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A Current Microeconometric Assessment of the Racial Wage Gap in the United States

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Abstract
Minority groups in the United States promoted affirmative action legislation in the 1960s during the civil rights movement to help ease the inequalities suffered in their economic history. Many labor economists have sought since this time to study the effects of race, gender, and the effect of income – how it has changed and if the gap has closed. Existing literature uses many different econometric models to show how the effects of race, gender, age, occupation, educational attainment, and geographic location on an individual comparative basis. This paper will examine the effects of all of these variables jointly using an ordinary least squares (OLS) regression analysis. [*excerpt*]

Keywords
microeconomics, hourly wage, income, minority income, income distribution, income gap

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By David Krisch

I. Introduction

Minority groups in the United States promoted affirmative action legislation in the 1960s during the civil rights movement to help ease the inequalities suffered in their economic history. Many labor economists have sought since this time to study the effects of race, gender, and the effect of income – how it has changed and if the gap has closed. Existing literature uses many different econometric models to show how the effects of race, gender, age, occupation, educational attainment, and geographic location on an individual comparative basis. This paper will examine the effects of all of these variables jointly using an ordinary least squares (OLS) regression analysis.

Does race effect income according to the 2005 American Community Survey (ACS)? The ACS is 1 in 100 national survey that encompasses over 1.1 million households and 2.878 million individuals (Steven et. al.). Using multivariable OLS regression of such data will yield results that will provide an overall snapshot of the state of the modern labor economy and identify what problems our society has to economically overcome if an income gap between white males and minority groups still exists. Many other researchers have answered a similar question, however, the link between these variables on broad current level has not been drawn.

Many economists since the enaction of affirmative action have examined the effects of many different factors that influence income. Two major labor economists, Jacob Mincer and Peter Blau pioneered modern understanding of income labor economics that inspired further labor analysis. The major contribution of Mincer was to connect the modern theory of human capital to empirical survey data on income, and apply it to labor force inequality (Rosen 159). Mincer using a semi-log transformation analyzed the gender gap problem in the 1960s and 1970s by examining disparity among educational attainment (Rosen 159) (Bloom et.al. vi). This will be important in reviewing the results of the regression analysis, the use of showing how human capital will affect current data (apposed to the previous analysis that was rendered by Mincer), and the connection of the wage gap that will encompass both race and gender.

Blau's theory of status attainment describes that one can achieve a high social status (which is a measure of income economic status) by having an occupation which is associated with a higher economic benefit (Guan et. al. 115). Directly linked to cultural and individual microeconomic characteristics is higher social attainment (Guan et. al. 115). This theory will be used in conjunction with Mincer's work of human capital income analysis to both review current labor economics wage gap analysis and lay the framework for the economic model used in this paper (Guan et. al. 115).

Other literature examines the regional wage gap with particular focus on race. Bisping and Fain (2005) examine the theory of a labor queue, which orders demographics in terms of employer favorability on a regional and national level (Bisping et. al. 352). The results of this study show that there is no change in the order the labor queue and there is no significant change in the ordering of the queue on a national level (Bisping et. al. 358). In some specific regions, however, the existence of a racial gap appears eliminated (Bisping et. al. 358).

More recent wage gap analysis by Baumann (2005), examines using the Integrated Public Use Microdata Census project (IPUMS), if there has been a shift in the wage gap using time series data, specifically in Appalachian region of the United States (Baumann 416). This is in response to the historical evidence that suggests that individuals who live in this region have lower wages when compared to the rest of the country (416). The findings of this study show that the wage gap between the Appalachian region and that of the rest of the country has only decreased slightly from its level in 1970 to its level in 2000 (439). The focus of the econometric model in this paper will depart from the comparative nature of a shift in the wage gap over time, but focus on whether this gap currently exists between all races in geographic regions.

Further race-gender wage gap studies conducted recently narrow the specific hypothesis. Saunders (1995) examines the wage gap that exists on a regional, racial, gender, and occupational levels (Saunders 68). Findings indicate that black men average income decreased, while white men's average income increased over a ten-year period from 1979 to 1989 (68). Saunders' findings also indicate that black women gained ground when compared to white men (68). This is a refinement of the models previously discussed, but when examining the income gap between women, the same results are found then when comparing different races (69).

Antecol and Bedard (2002) conclude that minority women make substantially less than that of their white counterparts (Antecol 122). Neal

(2005) also supported this finding but insists that the wage gap is much higher then that was previously found in earlier analysis, such as the one conducted by Antecol and Bedard (Neal S1). The use of panel data in Neal's analysis and its inclusion of non-labor force individuals is the source of the underestimation of the wage gap (S3). This analysis will depart from Neal's method by examining only participants in the labor force market. These studies show how the Blau's theory of status attainment can relate to differing groups of minorities, while the differing human capital between gender and races support Mincer's theory of the connection between modern human capital and income.

Many economists have conducted studies looking at a number of different factors that influence income, but the analysis in this paper will seek to combine a number of different factors to give a general overview of the racial gap on differing regional levels. Marital status, age, region, occupation, gender, race, number of hours worked, and educational attainment all will be combined in OLS regression analysis to find whether such a gap still exists from 2005 ACS data. This is a departure from previous literature because of the larger scope of the analysis and current data for a more updated snapshot of the state of our economic equality.

Section II, Modeling and Data, contains the economic multivariable model that will be used in regression, how the hypothesis of the effects of race will be tested, description of the statistical properties of the ACS data variables used for this analysis, and how such data could influence the results. Section III, Empirical Results, will seek to explain the findings of the regression analysis. This section provides graphical analysis of the variables on a comparative level as well. Section IV will conclude with an overview of the findings and the impact of such findings.

II. Modeling and Data

The hypothesis that is being tested by this model is that: income has a negative (or equal) relationship to minority groups among differing geographical regions, educational attainment, marital status, occupation, gender, and age. The primary focus will be on regional affects, however, there will be a need to look at the influence of the other variables in order to truly understand the problem of income inequality in totality.

Evidence would support from the previous research that there is correlation between all of these variables and differences among these variables for different races compared to the historical Caucasian hierarchy that has

dominated economically (Bisping et. al. 352). The status attainment theory that was offered by Blau in the previous section seem to confirm this finding and so does the research Bisping and Fain (2005) with the notion of a national labor queue (Bisping et. al. 352). The model will attempt to answer the question from a modern perspective using the most current economic data while trying to paint a complete picture of the factors that influence income.

In order to complete such a task, the dependent variable will be in logarithmic form to show the percent change in income for each of the independent variables. This is the same form of the semi-log transformation that Mincer provided in his earnings equation for the dependent variable (Rosen 159). In order to measure such effects of race, the coefficients of each of the independent variables tested in a multivariable analysis. If the coefficient is negative for an independent variable then the net effect on the percentage of income is negative while the opposite is true for a positive coefficient value.

Statistical significance of each of the variables and the model as a whole is incredibly important in both understanding and placing confidence in the findings. For individual variables, if the t statistic is greater than the critical value at n degrees of freedom at five percent significance then we can reject the null hypothesis that the coefficient is statistically insignificant. If the model, as a whole, is significant then the p value for the F statistic will be less than $\alpha=0.05$ and the null hypothesis that the coefficients are jointly insignificant can be dismissed.

The hypothesis being tested in this model would be confirmed if minority groups made less than or equal to that of Caucasians on a regional level, as well differing measures of human capital, and other differing measures of individual characteristics. In order to test such a hypothesis a multivariable analysis will be offered. This multivariable regression will be run with numerous dummy variables for measures of qualitative data (such as race, region, gender, marital status, occupation, ect.) versus quantitative data (such as educational attainment and age). There will be numerous interaction terms with race against occupation, education, gender, age, marital status, geographical region, and educational attainment. In order to correct for perfect multicollinearity, one dummy variable for each group of the dummy variables that will be created must be excluded. The excluded dummy variables will be reflected in the constant coefficient (β_0) as well as the intercept value of the equation estimation. The model is as follows:

lnIncome = f (race, gender, usual hours worked, region, education, education^2, age,

*age^2, occupation, marital status, race*gender, race*usual hours worked, race*region, race*education, race*education^2, race*age, race*age^2, race*occupation, race*marital status)*

The above model compares the percentage change in income of a single, white, male, residing in the East North Central Region, and is in a management occupation against the other dummy variables that are in the equation.[1] The constant is the comparative term to the rest of the dummy variables.

The other quantitative measures: age, years of education, and usual hours worked is a measure the marginal effect on the percentage change of income. Two variables are specifically notable. The variables of age and years of education both have a squared term counterpart. This occurs because usually these two variables do not move in a linear relationship as they increase, but as an exponential relationship (specifically as a quadratic). The marginal effect of age is the sum of $\beta_2+2\beta_3$(Age). This value was computed by taking the derivative of the age variables. The same transformation would be applied to education to find its marginal effect with respect to income.

The interaction terms that the economic model contains compare two changes from the constant, omitted dummy variables term. Notice that these interaction terms encompass the race (black, white, other) and other variables in the equation. This economic model is comprehensive in an attempt to precisely identify the factors to income in a hope to identify racial problems. The model is similar to that proposed by Mincer to measure wage and encompasses measures of status attainment by occupation proposed by Blau (Rosen 159) (Guan et. al. 115). This should produce a modern economic model to estimate the overall affects of race on income in a hybridized OLS estimation model. If the hypothesis is confirmed then the race and racial interaction terms should produce lower (or equal) coefficients. This would prove that there is the existence of a racial wage gap today and the examination of the regional affects could suggest where major problems still exist as compared to others. [2]

The data used for this examination of income with respect for race has its limitations. The model that was proposed in the previous section only examines one part of the evidence that can be used in determining the effects of

1 Full Equation in Appendix A

2 Note that time series analysis will not be offered but simply a cross sectional snapshot which cannot empirically show a shift in the wage gap without the use of a Chow Test on Panel Data.

income distribution. The data for this study was gathered from the Integrated Public Use Microdata Census project (IPUMS), which organizes and codes individual United States survey data (Steven et. al.). The particular data that will be examined in this study will use American Community Survey (ACS) of 2005. The ACS is a 1 in 100 national survey that encompasses over 1.1 million households and 2.878 million individuals that will prove to be essential to the validity of the findings because of the number of observations (Steven et. al.). Also if note is that this data is cross sectional data, which provides for a snapshot of the wage gap currently. This interpretation from the data and evidence should not be construed to show the shift of such a curve but how it affected individuals in 2005.

The assumption that all surveys are answered truthfully and completely is a flawed one. Many individuals who answer such surveys do not always answer the question that is being answered or the data is not always answered truthfully because of a privacy concern. This could produce bias or inconsistent results. An optimal data set would contain complete and actual data on each of the individuals surveyed in order to lead to complete, unbiased, and consistent results for the OLS regression. However, the sheer number of observations and the reliability of the reputable American Community Survey and IPUMS should decrease the probability of flawed results.

As was stated in previously, this data will incorporate dummy variables, whose observations will take either a 1 or 0. The value of 1 will be assigned if the individual being surveyed fits into the particular categorical variable or 0 if they do not. This measure will be applied to cross sectional, discrete, qualitative data while the continuous variables will take a specific input from the values observed. For instance age for an individual could be 45 in contrast to the variable female which would take a value of 1 in the individual was female or 0 if the individual was male.

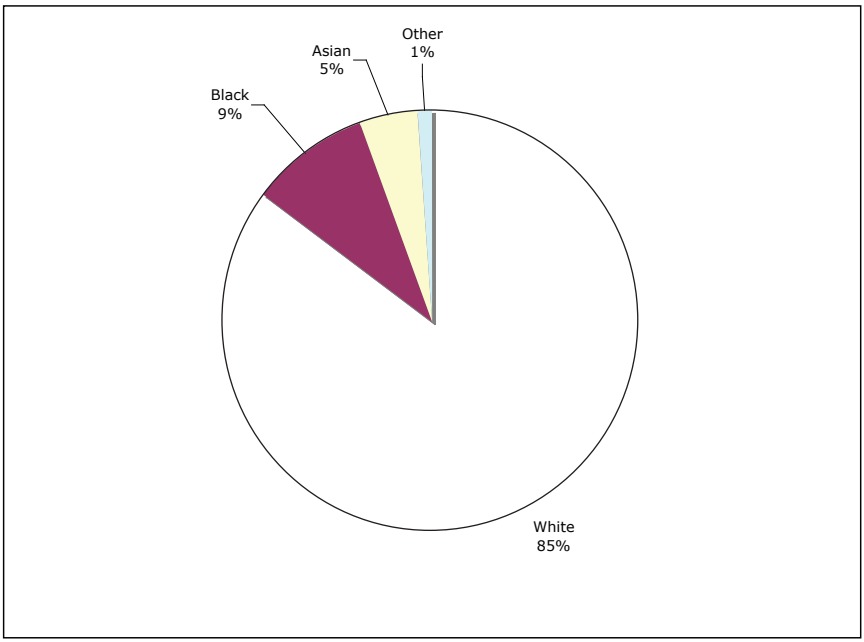
The number of observations for this particular data set that is being regressed is 1,346,250 and the changes for the regression OLS estimates will be in percentage changes with respect to the percentage change in income (and against the constant term). Statistically insignificant terms, probability values for the t statistic less than $\alpha=0.05$, will not be reflected in the results but this will be noted as each section of the results is discussed and in Appendix B.

The dependent variable is the natural log of the total amount of income and wage. Any observations for an individual who makes an income of zero will be dropped from the data because this analysis will focus on factors of the change in percent of income in the current labor force. This will be important

when also examining the factor of age. The variable age was dropped if the individual was under the age of 18 or over the age of 65. The mean income of the data set was 39,624.42 and the mean age of 40.795.

The independent variables used in the OLS regression for race where divided into four dummy variables. The first variable white, takes a value of 1 if the variable is white or 0 for non-white. The variable "White" is defined by those who are both Caucasian and Hispanic (Steven et. al.). The variable "white" will be omitted from the regression, will be included in the constant, and therefore comparative to all the other dummy variables. The variable "Black" includes all individuals who are of African American descent and identify themselves as black (Steven et. al.). The variable "Asian", reflect those individuals who are Asian or Pacific Islander (Steven et. al.). The variable "other" is for those who are not included in the category of white, black, or Asian. It is important to note that for this analysis, added to this category are the indigenous population (Native Americans) from the original survey results reported by the ACS and organized by IPUMS.

Figure 1. Frequency of Race Survey Data



The graph above shows the break down of the percentages of individuals surveyed and included in this regression. The number of observations as stated above for this data set was 1,346,250 and for this data set the amount of African American individuals that were sampled shows that there could be some bias in regression results. According to Census Scope, which is a product of the Social Science Data Analysis Network, the African American population accounts for 12.1% of the total population for the 2000 United States Census Survey ("CensusScope -- Demographic Maps: African-American Population"). Such a discrepancy in the representation of the population through this sample could lead to some biased and inconsistent results, which would not reflect the true β for the estimation.

The regional variables were divided into 9 different geographical regions in dummy variables as designated by the United States census and IPUMS classification (Steven et. al.). The East North Central region will be omitted from the regression because of perfect multicollinearity among dummy variables. The regions in the data are as shown in Figure 2 below, along with mean income and number of observations for each of the specific regions.

Figure 2. Regional Mean Income and Wage Observations

Region	Encompassed States	Mean Income[39]	# of Obs.
New England	Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont	46,500.53	67,690
Middle Atlantic	New Jersey, New York, Pennsylvania	44,047.26	181,847
East North Central	Illinois, Indiana, Michigan, Ohio, Wisconsin	37,594.00	219,726
West North Central	Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota	34,401.52	94,244
South Atlantic	Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, West Virginia	40,018.01	260,214
East South Central	Alabama, Kentucky, Mississippi, Tennessee	33,782.85	78,129
West South Central	Arkansas, Louisiana, Oklahoma, Texas	36,165.84	145,108
Mountain	Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming	37,296.81	93,600
Pacific	Alaska, California, Hawaii, Oregon, Washington	43,233.47	205,692

Notice that the omitted variable East North Central, has a mean income of 37,594.00 that lies somewhat in the middle of the data set which will be a good measure for comparing differing regions in the OLS regression analysis.

Occupation, marital status, and gender are generated dummy variables from the original equation. There are 25 occupations that are incorporated into the data with varying categories and 24 will be used in the regression. The variable "management" has a relatively high mean of 74,927.50 and a standard deviation of 61,516.55. This variable will be omitted from the regression and the definitions of the other occupation variables are offered in Appendix C. Marital status has five different dummy variables (single, married, divorced,

widowed, and separated) and the variable "single" is dropped from the regression equation. The variable "single" has the lowest average income of all of the variables, 24,994.82, while those who are married have the highest average income, 46,950.95. By no means is this a surprising factor, because those who are older tend to be married and also have a higher income. The final dummy variable gender, are obviously divided into male and female variables. The variable male has a mean income of 48,394.13 and a standard deviation of 47,672.79 while females have a mean income of 30,429.30 and a standard deviation of 30,575.10. A clear gender gap that still exists and the variable "male" will be omitted from the regression.

Figure 3. Summary Statistics for Continuous Data[3]

Variable	# of Obs.	Mean	Std. Dev.	Min	Max
Years of Ed.	1,346,250	13.4900	2.5899	0	20
Age	1,346,250	40.7951	12.5175	18	65
Usual Hours Worked	1,346,250	39.8141	11.9730	1	99

The variable "Years of Education" was recoded in order to accommodate for preschool and kindergarten education. The number of years of education and the percentage change in income has a positive correlation of 0.315 and the mean education that an individual receives in the survey is 13.49 years as shown above in Figure 3. Education is a large component to income which is reflected in the positive correlation in the percentage change in income and the average individual in the data receive their high school diploma. The relationship between human capital (years of education being one factor in this case) and amount of income one receives is an already time tested model by Mincer (Rosen 159).

The final variable examined, the amount of hours usually worked in a workweek, also has opposite correlation effects on the percentage change in income. The amount of income hours worked increases as income does. The average amount of hours worked for the data set is 39.8141, shown in Figure 3, the standard workweek. This is not surprising and matches the intuition about the amount of hours worked in the American workweek.

III. Empirical Results

The full results of the regression analysis for the model that was in Section II is displayed in Appendix B. The Breusch-Pagan test statistic of 44,583.32 for the equation estimation identified the problem of heteroskedasticity. This

3 Values will be rounded to four decimal places.

BP test statistic has a p value of 0.000 and because it is less than α=0.05, the null hypothesis of homoskedasticity can be rejected. This has prompted the regression to be re-estimated with robust standard errors using the white correlation matrix to correct this problem. With the correction, the first of three different results of particular interest will be discussed in detail, after significance of the individual variables and the model as a whole is discussed.

The F test statistic, which tests that all of the coefficients are significantly different than zero, yielded a result of 5,696.86. The p value for the F statistic for this equation is equal to 0.000 which is less than α=0.05 so we can reject that the coefficients of the model are jointly insignificant. This result is reflected in Appendix B. Each individual variable was also tested for significance by calculating a t test statistic from the regression results. The p values for the t test statistic that were greater than α=0.05 are reflected in Appendix B without asterisks.

For instance, the p value of the t statistic for the variable "other" indicates that there is not a difference in the nominal income of an individual who's race is considered "other" against the constant white individual with all of the same characteristics besides race. The same is true of occupational, marital status, regional, and continuous (usual hours worked and years of education) variables that are interacted with race. The interaction variables that were interacted with age were dropped for reasons of perfect multicollinearity and are not reflected above for the races of Asian and other. This lack of significance for the variable of "other" is in conflict with the original hypothesis that being non-white has a negative impact on an individual's nominal income. This will be compared to the results found for significant variables in the preceding part of this section and in the conclusion. It should also be mentioned that in order to combat omitted variable bias the variables that are in Appendix B without asterisks are included in the final regression. Omitting such variables could cause biased estimates of the parameters.

The evaluation of the R-squared term is essential to understanding the prediction capability of the model as a whole. The R-squared term reflects the proportion of the variance of the dependent variable that can be explained by the independent variables ("Annotated Stata Output: Regression"). The R-squared value for the equation that was regressed from the model in Section II is 0.4902. This would indicate that 49.02% of the variance in the percent change in income could be predicted from the independent variables ("Annotated Stata Output: Regression"). This is not a bad measure of fit for how well the model is at predicting income assuming that there are many different

variables that can be used to predict income which cannot be measured, such as drive to succeed and ambition. This R-squared value vastly improved when the variable of occupation was added to the regression and therefore occupation improved the prediction of the dependent variable, which is to be expected.

The continuous variable "years of education" produced a value of -0.0235 and a value of 0.0042 for the variable "years of education^2". This relationship between income and education in quadratic terms is the same function that Mincer used in his earnings equation to examine the gender wage gap in the United States (Rosen 159). Such will be applied here to look at the differences in racial variables with individuals who have the same amount of education. In Figure 4, the table reflects the significant interaction terms between race and years of education. Also, there are the coefficients for the variables of race in the East North Central Division. This analysis will first encompass how race effects income against education in the East North Central Division and then examine how these effects are administered for other regions of the United States in the same comparative nature against the constant term with the same amount of education.

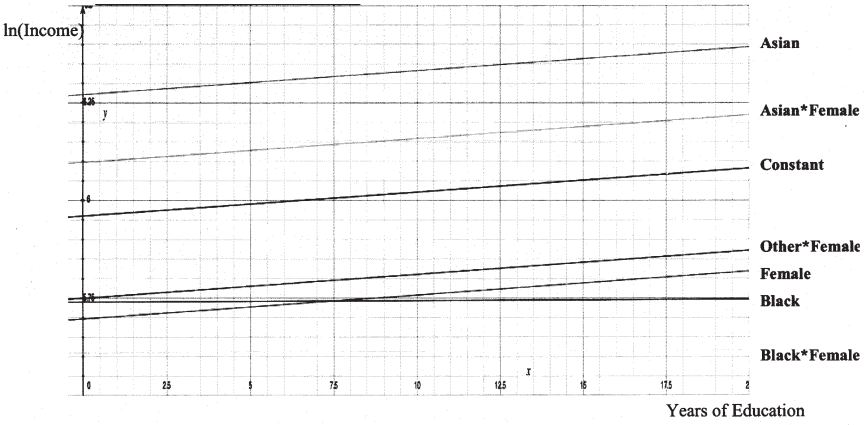
Figure 4. Statistically Significant Regression Results for Education, Race, and Gender in the East North Central Region (and applicable interactions)[4]

Variable[2]	Coefficient	Robust Std. Error
Year of Education	-0.0235	0.0015
Year of Education2	0.0042	0.0001
Black*Years of Education	-0.0194	0.0058
Black*Years of Education2	0.0010	0.0002
Black	-0.2200	0.0531
Asian	0.3113	0.0417
Female	-0.2630	0.0019
Black*Female	0.1326	0.0065
Asian*Female	0.0888	0.0079
Other*Female	0.0528	0.0208
Constant	5.9599	0.0148

4 Not included in the findings are the insignificant variables which had a p value for the t statistic greater than α=0.05 which are in Figure 4.

Figure 4 contains some interesting results go to disproving the hypothesis of being a non-white male has a negative affect on income in this particular region. Asian males and females have a larger change in income than the constant white single male term, which is reflected in the constant variable. To see the results more clearly, Figure 5 has a linear representation of the marginal change in income on one additional year of education.

Figure 5. Marginal Effect of Education on Managerial Income by Race and Gender in the East North Central Division



What should be noted in this graphical depiction is the intercept of each of the linear equations graphed with respect to the constant. Single managers who reside in this region are all compared with education for differing variants for race and gender. The line with the lowest intercept is the black female. The average black single female manager in this region makes 33.10% less than the constant comparative term whereas the white female makes only 26.30% less than the constant term. The black female makes substantially less than her white counterpart.

The trend for Asian individuals receiving more income for an increase in education transcends gender. The Asian male makes 31.11% more than the constant term and the Asian female only makes 13.11% less than the constant term. Both of these terms show that Asians make more on average than their white counterparts when compared to gender. This is a clear depiction that the gender gap exists, however, Asian individuals receive the highest utility out of all of the racial groups.

The racial wage gap still clearly exists between black and white individuals with the same constant comparative dummy variable terms. Black individuals make 22% less than the constant comparative term in this equation. This indicates that Asian women, "other" women, white males, and Asian males make more than a black male in a managerial position for the same amount of education in the East North Central Region. These groups receive more income than the black male for each additional year of education. Such a result is discouraging when examining the racial wage gap divide in the United States and reinforces the hypothesis that such a wage gap does still exist.

The same comparisons can be made against other continuous non-dummy variables in the OLS regression results. The coefficients for the usual hours worked, age, and age^2 is shown below in Figure 6.

Figure 6. Continuous Coefficient Estimations for Usual Hours Worked, Age, and Age^2

Variable	Coefficient	Robust Std. Error	T Statistic
Age	0.1132	0.0005	220.0100
Age2	-0.0012	0.0000	-196.6000
Usual Hours Worked	0.0389	0.0001	340.5800
Asian*Usual hours worked	-0.0058	0.0005	-12.3700

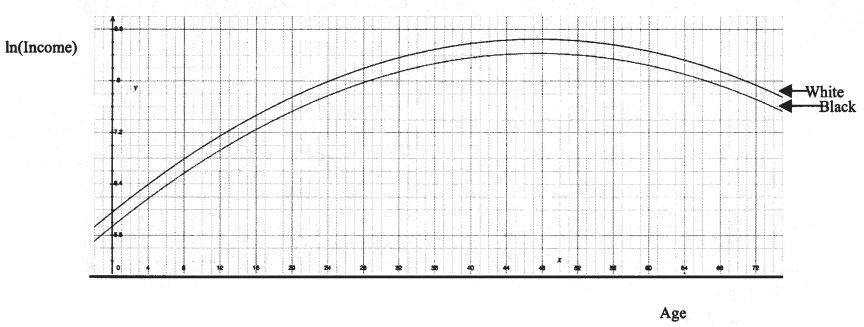
Omitted from Figure 6 are the interaction variables between race and age dropped for reasons of multicollinearity. Also omitted from Figure 6 is the interaction variables Black*Usual Hours Worked and Other*Usual Hours Worked, because of lack of significance. These continuous variables can be used with respect to the constant and the use of the other dummy variables to calculate intercepts and find the effect of usual hours worked and age on income. The amount of hours worked does positively increase the amount an individual earns by 3.89% for each additional hour worked and this number decreases by 0.58%[5] for each additional hour that an Asian individual works. The increase in the amount an individual earns being positively correlated to income is not surprising and are both supported by the previous research done in labor economics by Mincer, Blau, and others previously cited in the literature review ((Rosen 159) (Guan et. al. 115) (Bisping et. al. 352)). The interesting result is the effect of being Asian and the number of hours worked on the constant term. This gain in earnings for other races is higher for the number of hours

5 Total Marginal Effect for an Asian individual is 3.31% for Hours worked within a workweek.

worked when compared to the Asian individual. Such a finding is paramount in balancing the effects of income and race with continuous variables (like the results found for years of education).

The variables for age and age^2 create a parabolic effect, which is shown in Figure 8. (Guan et. al. 115). The marginal effect of one year of age is β_1 + 0.1131896 +2*-0.0011914(Age) by taking the derivative of the age function, but its quadratic form is graphed in Figure 7.

Figure 7. Effect of age on the percentage of income in East North Central region for the constant white single male manager in the East North Central region compared with a black individual with the same characteristics.



We see this in Figure 7, with the maximum point of the quadratic age function residing at 47.50. An individual's income after this point will not increase as age increases. Also, shown in Figure 7 is the age quadratic function for a black individual with the same characteristics in the East North Central Region. Here the wage gap between the two groups can clearly be seen, as was the case in the analysis for educational attainment. Focusing on the results of the amount of education and the percentage change in income is the original function that Mincer used in his original analysis (Rosen 159). Both education and age are measures of human capital, however, the results of the years of education analysis provide a more in-depth analysis and allow for interaction terms without multicollinearity.

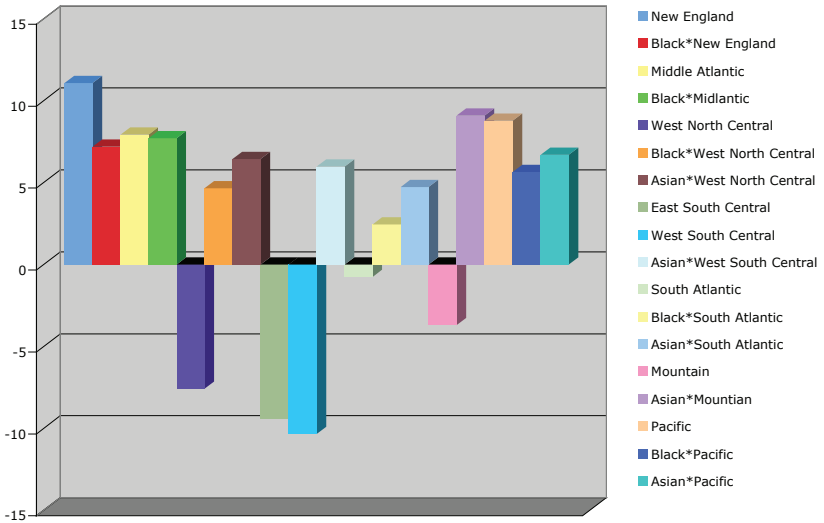
The regional effects on income are interesting especially when looking at the variables of race. Such are interesting and help to pinpoint specific areas in which progress has been made in closing the wage gap and comparing how minorities fair in these regions. Figure 8 shows the regression results from statistically significant variables of the percentage change in income when compared to the constant East North Central region with all of the

same constant dummy variables except for race. It is important to note that the significant interaction terms are in terms of the percentage difference in income when compared to that specific race variable for the East North Central Division. For instance the interaction variable for "Black*Middle Atlantic" is the percentage change between an individual who is Black, resides in the East North Central Region, Single, and working in a managerial position. Such results are illustrated more clearly in Figure 10, which depicts the percentage change using a histogram.

Figure 8. Statistically Significant Regional Effects on Income (with race interaction) compared to the constant regional variable East North Central.

Region	Coefficient	Robust Std. Error
New England	0.1109	0.0037
Middle Atlantic	0.0793	0.0028
West North Central	-0.0758	0.0033
East South Central	-0.0941	0.0038
West South Central	-0.1034	0.0031
South Atlantic	-0.0076	0.0026
Mountain	-0.0371	0.0035
Pacific	0.0878	0.0028
Black*Middle Atlantic	0.0770	0.0110
Black*New England	0.0720	0.0185
Black*West North Central	0.0465	0.0182
Black*South Atlantic	0.0245	0.0093
Black*Pacific	0.0565	0.0130
Asian*West North Central	0.0644	0.0270
Asian*West South Central	0.0598	0.0186
Asian*South Atlantic	0.0473	0.0164
Asian*Mountain	0.0910	0.0210
Asian*Pacific	0.0670	0.0142

Figure 9. Managerial Income Percentage Change with Respect to the Constant Term of East North Central White Single Male



The graph in Figure 9 and the table in Figure 8 provide interesting results for analysis. We can see for the New England Region that the wage for a white individual increases by 11.09%, however, a black individual with the same microeconomic characteristics in the same region only has 7.20% increase in wage in income from the black individual in the East North Central Region. The persistence and widening of the wage gap in the New England Region is clear when looking at the comparative variables. If the black individual had received the same increase in salary as the white individual then the wage gap would be the same as East North Central division with the same characteristics. This is not the case however, with a discouraging increase in the differences in wage with an increase of 3.89% in the racial wage gap. This is in contrast to the West North Central Division.

The interaction terms between Asian, Black, and West North Central Division are statistically significantly. The regional variable West North Central has decreased by 7.58% for the amount of income received for a white individual with the same microeconomic characteristics. An Asian individual's income with the same characteristics has an increased income of 6.44% and a black individual has an increased income by 4.65% when compared to the racial variables for the East North Central region depicted in Figure 4. The

more significant of the two findings is not the increasing of the income gap between Asians and Whites in the West North Central Division but the decreasing of the income gap between Black and White individuals with the same characteristics when compared to the East North Central Region. Such a gap leaves black individuals with only a 9.77% difference in wage with their white counterparts in this region. This is a 12.23% narrowing from the 22.00% gap in the East North Central Division between a black and white individual with the same characteristics.

Two elements should be reiterated. The first element that should be noted is the absence of the variable "other" in this particular variable analysis. This would suggest that this variable and its interaction terms are not significantly different from the constant term. This applies equally to the other variables for interaction that were not included in Figure 8. The second element that should be noted is the relationship that can be formed between the dummy variables, which were not discussed (marital status and occupation), the interaction of these variables with the race dummy variables, and the interaction of these variables with the continuous variables discussed in the first part of this section.

The statistically significant marital status variables, in Appendix B, can be applied in the same way for analysis of both interaction and non-interaction terms of the variables with respect to the constant. For instance an individual, who is white, married, resides in the East North Central Division, and a manager makes 15.11% more than a single individual who has the same characteristics. These terms could also appear in the graph of Figure 5 to show how a constant amount of education can affect the overall percentage of an individual income and how this affects their marginal effect on income. This same approach can be applied to occupation as well.

The implementation of comparing multiple different incomes for occupational variables can be applied for analysis to gain both an industry and skill based analysis. An individual who is white and works in the computer industry makes 11.83% more than the manager in the East North Central region with the same microeconomic characteristics. A black individual in the computer industry makes only 10.13% more than a black manager in the East North Central region with the same microeconomic characteristics. This is further evidence that a racial gap does exist between individuals in other high skilled labor markets. This same analysis can be applied to non-skilled based jobs by applying the findings in Appendix B.

IV. Conclusion

By combining the theories previously explored in this field labor economics, a suitable model was formed in order to diagnose and analyze the current state of the racial wage gap (Rosen 159) (Guan et. al. 115). Through the use of ACS data and multivariable OLS regression, an in-depth analysis of variables that pertain to the percentage of income was completed in Section III. Evidence in this section shows that there is an existence of a racial and gender based wage gap in the United States both on a regional and national level, however, this is an oversimplification of the problem.

The literature review shows that a racial wage gap still exists on a national level but not on regional level from Bisping and Fain's findings (Bisping et. al. 352). The previous review of analysis show that there is an existence of an income gap between African American individuals and white single manager individuals in the East North Central Region of the United States. Being an African American has a negative effect on income. The gender gap was also shown in this analysis as well. Also being a white, black, other, or Asian female has a negative effect on income against their microeconomic identical male counterpart.

The surprising finding of this study shows that there is a wage gap between Asian individuals and white individuals with the same microeconomic characteristics. This might be the discrepancy that was found on the regional level in East North Central region in this study and that found by Bisping and Fain's findings (Bisping et. al. 352). Breaking the groups down into more specific classifications in and making this a broad overall snapshot from the most recent data available were the most important distinctions from how this study differed from other previous analysis.

Even though this model is comprehensive, adding more variables and interaction terms could give clearer results for future studies. This would then broaden the scope of the study and provide more information on other variables that pertain to income such as place of origin or weight. Also, classifying groups by ethnicity *and* race could provide more accurate results if the data sample was an accurate representation of the United States population. The analysis provided in this study would be most useful in showing how we need as a society to correct the disparities between African Americans, females, and white males with the same microeconomic characteristics. Only through conscience effort can this goal be achieved through a national and regional level. Such was the attempt of Affirmative Action but it is clear by this analysis that the goal was not accomplished in 2005.

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Appendix A. Full Equation Regressed

$$\ln Income_i = \beta_0 + \beta_2 Age + \beta_3 Age^2 + \beta_4 Usualhoursworked + \beta_5 MiddleAtlantic + \beta_6 EastNorthCentral + \beta_7 WestNorthCentral + \beta_8 EastSouthCentral + \beta_9 WestSouthCentral + \beta_{10} SouthAtlantic + \beta_{11} Mountain + \beta_{12} Pacific + \beta_{13} Black + \beta_{14} Asian + \beta_{15} Other + \beta_{16} Female + \beta_{17} MarriedSpouse + \beta_{18} Widowed + \beta_{19} Seperated + \beta_{20} Divorced + \beta_{21} YearsofEducation + \beta_{22} YearsofEducation^2 + \beta_{23} Buisopp + \beta_{24} FinancialSpecialist + \beta_{25} Compmath + \beta_{26} EngArch + \beta_{27} Science + \beta_{28} CommunitySocial + \beta_{29} Legal + \beta_{30} Edocc + \beta_{31} ArtMediaSports + \beta_{32} HealthCarePrac + \beta_{33} Healthcaresupport + \beta_{34} Protect + \beta_{35} Food + \beta_{36} CleanMaintain + \beta_{37} PersonalCare + \beta_{38} Sales + \beta_{39} OffAdSup + \beta_{40} FarmFish + \beta_{41} Construction + \beta_{42} Extraction + \beta_{43} InstallMaintRepair + \beta_{44} Production + \beta_{45} Transportation + \beta_{46} Military + \beta_{48} (Black*MiddleAtlantic)_i + \beta_{49} (Black* EastNorthCentral)_1 \ldots + \beta_{55} (Black*Pacific)_i + \beta_{56} (Asian*MiddleAtlantic)_i + \beta_{57} (Asian*EastNorthCentral)_1 \ldots + \beta_{63} (Asian*Pacific)_i + \beta_{64} (Other* MiddleAtlantic)_i + \beta_{65} (Other*EastNorthCentral)_1 \ldots + \beta_{71} (Other*Pacific)_1 + \beta_{72} (Black*MarriedSpouse)_i + \beta_{73} (Black*Widowed)_1 \ldots + \beta_{75} (Black*Divorced)_i + \beta_{76} (Asian*MarriedSpouse)_i + \beta_{77} (Asian*Widowed)_1 \ldots + \beta_{79} (Asian*Divorced)_i + \beta_{80} (Other*MarriedSpouse)_i + \beta_{81} (Other*Widowed)_1 \ldots + \beta_{83} (Other*Divorced)_i + \beta_{84} (Black*Yearsofed)_i + \beta_{85} (Black*YearsofEducation^2)_1 + \beta_{86} (Asian*Yearsofed)_i + \beta_{87} (Asian *YearsofEducation^2)_1 + \beta_{88} (Other*Yearsofed)_i + \beta_{89} (Other*YearsofEducation^2)_1 + \beta_{90} (Black*Female)_i + \beta_{91} (Asian*Female)_{1+} \beta_{92} (Other*Female)_i + \beta_{93} (Black*Age)_i + \beta_{94} (Black*Age^2)_1 + \beta_{95} (Asian*Age)_i + \beta_{96} (Asian*Age^2)_1 + \beta_{97} (Other*Age)_1 + \beta_{99} (Other*Age^2)_i + \beta_{100} (Black*Buisopp)_i + \beta_{102} (Black*FinancialSpecialist)_1 + \ldots + \beta_{124} (Black*Military) + \beta_{125} (Asian*Buisopp)_i + \beta_{126} (Asian*FinancialSpecialist)_1 + \ldots + \beta_{149} (Asian*Military) + \beta_{150} (Other*Buisopp)_i + \beta_{151} (Other*FinancialSpecialist)_1 + \ldots + \beta_{171} (Other*Military)$$

Appendix B. Full Regression Results (*Statistically Significant at the 5% Level)

Variable	Est. Earnings Effect	Robust Std. Err.	P>t
Constant	5.9599*	0.0148	0
AGE:			
Age	0.1132*	0.0005	0
Age^2	-0.0012*	0.0000	0
Black*Age	0.0034	0.0018	0.056
Black*Age^2	0.0000	0.0000	0.814
USUAL HOURS WORKED:			
Usual Hours Worked	0.0389*	0.0001	0
Asian*Usual Hours Worked	-0.0058*	0.0005	0
Black*Usual Hours Worked	-0.0007	0.0004	0.085
Other*Usual Hours Worked	-0.0023	0.0012	0.051
EDUCATIONAL ATTAINMENT:			
Years of Education	-0.0235*	0.0015	0
Years of Education^2	0.0042*	0.0001	0
Black*Years of Education	-0.0194*	0.0058	0.001
Black*Years of Education^2	0.0010*	0.0002	0
Asian*Years of Education	-0.0047	0.0046	0.301
Asian*Year of Education^2	-0.0004	0.0002	0.062
Other*Years of Education	-0.0186	0.0122	0.129
Other*Years of Education^2	0.0002	0.0005	0.781

REGION:			
New England	0.1109*	0.0037	0
Middle Atlantic	0.0793*	0.0028	0
West North Central	-0.0758*	0.0033	0
East South Central	-0.0941*	0.0038	0
West South Central	-0.1034*	0.0031	0
South Atlantic	-0.0076*	0.0026	0.004
Mountain	-0.0371*	0.0035	0
Pacific 0.0878*		0.0028	0
Black*Middle Atlantic	0.0770*	0.0110	0
Black*New England	0.0720*	0.0185	0
Black*West North Central	0.0465*	0.0182	0.011
Black*East South Central	-0.0096	0.0119	0.419
Black*West South Central	-0.0032	0.0112	0.776
Black*South Atlantic	0.0245*	0.0093	0.009
Black*Mountain	0.0388	0.0208	0.062
Black*Pacific	0.0565*	0.0130	0
Asian*Middle Atlantic	-0.0085	0.0162	0.599
Asian*New England	0.0246	0.0221	0.267
Asian*West North Central	0.0644*	0.0270	0.017
Asian*East South Central	0.0443	0.0327	0.175
Asian*West South Central	0.0598*	0.0186	0.001
Asian*South Atlantic	0.0473*	0.0164	0.004
Asian*Mountain	0.0910*	0.0210	0
Asian*Pacific	0.0670*	0.0142	0
Other*Middle Atlantic	0.0623	0.0408	0.127
Other*New England	0.0088	0.0485	0.855
Other*West North Central	-0.0871	0.0450	0.053
Other*East South Central	0.0015	0.0550	0.978
Other*West South Central	-0.0212	0.0342	0.536
Other*South Atlantic	0.0201	0.0357	0.573
Other*Mountain	-0.0427	0.0346	0.216
Other*Pacific	-0.0625	0.0336	0.063
RACE:			
Black	-0.2200*	0.0531	0
Asian	0.3113*	0.0417	0
Other	0.1420	0.1018	0.163
GENDER:			
Female	-0.2630*	0.0019 0	
Black*Female	0.1326*	0.0065 0	
Asian*Female	0.0888*	0.0079 0	
Other*Female	0.0528*	0.0208 0.011	
MARITAL STATUS:			
Married	0.1511*	0.0023	0
Widowed	0.0729*	0.0072	0
Separated	-0.0368*	0.0067	0
Divorced	0.0792*	0.0032	0
Black*Married	0.0089	0.0070	0.202
Black*Widowed	-0.0250	0.0195	0.199
Black*Separated	0.0272	0.0144	0.06
Black*Divorced	0.0015	0.0093	0.873
Asian*Married	-0.0251*	0.0085	0.003
Asian*Widowed	-0.0082	0.0321	0.798

Asian*Separated	0.1047*	0.0330	0.001
Asian * Divorced	0.0848*	0.0163	0
Other*Married	0.0573*	0.0203	0.005
Other*Widowed	0.1001	0.0614	0.103
Other*Separated	0.0231	0.0523	0.658
Other*Divorced	0.0479	0.0283	0.09
OCCUPATION:			
BusinessOp	-0.0412*	0.0055	0
Financial	-0.0242*	0.0053	0
ComputerMath	0.1184*	0.0049	0
Engineering	0.0292*	0.0049	0
Science	-0.1913*	0.0079	0
Community	-0.4519*	0.0062	0
Legal	0.0011	0.0080	0.892
Teachers	-0.4998*	0.0039	0
Media	-0.3807*	0.0074	0
Doctors	0.0217*	0.0039	0
Nurses	-0.4313*	0.0064	0
Protect	-0.2732*	0.0057	0
Food	-0.7077*	0.0051	0
Maintain	-0.7162*	0.0058	0
PersonalCare	-0.7574*	0.0071	0
Sales	-0.3593*	0.0037	0
OfficeAdmin	-0.3120*	0.0032	0
FamingFishing	-0.9619*	0.0108	0
Construction	-0.3398*	0.0044	0
Extraction	-0.4208*	0.0218	0
InstallMaint	-0.2248*	0.0044	0
Production	-0.3480*	0.0039	0
Transportation	-0.5340*	0.0044	0
Military	-0.3405*	0.0132	0
Black*BusinessOp	0.0574*	0.0180	0.001
Black*Financial	-0.0133	0.0185	0.47
Black*ComputerMath	0.1003*	0.0182	0
Black*Engineering	0.0851*	0.0225	0
Black*Science	0.0809*	0.0309	0.009
Black*Community	0.1503*	0.0157	0
Black*Legal	0.0293	0.0290	0.311
Black*Teachers	0.1363*	0.0130	0
Black*Media	0.1660*	0.0318	0
Black*Doctors	-0.0101	0.0150	0.501
Black*Protect	0.0426*	0.0161	0.008
Black*Food	-0.0220	0.0159	0.166
Black*Maintain	-0.0027	0.0167	0.873
Black*PersonalCare	0.0348	0.0191	0.068
Black*Sales	-0.1653*	0.0131	0
Black*OfficeAdmin	0.0543*	0.0099	0
Black*FamingFishing	0.0098	0.0546	0.858
Black*Construction	-0.1412*	0.0190	0
Black*Extraction	0.0021	0.1207	0.986
Black*InstallMaint	0.0787*	0.0176	0
Black*Production	-0.0284*	0.0130	0.029
Black*Transportation	0.0461*	0.0136	0.001
Black*Military	0.2702*	0.0363	0
Asian*BusinessOp	0.0067	0.0252	0.792

Asian*Financial	-0.0854*	0.0207	0
Asian*ComputerMath	0.0710*	0.0166	0
Asian*Engineering	0.0747*	0.0187	0
Asian*Science	-0.0689*	0.0246	0.005
Asian*Community	-0.0984*	0.0346	0.004
Asian*Legal	0.0119	0.0415	0.775
Asian*Teachers	-0.1085*	0.0210	0

Appendix C. Definitions of Occupational Variables

Variable	Occupation Definition
BusinessOp	Business Operations Specialists
Financial	Financial Specialists
ComputerMath	Computer and Mathematical Occupations
Engineering	Architecture and Engineering Occupations
Science	Life, Physical, and Social Science Occupations
Community	Community and Social Services Occupations
Legal	Legal Occupations
Teachers	Education, Training, and Library Occupations
Media	Arts, Design, Entertainment, Sports, and Media Occupations
Doctors	Healthcare Practitioners and Technical Occupations
Nurses	Healthcare Support Occupations
Protect	Protective Service Occupations
Food	Food Preparation and Serving Occupations
Maintaince	Building and Grounds Cleaning and Maintenance Occupations
PersonalCare	Personal Care and Service Occupations
Sales	Sales Occupations
OfficeAdmin	Office and Administrative Support Occupations
FamingFishing	Farming, Fishing, and Forestry Occupations
Construction	Construction Trades
Extraction	Extraction Workers
InstallMaint	Installation, Maintenance, and Repair Workers
Production	Production Occupations
Transportation	Transportation and Material Moving Occupations
Military	Military Personnel