster, p. 4). In 1860 the slave population was estimated at nearly 4,000,000 (Webster, p. 6).

The end of the Civil War and the defeat of the South provided great hope for blacks. Most blacks had little wealth or education, but now it appeared that they would at least have the freedom to pursue a better life and the opportunities to achieve financial sovereignty. The plans for the reconstruction of the South were supposed to provide a means for blacks to integrate into society, but they failed. Former slaves had difficulty finding jobs. Several groups tried to start their own businesses, but most were profitless due to a lack of experience. Blacks that had jobs, whether in the North or the South, were not paid the same wage as their white counterparts (Asante, p. 92). As the country moved toward the turn of the century, the outlook for progress was bleak.

In spite of the hardship, black leaders tried to create a positive attitude in the black community. They urged blacks to learn vocational skills and to educate themselves so they could compete with whites. But these efforts were made difficult by continued racial prejudice. Trade unions refused to offer membership to blacks and many institutions of higher learning refused them admission. Without such opportunities, blacks continued to struggle. Economic and social progress was limited as blacks fought for an equal playing field.

The fight was dealt a serious blow in 1896 when the Supreme Court decision in Plessey v. Ferguson concluded that separate accommodations in public facilities were acceptable as long as they were equal.[2] The negative impact of the Plessey decision was

apparent in the economic condition of blacks. Segregation extended into the workplace and coupled with the already established discrimination made it extremely difficult for blacks to get jobs. The jobs they were able to find mostly involved unskilled labor, working in unsafe environments for very little pay.

The country's economy started to pick up in the 1920's but for blacks very little economic progress was made. When the depression hit, blacks, already on the bottom of the economic ladder, suffered greatly. During the depression era it was estimated that 65 to 80 percent of blacks were on relief rolls (Webster, p.29).

By the end of World War II the country had managed to make it's way out of the depression, but a larger battle was facing blacks, the fight for their civil rights. In 1946, President Truman created the Committee on Civil Rights. At the urging of this Committee a series of legislative bills were drafted that pushed for equality between the races. Pressure was also placed on the judicial system to eradicate prejudices in the existing law. In 1954, the Supreme Court ruled in Brown v. the Board of Education of Topeka that segregation could no longer be practiced. This ruling overturned the earlier Plessey decision.

Segregation had been one of the major obstacles blocking the progress of blacks. The removal of this barrier catalyzed progress for blacks throughout the late fifties, sixties, and into the seventies.[3] Enrollment at all levels of education went up for blacks. In 1940, the median school years completed for a black was 6.9 years, by 1975 it had risen to12.3 years. The illiteracy rate was reduced by more than half from 7.5 percent in 1959 to 3.6 percent in 1969 (Historical Statistics of Black America: Volume 1, Gale Research p. 683). Employment grew and the earnings differential between blacks and

whites decreased.[4]

In the 1980 and 1990 progress slowed. The economy had transformed from production and manufacturing to service related industries. In the 1960's United States manufactures accounted for 96 percent of total auto sales in the domestic market, 96 percent of steel sales, and over 93 percent of the textile market. By 1980 the percentages dropped to 73 percent of the auto sales, 83 percent of the steel sales, and 53 percent in the textile market. The export markets dropped as well. In 1962 the United States controlled 22.6 percent of the total world sales of motor vehicles, by 1980 that figure had dropped to 11.4 percent (Zucker et al., p. 14). De-industrialization coupled with corporate downsizing reduced the number of labor-intensive jobs making it difficult for people without a college education to find work. Blacks, who historically are twice as likely to be unemployed as compared to whites and who are less likely to invest in higher education, were especially hurt (Bureau of Labor Statistics 1998). Furthermore, studies have found that blacks have longer post-displacement spells of unemployment compared to whites (Kruse 1988).

The struggle for equality remains a priority for blacks. Discrimination still exists as an inhibiting factor to their progress in the workplace and society in general. The social and economic conditions of blacks in this country are alarming. One third of blacks are poor, compared with just over 10 percent of whites. Recent statistics also reveal some discouraging educational trends. The proportion of black male high school graduates who go on to college is lower than it was in 1975, and there are more young black males in prison than in college (D'Souza, p. 6).

The substantial earnings gap between blacks and whites suggests that equality has

not yet been obtained. The stagnation in progress can be attributed in part to the remnants of a troubled history and the problems associated with current discrimination. However, the alarming statistics that show a drop in the number of black males attending college is perhaps the most insightful explanation as to why the earnings gap remains. It is important to ask why blacks are foregoing college. Is it possible that returns from a college education are not enough to justify the investment? Succeeding sections of this study examine the relationship between educational attainment and earnings, and whether the earnings differential diminishes as the level of education increases.

Related Literature

A vast amount of research has been devoted to the examination of the earnings differential between blacks and whites. Beyond the persistence of discrimination, economists have sought answers into why the gap in earnings has continued over the past thirty years without a significant change in size. For many researchers the investigative path has led them to an inquiry into how each group invests in human capital, specifically education, and the returns they receive from such investments.

Theodore Schultz (1961) argued that investment in human capital to improve skills and increase knowledge accounted for an impressive rise in real earnings per worker. Schultz tried to determine if relationships existed between various forms of human capital and earnings. In the case of education, Schultz pointed out that between 1929 and 1956 anywhere from 36 to 70 percent of the unexplained rise in earnings of labor could be attributed to the additional education of the work force. To further his argument for human capital investment Schultz projected that in the future, due to

technological progress, there would be a greater need for highly educated workers. However, despite the high returns and increased demand for education, Schultz observed an under-investment in this form of human capital among minority groups, which he concluded to be the major reason for their low earnings.[5] Schultz blamed this on discriminatory practices and failed governmental policy.

Schultz's article laid the groundwork for many more investigations into the relationship between human capital and earnings. Elements of Schultz 's work were further developed by subsequent researchers including Becker, Mincer, and Welch. Perhaps the most notable is Becker. His contributions comprise the most influential work in the study of human capital investment.

Becker, using 1940 and 1950 Census data, estimated and compared the returns to education for both whites and non-whites. His results showed that there was a substantially greater difference in income between high school graduates and college graduates for whites compared to non-whites. For Becker this did not necessarily mean that non-whites were gaining any less from a college education, but to determine the actual difference in the returns from college one must look at the cost to attend. Becker showed that both the indirect and direct costs of attending college for non-whites were lower in comparison to whites. The opportunity cost of forgone earnings for the non-white was less because the non-white high school graduate earned less. In addition, the non-whites usually attended a less expensive and presumably lower quality college than the whites. By adjusting for such costs, Becker observed that the difference in returns was substantially lowered. Becker estimated that the returns to college for a non-white male were 6.6 to 10 percent in the North and anywhere from 10.6 to 14 percent in the

South. The returns for urban white males were 14.5 percent across all regions. Despite the difference in returns Becker concluded that the incentive to invest in college existed for people of all races. (Becker p.69-113) The work of Becker and Schultz illustrated the positive impact of a college education on earnings. Hence, research in the area of human capital investment (schooling) focused more attention to answering the question of whether returns to education were consistent across racial and gender lines. In other words, did all groups receive the same wage premium as white males from increased years of education?

Welch (1967) found that schooling was a poor investment for blacks. Comparing 1960 census data for whites and non-whites, Welch observed that non-whites without any schooling earned 81 percent of their white counterparts while a non-white college graduate earned only 50 percent of what a white college graduate earned. Welch (1973) updated and reexamined the results of his 1967 study. Using a 1959 and a 1966 Survey of Economic Opportunity, Welch noticed that for black and white workers that had most recently entered the labor force (younger workers) there was no significant difference in the returns to education beyond high school. Both groups received approximately the same from additional education. Welch concluded that the equality in returns was at least partially influenced by gains in the quality of schooling blacks received. He also noted that on average, blacks that had entered the work force most recently had more education than their predecessors.

Mincer (1974) developed a schooling model to measure the relationship between numbers of years of education and earnings. By incorporating a vector of individual characteristics, Mincer was able to use the model to compare how the returns on

investment differed across individuals by age, race, gender, and other traits. The model has served as the cornerstone to subsequent studies on the earnings-education relationship. Mincer's schooling model has several variations, but the one applicable to this study estimates the log of earnings as a function of time spent in school. The model takes the form:

$$\text{Ln } Y_s = \ln \beta_o + rs.$$

$\ln Y_s$ represents the natural log of annual earnings of an individual with s years of schooling. This amount is equal to the log of the original earnings capacity $\ln \beta_o$, plus the discount rate, r, multiplied by the years of schooling. The basic conclusion of this equation is that percentage increments in earnings are strictly proportional to the absolute differences in the time spent at school, with the rate of returns as the coefficient of proportionality. More precisely, the equation shows the logarithm of earnings to be a strict linear function of time spent in school (Mincer 1974). Mincer conceded that the observed correlation between educational attainment, measured in years spent at school, and earnings of individuals, although positive is relatively weak (Mincer 1974); the coefficient of determination was only 7 percent using 1960 Census data. However, when earnings are averaged over groups of individuals differing in schooling, a clear and strong correlation emerges. The coefficient of determination increases to almost 33 percent. With regard to wage inequality, Mincer concluded that the persistence of these differentials was not only the result of differences in the amount of schooling but also the rate of returns on schooling. Therefore it may be assumed that individuals who receive higher returns from schooling spend more time and money on schooling investments.

Welch and Smith (1986) using Census data from 1940 to 1980 found that blacks

were attaining more education and were earning more. They also noted that the wages

for blacks that had continued their education beyond high school rose as rapidly as they

did for whites that had reached comparable education levels. Their results indicated that,

"...by 1980, 29 percent of working black men had incomes above that of the median

white" Smith and Welch (1986). In 1940 less than 10 percent of black males earned

above the white median.

Despite Welch's findings there were still questions about how the returns to a

college education affected the earnings gap. Belman and Heywood (1991) proposed the

possibility that whites and minorities have separate labor markets. Since there was a

smaller supply of minorities with high degrees of education there would be a greater

demand for them in the workplace, and therefore the returns to increased education would

be greater for minorities than for whites. If this were true then the gap in earnings would

be lower among those that had obtained additional years of education. The empirical

results of Belman and Heywood's study did not support this theory. Using data from the

May 1978 Current Population Survey, they found that the returns to increased education

(in terms of additional years) was higher for whites than for minorities. However, the

sheepskin effects (attainment of a degree) meant more in terms of a wage premium for

minority groups.

Gyiman-Brempong and Fichtenbaum (1993) refuted the idea that human capital

investment in terms of increased education had helped to diminish the wage gap between

blacks and whites. They found that while the education gap between blacks and whites

narrowed in the 1980's, there was no corresponding reduction in the wage gap between

the two groups. In fact, their research showed that the gap actually widened during the

period. In an attempt to offer an alternative explanation to the existence of the gap, they investigated the importance of how the labor market structure and the relative position of blacks compared to whites within these markets affected the wage gap. Using decomposition analysis of earnings models composed of a vector of labor market structure characteristics[6], personal characteristics and productivity characteristics, the two researchers found that the labor market structure due in large part to institutional racism, is the major factor of the black –white wage gap[7]. In the specific case of black and white males they concluded the entire wage gap could be attributed to the higher endowments of labor market characteristics (and the returns to these endowments) possessed by white males (Gyiman-Brempong and Fichtenbaum, p. 43).

Ashraf (1994) further examined the relationship between the earnings gap and returns to education. Taking a representative sample of the U.S. population (Panel Study of Income Dynamic Waves I-XX), Ashraf constructed a model comparing wages between blacks and whites over a twenty-year period from 1967 through 1986. The model estimated the log of hourly wage as explained by a group of independent variables comprised of characteristics of the individual respondents. These variables included demographic characteristics, types of work and specific regional effects. The results of this model showed a significant difference between wages existing between males and females of both races with the wages of men being higher. The model also confirmed that the attainment of a college education increased wages. As a point of interest, the returns for blacks were found to be higher than for whites over the twenty-year period observed. Ashraf attributed part of the higher returns to black college graduates to the benefit of affirmative action programs. For respondents with only a high school

education, the result was opposite; whites tended to receive greater returns than blacks. Ashraf believed that this was due, in large part, to discrimination. He argued that because the relative number of blacks with high school diplomas was larger than blacks with college degrees the potential for discrimination among the high school graduates was greater. Furthermore, Ashraf suggested that because there were a relatively small number of blacks with college degrees they would benefit more from affirmative action programs than the larger pool of black high school graduates (Ashraf, p. 288). The results also showed that wages for both blacks and whites in the South were below the wage level received in the rest of the country. However, the regional difference had a declining trend over the twenty-year time frame. Ashraf's findings that blacks had higher returns to college than whites re-affirmed the results of Belman and Heywood (1991) that minorities received higher returns for completing a college degree.

Choudhury (1994), measuring for gender based discrimination and differences in earnings between public and private sector workers found that the net gender earnings gap was smaller in the public sector market than it was in the private sector market. Thus she suggested that there are factors beyond education that contribute to the wage differential between groups of individuals, specifically an individual's choice of workplace sector. Choudhury's empirical findings revealed that in the public sector females tended to earn up to 26 percent more than females with similar jobs in the private sector. Males working in the public sector earned 12.8 to 19 percent more than their counterparts in the private sector, depending on specific occupations. Furthermore, the wage gap between males and females was reduced within public sector jobs. The results of the study indicated that in the public sector women earned 74 percent of what men

earned, as compared to 54 percent in the private sector. Although the focus of Choudhury's study was on gender discrimination, it reiterates and furthers the argument of Gyiman-Brempong and Fichtenbaum (1993) that differences in education account for only a portion of the wage gap.

Eckstein and Wolpin (1999) developed methods to measure how labor market discrimination accounted for group-based wage differentials. Using 1979 youth cohort data from the National Longitudinal Surveys of Labor Market Experience, the researchers found that the first wage for blacks was on average 15% less than the mean average first wage for whites with similar schooling. Furthermore, the first job search duration was one quarter to three quarters longer for blacks than for whites with similar educational backgrounds. Results of their models indicated that there were several reasons for the wage differential and difference in job search duration. These factors included racial discrimination, unobserved skill differentials, and race differences in reservation wages.

Mitra (1999) examined data from the 1988 National Longitudinal survey of Youth (Bureau of Labor Statistics 1997) to determine if structural characteristics of the firms and industries accounted for differences in the wages of blacks and whites. The analysis included 2,370 full time private sector workers. Using ordinary least squared regressions on background, human capital, and structural variables, Mitra found that on average blacks earn 14 percent less than whites. When he controlled for education and cognitive skills, he discovered that the wage gap between blacks and whites decreased significantly (approximately 75 percent). However, the gap increased once the structural characteristics of the firm were included. Mitra concluded that the difference was in part due to the fact that supervisory positions increase wages 12 percent for whites and only 5

percent for blacks. Furthermore, black workers were underrepresented in supervisory positions. According to the data, 32 percent of black males held supervisory positions compared to 49 percent of white males and 34 percent of black women held supervisory positions compared to 42 percent of white women (Mitra, p. 185).

In Summary, the body of reviewed literature highlights various explanations of the wage gap between blacks and whites. The debate focuses mostly on what impact education has had on decreasing the gap, and on how much of the gap can be explained by discrimination. The work of Schultz, Becker, Welch, and Mincer concluded that human capital in the form of education played a significant role in explaining wage differentials. Choudhary and Gyiman-Brempong and Fichtenbaum argued that education had a limited role in explaining the gap between blacks and whites, suggesting that labor market forces, unionization, and sector differences described a larger portion of the wage gap than educational attainment. Eckestien, Wolpin, and Mitra pointed to job selection and rate of promotion as reasons for the gap.

Notes

2 The case involved an incident where a Black male, Homer Adolph Plessey, had been arrested for riding in a "white section" on a Louisiana railway coach. Under the Louisiana Jim Crow laws blacks where forced to ride separate from whites. When Plessey refused to move he was arrested. Plessey brought the case to the Supreme Court in an attempt to overturn the law that he claimed, based on the fifteenth amendment, was unconstitutional. Ferguson, the defendant, was the judge in the criminal court where Plessey had been charged. The Supreme Court ruled against Plessey. This ruling held until 1954.

3 In a study examining black - white differences in schooling and earnings, Finis Welch commented that " the returns to blacks schooled in the 1920's and 1930's were so low that relative to whites, black income fell as school completion levels rose[…]returns, as a fraction of earnings, for blacks schooled in the 1950's and 1960's exceeded returns to whites." Welch attributed the gain to the higher quality of education blacks received after the end of segregation (Welch 1973).

4 In 1939 black men earned 45 percent of what white males earned and black women earned only 38percent of what white women earned. Between the years 1975 to 1982 black men earned up to 73percent of white men and black women earned 93 percent of what white women earned (Elliot, p. 388). The Bureau of Labor Statistics reported that in 1997 blacks earned 77 percent of what whites earn, down from 79 percent in 1986.

5 According to Schultz, "no small part of the low earnings of many Negroes, Puerto Ricans, Mexican nationals, indigenous migratory farm workers, poor farm people and some of our older workers reflects the failure to have invested in their health and education" (Schultz p14).

6 Market structure included: industry classifications, the regional distribution of the work force, part-time and part year employment, employment statistics, the unemployment rate and the probability of being employed.

7 The decomposition methods used by Gyiman-Brempong and Fichtenbaum to determine what factors are most responsible for the persistence of the earnings gap were first described in Oaxaca (1973). The model takes the sample means from the data and breaks down the differences in the mean wage from one group denoted the advantaged group and a second group denoted the disadvantaged group into the differences in the endowments with the residual being attributed to race discrimination.

CHAPTER 3

THE MODEL

In Chapter 2 we outlined the past and present occurrence of racism and how the

lack of opportunity for advancement helped explain why blacks earn less than whites.

However, there is still uncertainty as to how and to what degree discrimination influences

the difference in earnings. In their book, Economics Explained, Heilbroner and Thurow

argue the possibility of a relationship between discrimination, education and earnings.

> In virtually every field, black earnings are less than white earnings in the same
> jobs. In itself, of course, such facts do not prove that discrimination exists.
> An apologist for the differentials in wages could claim that there is a real
> difference in productivity of whites and blacks. In that case the question is
> whether there has been discrimination at a more basic level: for instance, in
> the access to education and training (Heilbroner and Thurow, p. 210).

The inference we can draw from this quote is that with education the earnings gap

can be reduced. In order to measure the effects of education on earnings we consider a

variant of Mincer's empirical wage equation.

$$lnW = \beta X' + \epsilon \quad (1)$$

where lnW, is the natural logarithim of hourly earnings, X is a vector of characteristics

that affect earnings, β represents the vector of slope coefficients, and ϵ is an error term.

The vector of explanatory variables, X, accounts for demographic, geographic, and

market factors that may cause variation in earnings. These variables include age, age

Squared, race, gender, size of the city, region of the country, hours worked in a week,

employment in the public or private sector, union membership, and industry category.[8]

Table 1 describes the expected relationships between the natural log of earnings and the

vector of independent variables.

Table 1. Definition of variables and expected sign of the relationship between
dependent and the independent variables

Variable	Definition	Sign
Lnearnhrs (dependent)	= The natural logarithm of hourly earnings	
	Key Independent Variables	
Bachelor's Degree	= 1 if the individual has a college degree	+
	= 0 if the individual does not have a degree	
Black	= 1 if the individual is Black	-
	= 0 if the individual is White	
	Control Variables	
Age	= Age of the individual	+
Age^2	= Age squared of the individual	-
Female	= 1 if the individual is Female	-
	= 0 if the individual is not Female	
Midwest	= 1 if the individual lives in the Midwest	-
	= 0 if the individual lives elsewhere	
Northeast	= 1 if the individual lives in the Northeast	+
	= 0 if the individual lives elsewhere	
South	= 1 if the individual lives in the South	-
	= 0 if the individual lives elsewhere	
West (reference)	= 1 if the individual lives in the West	
	= 0 if the individual lives elsewhere	
Large city	= 1 if the individual lives in a large sized city (above 2,500,000)	+
	= 0 if the individual lives elsewhere	
Medium city	= 1 if the individual lives in a medium size city (250,000-2,500,000)	+
	= 0 if the individual lives elsewhere	
Small city (reference)	= 1 if the individual lives in a small sized city (below 250,000)	
	= 0 if the individual lives elsewhere	
Hoursweek	= The number of hours worked in a week	+
Public	= 1 if the individual works for the government	?
	= 0 if the individual works in the private sector	
Private (reference)	= 1 if the individual works in the private sector	
	= 0 if the individual works for the government	
Unionmem	= 1 if the individual is a member of a union.	+
	= 0 if the individual is not member of a union	
Industry	= The individuals choice of work	?

Expected Relationship Between The Dependent And Independent Variables

According to the literature, a college education (*Bachelor's degree*) should increase an

individual's earnings. Therefore, we expect this variable to have a positive and significant

relationship with the log earnings of an individual. The variable *Black*, which measures

the effect of race on earnings, should have a negative sign. Current statistics show that

blacks earn about 60 percent of what whites earn (Bureau of Labor Statistics 1997)[9].

Through on the job experience individuals accumulate human capital, which

makes them more productive and increases their earnings. However, the returns on

experience declines over time. Based on this relationship, earnings should increase

throughout a person's lifetime but at a decreasing rate, therefore the coefficient on the

Age variable should be positively correlated to the earnings while the coefficient on the

Age^2 variable will have a negative sign. Statistics indicate that males earn more than

females and henceforth the gender variable, *Female* will be negatively correlated to

earnings. The city size (*Medium city and Large city*, and the reference group *Small city)*

and geographic location (*Northeast, Midwest, South*, and the reference group *West)* are

expected to have significant varying effects on earnings due to the differences in

opportunity and standard of living across the country. The hours worked in a week,

Hoursweek, measures the relationship between time-spent working and earnings. During

the life cycle of an individual, the tendency will be to work more when earnings are

higher and less when earnings are lower. At higher earnings, the opportunity cost of not

working is greater than at lower earnings. Therefore, it would seem likely that those who

work a greater number of hours would have higher hourly earnings, the relationship

between *Hoursweek* and the dependent variable will be positive. *Public* represents the

effect of working in the public sector on one's earnings. For this study *Public* identifies individuals that are employed by the local, state, or federal government. The sign of the variable is ambiguous. Because of the varying occupations within each sector, it is difficult to predict the effects of this variable on earnings. Union membership, *Unionmem*, implies that the individual's earnings are determined by a collective bargaining agreement. Earnings for union members tend to be higher on average than their non-union counterparts. Therefore the coefficients on *Unionmem* are expected to be positive. Finally, because of the aggregation of the industry variable, the expected sign is unknown.

<div align="center">Data and Descriptive Statistics</div>

The data used in this study comes from the **Current Population Survey Outgoing Rotation Group, 1996**. The survey is produced by the United States Department of Commerce, Bureau of the Census. It includes black and white individuals living in the four geographic areas, Midwest, Northeast, South, and West. Only those individuals with at least a high school diploma were included in the sample since the purpose of this study is to measure the marginal effect of a college education beyond high school. Furthermore, the data consider individuals who are employed and between the ages 18 and 65. This constraint on the data is imposed because the study is specifically concerned with the discrepancy in earnings derived from employment. Self-employed individuals were also excluded from the sample.

Table 2a. Means and Standard Deviations for the pooled data

Variables	Pooled n= 41,168	Black n= 4,737	White n= 36,431
Lnearnhrs	2.280 (.470)	2.178 (.424)	2.294 (.471)
Bach. Degree	.201 (.401)	.150 (.357)	.208 (.406)
Black	.115 (.319)		
Age	37.764 (11.579)	37.187 (11.089)	37.840 (11.639)
Age^2	1560.223 (918.446)	1505.786 (871.725)	1567.301 (924.123)
Female	.520 (.500)	.567 (.496)	.513 (.500)
Large city	.295 (.456)	.449 (.497)	.275 (.446)
Medium city	.353 (.478)	.356 (.479)	.353 (.478)
Small city	.352 (.478)	.196 (.397)	.373 (.483)
Midwest	.272 (.445)	.183 (.387)	.284 (.451)
Northeast	.294 (.456)	.325 (.469)	.290 (.454)
South	.231 (.421)	.427 (.495)	.205 (.404)
West	.203 (.402)	.064 (.245)	.221 (.415)
Hoursweek	37.806 (8.958)	38.387 (7.349)	37.730 (9.143)
Private	.866 (.341)	.823 (.381)	.872 (.335)
Public	.134 (.341)	.178 (.381)	.129 (.335)
Unionmem	.172 (.377)	.199 (.399)	.168 (.374)
Agriculture	.020 (.140)	.006 (.077)	.022 (.146)
Education & Soc. Services	.120 (.325)	.152 (.359)	.116 (.320)
Health Services	.113 (.317)	.150 (.357)	.109 (.311)
Manufacturing & Construction	.277 (.448)	.231 (.422)	.283 (.450)
Miscellaneous Services	.055 (.228)	.052 (.223)	.055 (.229)
Professional Service	.116 (.320)	.135 (.341)	.114 (.317)
Transportation	.080 (.270)	.095 (.293)	.077 (.270)
Sales	.220 (.414)	.179 (.384)	.225 (.417)

Note: standard deviations are in parentheses below each mean

Table 2b. Means and Standard Deviations by Educational Attainment

?s	High School			Bachelor's Degree		
	Pooled n=32,879	Black n= 4,028	White n=28,851	Pooled n=8,298	Black n= 709	White n= 7,580
Lnearnhrs	2.224	2.134	2.237	2.501	2.424	2.509
	(.435)	(.403)	(.437)	(.522)	(.458)	(.527)
Black	.123			.085		
	(.328)			(.280)		
Age	37.831	37.148	37.926	37.502	37.409	37.511
	(11.863)	(11.304)	(11.934)	(10.375)	(9.781)	(10.430)
Age^2	1571.866	1507.690	1580.826	1514.038	1494.969	1515.821
	(939.639)	(886.827)	(945.086)	(832.896)	(780.888)	(837.622)
Female	.502	.557	.495	.588	.608	.584
	(.500)	(.497)	(.500)	(.492)	(.488)	(.493)
Large city	.281	.439	.259	.350	.504	.336
	(.449)	(.496)	(.438)	(.477)	(.500)	(.472)
Medium city	.352	.354	.352	.356	.365	.355
	(.478)	(.478)	(.478)	(.479)	(.481)	(.478)
Smallcity	.367	.207	.389	.295	.131	.310
	(.482)	(.405)	(.488)	(.456)	(.338)	(.462)
Midwest	.275	.183	.288	.261	.188	.268
	(.447)	(.387)	(.453)	(.439)	(.391)	(.443)
Northeast	.292	.324	.287	.302	.334	.299
	(.455)	(.468)	(.452)	(.459)	(.472)	(.458)
South	.242	.435	.215	.188	.387	.170
	(.428)	(.496)	(.411)	(.391)	(.487)	(.376)
West	.192	.059	.211	.248	.092	.262
	(.394)	(.236)	(.408)	(.432)	(.289)	(.440)
Hoursweek	38.122	38.266	38.102	36.550	39.071	36.314
	(8.625)	(7.246)	(8.800)	(10.073)	(7.882)	(10.223)
Private	.888	.845	.894	.779	.700	.787
	(.316)	(.362)	(.308)	(.415)	(.459)	(.410)
Public	.112	.155	.106	.221	.300	.213
	(.316)	(.362)	(.308)	(.415)	(.459)	(.410)
Unionmem	.179	.201	.176	.144	.186	.140
	(.383)	(.401)	(.381)	(.351)	(.390)	(.347)
Agriculture	.021	.007	.023	.014	.000	.016
	(.145)	(.083)	(.151)	(.120)	(.000)	(.125)
Education & Soc. Services	.096	.128	.091	.216	.291	.209
	(.294)	(.334)	(.288)	(.411)	(.454)	(.406)
Health Services	.091	.146	.083	.204	.172	.207
	(.287)	(.353)	(.276)	(.403)	(.378)	(.405)
Manufacturing & Construction	.312	.254	.320	.137	.103	.140
	(.463)	(.435)	(.467)	(.344)	(.304)	(.347)
Miscellaneous Services	.058	.056	.058	.044	.030	.045
	(.234)	(.231)	(.234)	(.205)	(.170)	(.208)
Professional Service	.103	.125	.100	.168	.186	.167
	(.304)	(.331)	(.300)	(.374)	(.390)	(.373)
Transportation	.080	.091	.079	.075	.114	.071
	(.272)	(.288)	(.270)	(.263)	(.318)	(.257)
Sales	.239	.193	.246	.142	.104	.146
	(.427)	(.394)	(.430)	(.349)	(.306)	(.353)

Note: standard deviations are in parentheses below each mean.

The complete sample contained 41,168 individuals. Tables 2a and 2b provide the means and standard deviations of the dependent and independent variables. The first set of values (Table 2a) pertain to the combined data while the second set (Table 2b), represents the separate values for individuals with a high school diploma and individuals that have attained a bachelor's degree. These tables give a breakdown of the sample size for each category of race and educational level examined in this study, and the average values and standard deviations for each variable corresponding to the specific samples used. These tables are useful because they provide a general makeup of the individuals that comprise the sample and they allow for comparisons between the characteristics of the groups of individuals being examined in this study.

The summary statistics in Tables 2a and 2b provide the following information:

1. A higher percentage of whites have received a bachelor's degree, 20.8 percent as compared to 15 percent of blacks.

2. Blacks make up about 11.5 percent of the total sample, but only 8.5 percent of the sample that includes only bachelor degree recipients.

3. The gender makeup of the total sample is divided almost equally between males and females. However, considering the black sample, 56.7 percent are female. This percentage increases to 60.8 percent for blacks with a bachelor's degree. The gender makeup of the white population is approximately 50 percent men and 50 percent women in the high school sample. The percentage of females increases in the bachelor degree sample to 58 percent.

4. A larger percentage of the black individuals live in large cities, 45 percent compared to 27.5 percent of the white individuals.

5. Approximately 43 percent of the black population resides in the southern region of the United States. The white population, in comparison, is distributed rather evenly across the four geographic areas.

6. A much higher percentage of blacks work in the public sector, 17.8 percent as compared to 12.9 percent. This disproportion is even greater for those individuals with a bachelor's degree where 30 percent of blacks work in the public sector compared to 21.3 percent of whites.

7. Blacks are more likely to be a member of a union. Indeed, 20 percent of blacks are union members compared to 16.8 percent of whites. This tendency is consistent across educational levels.

8. For the most part, industry choices are similar across racial lines. However, they differ according to educational attainment. For high school graduates, the highest industry frequencies are in manufacturing and construction 31.2 percent and in sales, 23.9 percent. Individuals with a bachelor's degree tend to be employed in education and social service jobs or professional services.

From the above analysis we can already detect a number of characteristics that set apart the black and white populations. The next chapter analyzes whether such differences account for the earnings gap between the two racial groups.

Notes

8 A list of the industry categories is given in appendix I.

9 The median income for the main white householder was 38,972 compared to 25,050 for the main black householder (U.S. Census Bureau 1997).

CHAPTER 4

ECONOMETRIC RESULTS

Table 3 presents the results of the regression of the earnings model described in chapter 3. These results suggest that the hourly earnings are significantly influenced by the independent variables. The adjusted R^2 of .37, indicates that 37 percent of the variation in the *Lnearnhrs* is explained by the variables included in the model. The F-statistic, 1211.397, confirms that the independent variables used in this model are useful to explain the Lnearnhrs.

In our OLS results there are two types of variables. For the continuous variables, *Age, Age ^{2}, and Hoursweek*, the coefficients can be interpreted as percentages. For the dummy variables with discrete values, the coefficients are converted into percentages using the formula (e^x-1).

The findings suggest that a *Bachelor's degree* enhanced an individual's earnings by approximately 29.7 percent over the earnings of the individual with only a high school diploma. The results also indicate that on average blacks *Black* earn about 12 percent less than whites.

In addition to the effects of race and education, we observe, from Table 3, the weight and strength of the other characteristics. The results are consistent with the hypothesis that age is positively correlated with earnings and negatively correlated with

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Table 3. OLS Regression Results for the Pooled Data

Dependent Lnearnhrs		$e^x-1*100$
	.260***	29.7%
	(54.486)	
Black	-.129***	-12.1%
	(-21.652)	
Age	.043***	
	(41.832)	
Age^2	-.00045***	
	(-34.916)	
Female	-.170***	-16%
	(-41.154)	
Large city	.138***	14.8%
	(28.631)	
Medium city	.067***	.069%
	(15.207)	
Midwest	-.037***	-3.6%
	(-6.775)	
Northeast	-.016***	-1.6%
	(-2.908)	
South	-.059***	-5.7%
	(-10.347)	
Hoursweek	.008***	
	(36.399)	
Public	.064***	6.6%
	(8.698)	
Unionmem	.186***	20%
	(35.059)	
Agriculture	.166***	18%
	(12.137)	
Education & Soc.Services	.129***	13.8%
	(15.030)	
Health Services	.276***	31.8%
	(39.593)	
Manufact. & Construction	.246***	27.9%
	(44.586)	
Misc. Services	.020**	2%
	(2.318)	
Prof. Service	.193***	21.3%
	(28.784)	
Transportation	.260***	29.7%
	(32.525)	
Constant	.859***	85.9%
	(42.065)	
# of observations	41,147	
Adjusted R squared	.370	
Standard Error	.3705	
F stat	1211.397	
F sig	.000	

Note: T- ratios are below each coefficient. The asterisks, *, **, *** indicate statistical significant at the .1, .05, .01 levels, respectively. The coefficients on the continuous variables, *Age, Age* ^{2}*, and Hoursweek*, can be interpreted as percentages. For the dummy variables, the coefficients are converted into percentages (e^x-1).

Age^2. For each additional year of age earnings increases by 4.3 percent, whereas the quadratic element, Age^2, decreases earnings .045 percent. Females (*Female*) earn 16 percent less than males.

The results of the model indicate that living in a larger city helps to enhance an individual's earnings. Both the dummy variables *Medium city* and *Large city* have positive and significant coefficients. Earnings increase by over 14.8 percent for those living in a large city and 6.9 percent for those living in a medium sized city. The geographic variables show that individuals living in the *Northeast, Midwest* and *South* earn slightly less than those working in the *West*. The number of hours that an individual works weekly (*Hoursweek*) has a positive but weak effect on earnings. Working in the *Public* sector has a positive impact on earnings. Public sector workers earn 6.6 percent more than workers in the private sector. Union membership has a strong positive effect on earnings. A member of union (*Unionmem*) will experience an earnings increase by nearly 20 percent compared to a non-union member. Using *Sales* as the reference for industry grouping we find that job selection is a significant factor in determining earnings. All industry categories were significant at the five percent level.

In order to take a closer look at the role of education in determining earnings, the sample was split by educational categories. Table 4 shows a comparison of the earnings functions when we control for the education variables, high school and bachelor's degree. The adjusted R^2 suggests that the independent variables explain about 37.6 percent of the variation in *Lnearnhrs* in the high school sample and 27.9 percent in the bachelor's degree sample. Again, the F-statistics, 1044.204 (high school) and 170.063 (bachelor's degree) reaffirm the explanatory value of the independent variables.

Table 4. OLS Estimates by educational attainment

Dependent Lnearnhrs	High School		Bachelor's degree	
Black	-.116***	-11%	-.157***	-14.5%
	(-19.277)		(-8.716)	
Age	.040***		.066***	
	(39.006)		(19.097)	
Age^2	-.00042***		-.00072***	
	(-32.008)		(-16.752)	
Female	-.179***	-16.4%	-.121***	-11.4%
	(-41.411)		(-11.052)	
Large city	.123***	13%	.197***	21.8%
	(24.463)		(15.399)	
Medium city	.061***	6.3%	.087***	9.1%
	(13.575)		(7.089)	
Midwest	-.032***	-3.1%	-.052***	-5.1%
	(-5.562)		(-3.797)	
Northeast	-.007	-.7%	-.041***	-4%
	-(1.182)		(-3.010)	
South	-.061***	-5.9%	-.052***	-5.3%
	(-10.143)		(-3.401)	
Hoursweek	.008***		.008***	
	(34.415)		(15.781)	
Public	.063***	6.5%	.092***	9.6%
	(7.666)		(5.585)	
Unionmem	.197***	21.7%	.104***	10.9%
	(36.501)		(6.813)	
Agriculture	.155***	16.8%	.219***	24.5%
	(11.248)		(5.099)	
Education & Social Services	.091***	9.5%	.293***	34%
	(9.658)		(14.328)	
Health Services	.163***	17.7%	.566***	76.1%
	(21.396)		(32.749)	
Manufacturing & Construction	.227***	25.5%	.338***	40.2%
	(41.321)		(17.984)	
Miscellaneous Services	.025***	2.5%	.032	3.2%
	(2.882)		(1.187)	
Professional Services	.164***	17.8%	.357***	42.9%
	(23.087)		(20.235)	
Transportation	.258***	29.4%	.327***	38.7%
	(31.420)		(14.276)	
Constant	.936***	93.6%	.493***	49.3%
	(46.019)		(7.095)	
# of Observations	32,859			8,269
Adjusted R Square	.376			.279
Standard Error	.3433			.4429
F stat.	1044.204			170.063
F sig	.000			.000

Note: T- ratios are below each coefficient. The asterisks, *, **, *** indicate statistical significant at the .1, .05, .01 levels, respectively. The coefficients on the continuous variables, *Age, Age ^{2}, and Hoursweek*, can be interpreted as percentages. For the dummy variables, the coefficients are converted into percentages (e^x-1).

The partition of the sample highlights the differences in the earnings between individuals with only high school diplomas and those with bachelor's degrees. There is a negative relationship between the race variable *Black* and the dependent variable, *Lnearnhrs*, regardless of educational level. However, the magnitude of the relationship increases at the bachelor's degree level. Blacks with only a high school diploma earn about 11 percent less than their white counterparts. In comparison, blacks with a bachelor's degree earn approximately 14.5 percent less than whites at the same educational level.

The effects of the age variables are similar in terms of direction and significance to the findings in Table 3. The variables *Age* and *Age²* have a positive and negative relationship, respectively. The positive influence of age is stronger in the bachelor's degree model with a 6.6 percent increase compared to a 4 percent increase and the *Age²* variable has a slightly higher negative effect. This is consistent with the quadratic relationship between earnings and age. Females with a high school degree earn 16.4 percent less than males, while females with a bachelor's degree earn 11.4 percent less. Living in a large city increases earnings for a high school graduate by 13 percent and a college graduate by almost 21.8 percent. Living in a medium sized city increases a college graduate's earnings by about 9.1 percent and a high school graduate's earnings by 6.3 percent. The coefficients on all the regional variables were negative for both the high school and bachelor degree samples. The disadvantage was greatest for individuals living in the *South*. High school graduates in this region earned about 5.9 percent less than the reference group and bachelor degree recipients earned 5.3 percent less. The *Hoursweek* variable positively impacts earnings and is fairly consistent across

educational categories, adding approximately 1 percent to earnings. Working in the

Public sector has a positive effect on earnings for both high school and college graduates.

For high school graduates the difference is almost 6.5 percent. For college graduates the

difference is about 9.6 percent. Being a member of a union will also increase earnings

irrespective of education. However, the benefit of union membership for a high school

student is more substantial. Union members with only a high school degree receive a

21.7 percent earnings premium compared to non-union workers with equivalent

education. College graduates that are members of a union earn 10.9 percent more than

college graduates that are not in a union.

In both samples all the industry coefficients were positive and significant in

comparison with the reference group sales. The higher paying industries at the high

school level were in the *Manufacturing and Construction* category and the

Transportation category. For bachelor's degree recipients the highest paying categories

were *Professional Services* and *Health Services*.

Major Findings of the Empirical Results

1. The race characteristic, *Black*, has a negative impact on the *lnearnhrs* for individuals at

both levels of education. The effect is more pronounced at the bachelor degree level.

2. *Age* has a positive effect on earnings for both the high school graduates and the college

graduates. The Age^2 variable is negatively related to earnings.

3. The gender characteristic, *Female* has less of a negative impact on the *lnearnhrs* for

individuals that have received a bachelor's degree.

4. Living in a large city has a strong positive relationship on earnings for bachelor degree recipients and a modest effect for high school graduates.

5. Geographic variables in reference to the western region have a negative impact on the earnings at both levels of education.

6. The amount an individual works will affect the amount that they earn.

7. Union membership helps to increase the earnings for high school and college graduates. The relative increase is more substantial for individuals with only a high school diploma.

8. Workers in the *Public* sector earn more than their counterparts in the private sector, regardless of their educational attainment. The positive effect is slightly greater for bachelor degree recipients.

9. Industry choice affects earnings. For high school graduates transportation and manufacturing and construction offered the highest premiums. For bachelor degree recipients health services and professional services offered the highest rewards.

Decomposition

The results in Table 4 report the differences between the earnings functions of individuals with a bachelor's degree and those with only a high school education. These findings show that a college education leads to higher earnings. But does the increase in level of education reduce the earnings gap between blacks and whites? The race variable appears to have a stronger negative impact (-14.5 percent) at the bachelor degree level. This might imply that a bachelor's degree, although raising a black individual's earnings, does not reduce the gap between black and white earnings. However, the regression analysis

used thus far divided the data into two education classifications and not specifically into two race groups. In order to determine if the earnings differential is the result of discrimination or merely the differences in earnings determining endowments, we must first estimate separate earnings equations for both race groups at each level of education. The separate equations will allow us to decompose the earnings difference as a function of two factors: the returns to the earnings determining characteristics (endowments) and the endowments themselves. The difference in the returns to earnings determining characteristics can be thought of as a measure of discrimination. The method of decomposition (Oaxaca & Blinder) procedure is outlined in Appendix II. The procedure enables us to isolate and measure the extent of discrimination.

Table 5 reports the estimates for the earnings model for blacks and whites controlling for education. While the characteristics that are significant in determining the earnings for black and white high school graduates are somewhat similar, the same cannot be said for college graduates (geographical and many industry variables are significant for whites but not for blacks). This fact makes the decomposition analysis difficult because one of the underlying assumptions behind this method of analysis is that the two groups are perfect substitutes for one another.

Using coefficient estimates contained in Table 5 and multiplying them by the mean values of the explanatory variables in Table 2b, we can calculate the average earnings difference for blacks and whites at both levels of education, as in Equation 2.

Table 5. OLS Estimates of the Effects of Education and Race

Dep. Lnearnhrs	High School Black		White		Bachelor's Degree Black		White	
Age	.035*** (11.119)		.041*** (37.558)		.042*** (3.739)		.067*** (18.610)	
Age^2	-.00036*** (-9.000)		-.00043*** (-30.957)		-.00044*** (-3.116)		-.00074*** (-16.349)	
Female	-.096*** (-8.224)	-9.2%	-.191*** (-41.130)	-17.4%	-.098*** (-2.946)	-9.3%	-.123*** (-10.662)	-11.6%
Large city	.154*** (8.875)	16.6%	.121*** (22.758)	12.9%	.060 (1.184)	6.2%	.205*** (15.472)	22.8%
Medium city	.087*** (5.619)	9.1%	.059*** (12.491)	6%	.025 (.496)	2.5%	.088*** (6.895)	9.1%
Midwest	-.002 (-.084)	-.2%	-.035*** (-5.942)	-3.4%	-.052 (-.825)	-5.1%	-.053*** (-3.775)	-5.2%
Northeast	.014 (.592)	1.4%	-.009 (1.493)	-.9%	-.052 (-.877)	-5.1%	-.041*** (-2.910)	-.4%
South	-.045* (-1.837)	-.44%	-.061*** (-9.693)	-5.9%	-.084 (-1.454)	-8.1%	-.052*** (-3.218)	-5.1%
Hoursweek	.008*** (10.668)		.008*** (32.237)		.013*** (6.267)		.008*** (14.872)	
Public	.091*** (4.727)	9.5%	.059*** (6.477)	6%	.133*** (2.820)	14.2%	.090*** (5.129)	9.4%
Unionmem	.176*** (11.765)	19.2%	.200*** (34.519)	22.1%	.179*** (4.223)	19.6%	.096*** (5.910)	10%
Agriculture	.108 (1.640)	11%	.159*** (11.250)	17.2%	-	-	.232*** (5.346)	26.1%
Education & So. Services	.021 (.875)	2.1%	.097*** (9.428)	10.2%	.122* (1.843)	13%	.303*** (14.088)	35.4%
Health Services	.033* (1.716)	3.3%	.183*** (21.983)	20.1%	.279*** (4.478)	32.2%	.586*** (32.594)	79.7%
Manufact. & Construction	.155*** (8.909)	16.7%	.234*** (40.335)	26.4%	.131* (1.906)	14%	.351*** (17.962)	10%
Misc. Services	-.008 (-.327)	-.8%	.027*** (2.907)	2.7%	-.045 (-.444)	-4.4%	.039 (1.400)	4%
Professional Services	.078*** (3.958)	8.1%	.176*** (23.034)	19.2%	.224*** (3.736)	25.1%	.364*** (19.763)	43.9%
Transport.	.138*** (6.017)	14.8%	.273*** (31.090)	31.4%	.107 (1.577)	11.3%	.346*** (14.213)	41.3%
Constant	.917*** (14.286)	91.7%	.926*** (42.973)	92.6%	.860*** (3.841)	86%	.457*** (6.244)	45.7%
# obs.	4,009		28,832		691		7561	
Adjusted R sq	.285		.386		.207		.285	
Standard Err.	.3405		.3429		.4082		.4452	
F stat	90.137		1006.815		11.841		169.137	
F significance	.0000		.0000		.0000		.0000	

Note: T- ratios are below each coefficient. The asterisks, *, **, *** indicate statistical significant at the .1, .05, .01 levels, respectively. The coefficients on the continuous variables, *Age, Age ^{2}, and Hoursweek*, can be interpreted as percentages. For the dummy variables, the coefficients are converted into percentages (e^x-1).

The earnings difference is:

$$\ln W_w - \ln W_b = \Sigma b_w X_w - \Sigma b_b X_b \qquad (2)$$

rearranging terms we have,

$$\ln W_w - \ln W_b = \Sigma b_w(X_w - X_b) + \Sigma(b_w - b_b))X_b \qquad (3)$$

$\Sigma b_w(X_w - X_b) = $ difference in endowments

$\Sigma(b_w - b_b)X_b = $ difference in returns

The results are shown in Table 6. By substituting the black mean values into the white

earnings models we can create a hypothetical black earnings for both levels of education.

Subtracting the actual black earnings from the hypothetical earnings yields the

endowment difference (equation 3). Subtracting the hypothetical earnings from the

actual white earnings gives the difference based on the returns to the endowments

(equation 3).

Table 6. – Decomposition of the gap in earnings between Black and Whites (Real Dollars based on weekly pay).

	Black earnings	White earnings	Black earnings*	Earnings difference	Endowment difference	Returns difference
High School Education	8.41	9.23	9.36	.82	-.13	.95
Bachelor's Degree	11.29	12.05	13.00	.76	-.95	1.71

Note: the, * , represents the hypothetical earnings of blacks, given white returns.

The results in Table 6 show the earnings difference in dollar figures. For black and white individuals with only a high school diploma actual hourly earnings difference is $.82. For individuals with a bachelor's degree the difference is $.76. These findings imply that the earnings difference is slightly diminished by additional education. However, further examination of the results reveal the possibility that discrimination is greater at the bachelor's degree level. At both levels of education the earnings difference between blacks and whites can be completely attributed to the returns. The results indicate that if blacks had the same returns on endowments as whites they would actually earn more money at both levels of education. For high school graduates the returns difference is $.95 and for bachelor degree recipients the difference is $1.71.

Table 7 provides a breakdown of the productive characteristics that contribute to the earnings gap between blacks and whites at both the high school and the bachelor's degree levels. The gap in the natural log earnings between blacks and whites is captured by the difference in the intercept coefficients and the differences in the industry and personal characteristics of the individuals that comprise each group. The decomposition incorporates the differences in the descriptive factors (means) of the two groups, endowment differences, and the "treatment" differences, the advantage of being white and the disadvantage of being black. The advantages of being white are calculated by subtracting $\beta_{white} - \beta*$ (pooled) weighted by the means for a white individual. The disadvantage of being black is calculated by subtracting $\beta*$ (pooled) $- \beta_{black}$ weighted by the means for a black individual.

Table 7. Decomposition of the black-white earnings gap (log differences)

Variable	High School				Bachelor's Degree			
	Total Diff.	Endow. Diff.	White Adv.	Black Dis.	Total Diff.	Endow. Diff.	White Adv.	Black Dis.
Age	0.255	0.032	0.042	0.213	0.942	0.007	0.038	0.904
Age^2	-0.137	-0.031	-0.020	-0.117	-0.464	-0.015	-0.032	-0.432
Female	-0.041	0.012	-0.005	-0.036	-0.012	0.003	-0.001	-0.012
Large city	-0.036	-0.022	-0.003	-0.033	0.039	-0.034	0.000	0.039
Medium city	-0.010	0.000	-0.001	-0.009	0.022	-0.001	0.000	0.022
Midwest	-0.010	-0.004	-0.001	-0.008	-0.004	-0.004	0.001	-0.004
Northeast	-0.007	0.000	-0.001	-0.007	0.005	0.001	0.000	0.005
South	0.007	0.013	0.002	0.005	0.024	0.011	0.001	0.023
Hoursweek	-0.001	-0.001	0.000	-0.001	-0.217	-0.022	-0.002	-0.216
Public	-0.008	-0.003	-0.001	-0.007	-0.021	-0.008	-0.001	-0.020
Unionmem	0.000	-0.005	0.000	0.000	-0.020	-0.004	-0.002	-0.018
Agriculture	0.003	0.003	0.000	0.003	0.004	0.005	0.001	0.003
Education & Soc. Services	0.006	-0.004	0.000	0.006	0.028	-0.025	0.000	0.028
Health Services	0.010	-0.012	0.000	0.010	0.073	0.021	0.006	0.068
Manufact & Construction	0.036	0.015	0.004	0.032	0.036	0.013	0.003	0.034
Miscellaneous Services	0.002	0.000	0.000	0.002	0.003	0.001	0.000	0.003
Professional Services	0.008	-0.004	0.001	0.007	0.019	-0.007	0.001	0.018
Transportation	0.009	-0.003	0.001	0.008	0.012	-0.015	0.000	0.012
Constant	0.009	0.000	-0.010	0.019	-0.403	0.000	-0.036	-0.367
TOTAL	0.095	-0.014	0.008	0.087	0.066	-0.073	-0.023	0.090

The most glaring discrepancy can be observed in the age parameter. In both the high school and bachelor's degree categories the advantage of being white or disadvantage of being black is apparent. The age variable serves as a proxy for experience. The difference in returns from additional years of age might imply that blacks are not receiving the wage increases or promotions at the same rate as their white counterparts. This would be consistent with the findings of Mitra (1999).

CHAPTER 5

CONCLUSION

The purpose of the study was to determine if the difference in earnings between

blacks and whites in the United States is reduced as individuals increase their educational

level from a high school diploma to a bachelor's degree. Although additional education

raises the earnings level for all individuals it appears that it does little to reduce the

percentage difference in earnings between the two races. In fact, the results of the

earnings equations for the split samples of individuals with only high school diplomas

and individuals with bachelor's degrees indicated that the percent earnings differential

was greater at the higher level of educational attainment. The results of the

decomposition indicated a slight reduction in the earnings disparity, but also reveal the

possible presence of discrimination. Furthermore, the model indicates that the amount of

earnings discrimination blacks face increased for individuals with a bachelor's degree.

These results would appear to reinforce the conclusion that education alone does not

erase the earnings gap or eliminate earnings discrimination.

However, the comparison of the earnings equations when the sample was split by

race revealed that the earnings function for whites and blacks differs. This observation

complicates the earnings comparison between the two groups because characteristics that

appear to influence the amount of earnings received by one group do not influence the

earnings of the other. This finding would give merit to the argument that the two groups are not perfect substitutes, which is contrary to an assumption inherent in the Blinder-Oaxaca decomposition methods used in this study. This is not to say that educational attainment, and discrimination are useless in describing the earnings differential. The results of the study provide evidence that education has a significant impact on earnings and reinforces the likelihood that discrimination exists as a component of the earnings gap. Nevertheless, it is likely that there are other influential factors absent from this study that account for the earnings gap. For instance the U.S. Bureau of Labor Statistics reported that in the third quarter of 1999 the unemployment rate for blacks was 8.3 percent compared with 3.8 percent for whites. Since this study only took into account individuals that were employed it may in fact underestimate the gap between the earnings of the aggregate population of blacks and whites. Furthermore, variables such as the quality of education and the field of study were not considered in this study. These variables are likely to influence earnings, but unfortunately the information needed to include these variables is not readily available.

Still, the goal of this paper was to specifically determine if the attainment of a bachelor's degree reduced the earnings disparity between blacks and whites and the discrimination associated with this earnings difference. The results of this study indicate that this relationship is unclear.

APPENDIX I

The industry categories:	Variable Name:
Agriculture, Fishing, and Mining	Agriculture
Education Social Services & Public administration	Education & Social Services
Construction and Manufacturing	Manufacturing & Construction
Health Services	Health Services
Miscellaneous Services	Miscellaneous Services
Professional Services	Professional Services
Transportation Communication ,Utilities, & Sanitation	Transportation
Wholesale and Retail Trade (Reference Group)	Sales

APPENDIX II

BLINDER–OAXACA DECOMPOSITION

In order to explain the wage gap between blacks and whites in the labor market, we use the Blinder–Oaxaca procedure for decomposition.

Empirical studies of wage discrimination by Alan Blinder (1973) and Ronald Oaxaca (1973) provide the framework and methods for this determination. The models assume that if you eliminate the possibility of discrimination, the remaining estimated factors that determine one's wage, characteristics or endowments, will be the same for each group analyzed. The presence of discrimination is found by observing the differences in the estimated coefficients. By taking the least square estimated wage equations for two groups and separating the mean log differences into two parts we accomplish this. The difference in productivity characteristics (the difference in the coefficients of each group weighted by their means) and the residual wage difference (the differences in the group characteristics weighted by the wage equation parameters). The residual is used to determine the discrimination coefficient, the percentage amount that the discriminated would have received if discrimination was not present.

1. Suppose two groups, one advantaged and the other disadvantaged. We gather all the relevant data on those characteristics that affect one's wage, and determine the mean values for each group.

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2. Estimate how changes in the characteristics affect wages

The wage function for the advantaged group (white) is: $\ln W_w^* = X_w^* B_w^* + u^*$.

The wage function for the disadvantaged group (black) is: $\ln W_b^* = X_b^* B_b^* + u^*$

Where:

W is a vector of wages.

u is a random disturbance term.

X is a vector of explanatory variables.

B is the estimated slope coefficients.

3. Using the mean values for blacks and plugging them into the black wage equation we can obtain the average wage for a black individual (actual black wage). Likewise, by taking the mean values for whites and plugging them into the white wage equation we can obtain the average level for a white individual (actual white wage). By subtracting the two we get an average difference.

4. We determine the wage level of blacks if their productivity characteristics were the same as those of whites. This is achieved by taking the mean values of the black productivity characteristics and entering them into the white wage function. This procedure gives us a hypothetical wage for blacks. Subtracting the hypothetical black wage from the average black wage gives us a measurement for wage discrimination or the difference in the returns to wage determining characteristics.

5. We compare the hypothetical wage of blacks with the actual wage of whites (taking the average level of productive characteristics for whites and plugging them into the wage function for whites). This comparison is an estimate of the endowment (characteristic) difference between blacks and whites.

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