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# Neighborhood Effects and the Development of Cognitive Ability: A Re-examination of The Bell Curve

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Neighborhood Effects and the Development of  
Cognitive Ability:

*A Re-examination of The Bell Curve*

A Research Honors Project

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## ABSTRACT

“The average black and white differ in IQ at every level of socioeconomic status...” state Richard Herrnstein and Charles Murray in 1994’s controversial book, The Bell Curve (269). Implicit in this statement is the idea that blacks are genetically less intelligent than whites, and it is because of this, that the gap in black and white median incomes persists. Herrnstein and Murray believe that the portion of IQ, as measured by the Armed Forces Qualification Test (AFQT), that is influenced by environmental factors is virtually irrelevant. This is due to the fact that less intelligent people live in less desirable environments because of their lower earning potential.

My research provides a more optimistic conclusion regarding the future earnings potential of the youth of the disadvantaged. Regression analysis shows that AFQT scores are, in fact, dependent on neighborhood characteristics, especially measures of school quality. The data also show that poor neighborhood conditions affect whites as well as blacks. The resulting implications suggest that the racial divergence in AFQT scores, and the future earnings that they predict, could be the culminating result of the years of segregation of blacks into areas with poorer neighborhood conditions, rather than a function of some genetic difference. Policy implications of this research support the need to equalize public schools and other neighborhood conditions in order to provide equal opportunities for all.

## I. INTRODUCTION

“The average black and white differ in IQ at every level of socioeconomic status,” argue Richard Herrnstein and Charles Murray, authors of 1994’s controversial book, The Bell Curve (pp. 269). Written to address the growing division of the cognitive elite from the rest of society, The Bell Curve concludes that notions of an egalitarian society are grossly unrealistic. Herrnstein and Murray report that the economic hardships of the disadvantaged can be explained by their inferior IQs. Further, they believe that little can be done to raise the IQ levels of the disadvantaged. IQ, Herrnstein and Murray argue, is a function of two things: genetics and home environment. However, genetics predict home environment, according to their thesis. That is, the cognitive ability of parents determines their economic opportunities and thus, the home environment they provide for their children. Therefore, the poor remain poor, generation after generation.

Herrnstein and Murray highlight a subsection of the disadvantaged to expound further on their thesis—black individuals. Their theory suggests that the reason blacks remain disproportionately in poverty is that they are innately less intelligent, *vis a vis* whites. In answer to the question of whether blacks score differently on IQ tests than whites, Herrnstein and Murray write, “[i]f samples are chosen to be representative of the American population, the answer has been yes for every known test of cognitive ability that meets psychometric standards...” (pp. 276). Thus, having argued that cognitive ability is almost entirely determined by genetic factors, clearly Herrnstein and Murray imply that blacks are genetically inferior to whites, with regard to cognitive ability. This deduction leaves the reader with a surprisingly succinct explanation for black poverty—one that is free from societal influences.

The goal of this research, however, is to demonstrate, through multivariate regression analysis, that societal influences do play a role in the development of cognitive ability. Specifically, it is hypothesized that the characteristics of an individual's neighborhood play a significant role in this development. Further, it is expected that similar characteristics shape cognitive development in all people, independent of race. Once it has been established that neighborhood characteristics, which are shaped by government and social action, significantly contribute to the development of cognitive ability, it can easily be shown that change, albeit slow, is possible with regard to the intergenerational transmission of poverty for people of all races.

Perhaps the most dangerous implication of The Bell Curve is that inequalities of IQ, and the income that it predicts, will be ever present in society and therefore should be accepted by social policy makers. In their conclusion, Herrnstein and Murray write, “[i]nequality of endowments, including intelligence, is a reality. Trying to pretend that inequality does not really exist has led to disaster. Trying to eradicate inequality with artificially manufactured outcomes has led to disaster. It is time for America to once again try living with inequality . . .” (pp. 551). This paper seeks to provide alternatives to this deterministic approach to social policy.

This paper will proceed in the following manner. First, there will be a more thorough review of The Bell Curve. Next, a discussion of other models on cognitive development. Finally, an original empirical model will be presented and tested.

## II. LITERATURE REVIEW

The volatile subject matter of The Bell Curve, as well as the socially unfavorable conclusions drawn, has prompted hundreds of articles written in response. Barton Meyers explains the controversy surrounding the text as follows: “[i]f true, class struggle and the fight for racial justice are reduced to irrational protests against implacable nature. If accepted, the wealthy are confirmed in their power while the dispossessed are weakened in their resolve to gain what is rightfully theirs” (1996, 196). Critiques of The Bell Curve can take two forms: an analysis of the data and statistical tests or an analysis of the book’s politics. While a response to Herrnstein and Murray’s policy suggestions will be offered in a later section, what follows will primarily be an analysis of the data and statistical tests used.

The arguments presented in The Bell Curve are based primarily on simple bivariate correlations between an individual’s score on the Armed Forces Qualification Test (AFQT) and one of several other variables. These variables include race, a constructed variable for socioeconomic status, and a measure of individual income. A brief overview of the quantitative aspects of The Bell Curve will allow comparisons to be made to the more sophisticated analytical tools utilized in the present research.

The key variable is the AFQT test score, which is the measure of IQ used throughout the text by Herrnstein and Murray, and is described as, “a combination of highly *g*-loaded subtests from the Armed Services Vocational Aptitude Battery (ASVAB) that serves as the armed services’ measure of cognitive ability” (pp. 570). The *g* factor they refer to is based on a theoretical idea of general intelligence suggested in 1904 by a British Army officer named Charles Spearman. The mere existence of any such “general

intelligence” is based, however, on circumstantial evidence, and Herrnstein and Murray admit that proof of its existence is “arguable” (pp. 3). Furthermore, it is never explained what features make the AFQT test “highly *g*-loaded.”

Nevertheless, the AFQT score is a composite number derived from four of the ten sections of the ASVAB test. These four sections are as follows: arithmetic reasoning, word knowledge, paragraph comprehension, and numerical operations. The scores from each section are summed, with each section counting evenly except section four, numerical operations, which contributes only half of its score to the cumulative total. The AFQT score is used by the armed services as a general measure of trainability and a criterion of enlistment eligibility (NLSY Users’ Guide).

A final feature of the AFQT score is that it has been shown to be a strong predictor of future earnings potential. See Appendix One for regression analysis that shows the AFQT score to be significant to the .000 level of significance for predicting future wage. This significance suggests that whether or not AFQT is highly “*g*-loaded,” as Herrnstein and Murray propose, it is still worthy of study. This merit comes from the fact that this predictive power provides a direct, quantitative, link between factors influencing AFQT scores, such as the proposed neighborhood characteristics, and an individual’s future earnings potential.

Despite the fact that AFQT scores are powerful predictors of future earnings potential, its determinants have been questioned by many researchers. “Herrnstein and Murray offer the (inaccurate) observation that scientists consensually attribute 40 to 80 percent of the variance of IQ to heredity. Then, in a gesture of seeming generosity, they agree to accept a figure of 60%, which they believe errs on the low side. Science is not

about gracious compromise, though. It is about precision, and what Herrnstein and Murray actually reveal is ignorance," asserts Meyers (1996, pp. 200). In fact, their suggestion that a consensus exists about the portion of IQ that is heredity is quite untrue, considering that the "nature versus nurture" debate rages on in psychological research. Despite the seemingly ad hoc percentages proposed, it is commonly believed that some of IQ is genetic and some is a product of environment.

Arthur Goldberger and Charles Manski provide a detailed account of the analyses presented in The Bell Curve in their 1995 review. Goldberger and Manski comment on Herrnstein and Murray's failure to include any discussion on the importance of education for predicting cognitive development. "Most analysts have considered education to be an intervening variable in the chain that runs from child background to adult outcomes" (Goldberger 1995, 766). Herrnstein and Murray omit any measure of education, however, saying that "the role of education versus IQ as calculated by a regression equation is tricky to interpret.." (pp. 124). Herrnstein and Murray go on to argue that education is a function of IQ and socioeconomic status, and therefore is included implicitly in their results. Goldberger and Manski attack this as an illogical excuse for the exclusion of a potentially important explanation. They go on to explain that, "[c]orrelation among explanatory variables does not affect the interpretation of regression coefficients as descriptors of how mean outcomes vary with each regressor, holding the others fixed" (pp. 766).

To Goldberger and Manski, Herrnstein and Murray's "treatment of genetics and race is akin to standing up in a crowded theater and shouting, 'Let's consider the possibility that there is a FIRE!'" (pp. 771). Goldberger and Manski assert that the

"evidence" used in The Bell Curve to support a genetic basis for the racial difference in cognitive ability is questionable, at best. For example, their findings rely primarily on the 1904 work by Spearman on "general intelligence," rather than one of the hundreds of more contemporary psychological works. Most contradictory, however, is a quote presented by Goldberger and Manski that is attributed to Charles Murray himself, the sentiment of which seems to be ignored in The Bell Curve: "[v]irtually every commentator on what it is like to grow up black in America . . . has reflected on the devastating effects of racism. The result can be immobilization of even the most able and ambitious" (pp. 771). No discussion of racism, however, is present in The Bell Curve.

### III. THEORETICAL MODEL

As discussed above, the statistical analysis on which The Bell Curve's findings are based has been greatly criticized. Therefore, the empirical analysis in this research will be developed from the theoretical models of other researchers. Historically, the most common way to measure the contributions to the development of cognitive ability has been to use a standard production function. In this case, the measure of cognitive ability should serve as the output of a variety of inputs.

Researchers Robert Havemen and Barbara Wolfe expand on the production function idea by including measures that may capture effects of the informal education that occurs in the home and neighborhood, as well as the effects of the individual's school environment. They argue that the development of cognitive ability is based on three categories of inputs: government inputs, family inputs, and individual inputs (Havemen 1995). According to Havemen and Wolfe, government inputs include school spending

and neighborhood conditions. These inputs determine the opportunities available to both children and their parents. Family inputs would be income level, family size, and attitudes toward education. These family inputs can be seen as the parents' investment in their children. Finally, individual inputs capture the choices that children make given the investments in and opportunities available to them. These would include the decision to finish high school or to participate in extracurricular activities (1995). Non-choice inputs like gender, race, and innate ability also fit this individual inputs category.

Havemen and Wolfe argue that this comprehensive economic framework reflects a choice-based view of the world in which governments, parents, and children are all seeking to maximize their own utilities. They believe that this should be seen as a sequential view of the world. The sequence starts with the government "setting the economic environment in which both parents and children operate" (1995). Given this environment, parents choose how much time to work, how much money they make, and how much of this time and money to devote to their children. Finally, given their own talents, children make decisions about their education and work effort.

Implicit in the government inputs category, Havemen and Wolfe recognize the importance of neighborhood characteristics. The importance of these neighborhood characteristics is reiterated in numerous sociological works, including the work of William Julius Wilson. Wilson argues that adverse neighborhood conditions, such as high rates of joblessness, "trigger other neighborhood problems that undermine social organization" (1996).

High correlations between neighborhood conditions and the local public school systems also exist. Despite efforts to equalize school spending, the quality of public

education varies greatly with the local neighborhood. Foundation grants are now being used in 80% of states to help narrow the gaps in education funding across school districts. These grants are given to poorer school districts, where the local tax base is not adequate to provide funding for basic programs (O'Sullivan 2000, 632). However, schools from areas of high poverty actually have higher costs. These schools devote more time and resources to security measures, dealing with family and health problems, and trying to teach children with weak educational preparation (O'Sullivan 2000, 637). Therefore, school quality cannot be measured by funding, and it is, in fact, a function of neighborhood quality.

Starting from Havemen and Wolfe's framework, a variety of other research exists that suggests specific factors that fit into the three-part production function model. Research certainly suggests that children from low-income families are less likely to be successful in schools (Downes 1999). This, of course, supports Havemen and Wolfe's idea that a measure of family inputs is necessary when predicting cognitive development.

Research also suggests that a measure of neighborhood violence will be a significant predictor of overall cognitive development. Researcher Jeffrey Grogger finds that neighborhood levels of violence show a significant, negative impact on a child's level of educational attainment (1997). This result also leads to the implication that other neighborhood factors, such as the level of unemployment, may be important in predicting cognitive development.

Estimating cognitive development as a function of neighborhood inputs, family inputs, and individual inputs is an approach that finds substantial support from previous theoretical work.

#### IV. EMPIRICAL MODEL

For the empirical testing of cognitive development, the present research builds on Havemen and Wolfe's model of the three-part education production function. However, the government inputs category is modified to strictly measure neighborhood characteristics, and thus will be referred to as neighborhood inputs. The procedure used here for examining the components of cognitive development is quite different from the extensive use of correlation data in The Bell Curve. However, in order to draw conclusions that are comparable to the results of The Bell Curve, Herrnstein and Murray's measure of IQ is used in this study, which is the AFQT test score. The same database is also used—the National Longitudinal Survey of Youth (NLSY). The National Longitudinal Survey of Youth is a cohort study that began in 1979 by surveying over 12,000 respondents who were between the ages 14-21 on December 31, 1979 (Bureau of Labor Statistics). In 1981, respondents completed the AFQT test and thus all other data used in the present research are based on the environment of the respondent in 1981. A total of 11,914 civilian and military NLSY respondents completed the AFQT test as part of a separate study conducted by the Department of Defense and Congress. OLS regression analysis is used to show that AFQT test scores are a function of neighborhood, parental, and individual inputs. For a summary description of variables including their means by race, refer to Table One.

Table One: Descriptive Statistics

| <b>Variable</b>            | <b>Mean<br/>(White)</b> | <b>Mean<br/>(Black)</b> | <b>Expected Sign</b> |
|----------------------------|-------------------------|-------------------------|----------------------|
| <i>Dependent Variable</i>  |                         |                         |                      |
| AFQT                       | 53.4676                 | 25.8875                 |                      |
| <i>Neighborhood Inputs</i> |                         |                         |                      |
| Rural (dummy)              | 0.3239                  | 0.2664                  | Negative             |
| Central (dummy)            | 0.1245                  | 0.3125                  | Negative             |
| % Unemployment             | 3.2825                  | 3.2221                  | Negative             |
| % Disadvantaged            | 16.7385                 | 34.5817                 | Negative             |
| % White                    | 86.3529                 | 45.4490                 | Positive             |
| % Drop-out                 | 13.5871                 | 17.6581                 | Negative             |
| <i>Family Inputs</i>       |                         |                         |                      |
| Mom's highest grade        | 11.7888                 | 11.0433                 | Positive             |
| Dad's highest grade        | 11.9530                 | 10.1702                 | Positive             |
| # Siblings                 | 3.1769                  | 4.8375                  | Negative             |
| Both parents<br>(dummy)    | 0.8148                  | 0.6183                  | Positive             |
| <i>Individual Inputs</i>   |                         |                         |                      |
| Highest grade              | 11.9725                 | 11.7260                 | Positive             |
| Cocaine use<br>(dummy)     | 0.1860                  | 0.09135                 | Negative             |
| Female                     | 0.5232                  | 0.5128                  | Uncertain            |
| Year born                  | 60.4644                 | 60.5462                 | Positive             |
| Sample Size                | 3301                    | 1012                    |                      |

The neighborhood inputs category is tested with six proxies, aimed at capturing both the conditions of the neighborhood at large and the school environment. Two dummy variables are used to indicate whether each respondent lives in a central city, a rural area, or in a non-central portion of a city. The hypothesis is that living in the non-central section of a city should have the best effect on cognitive development as both central city and rural areas often contain inferior schools. The other neighborhood measure is the local unemployment rate. According to the work of Wilson, areas with concentrated poverty, which corresponds to high unemployment rates, often have a variety of negative attributes. These include higher crime and drug use rates, which could certainly impede cognitive development.

The remaining three variables in the neighborhood inputs category are proxies for school quality. These are the percentage of the student body that is white, the percentage of the student body that classifies as disadvantaged, and the individual's high school's drop-out rate. The first two of these variables should capture the effects of concentrated poverty. The percent of the individual's school that was classified as disadvantaged was based on reports made by each respondent's school district. It is not clear from the NLSY handbook whether a universal measure of "disadvantaged" was used. Census data shows that areas containing a high percentage of minorities are most likely to be areas with low income. Finally, the dropout rate should serve as a measure of school quality, independent of funding. Clearly, well-funded schools could exhibit high dropout rates due to other factors.

A few interesting trends can be seen by examining the racial differences in means of the variables presented in Table One. Most striking, is the difference in AFQT scores for blacks and whites. Whites have an average AFQT score of 53.4676, while blacks average score is only 25.8875. Other major differences between the races include the neighborhood inputs. Black respondents have, on average, almost twice the number of disadvantaged students in their schools and just over half the percentage of white students. Finally, Table One shows that blacks are over 2.5 times more likely to live in a central city.

The second category of inputs is the family input category. These variables are all designed to be proxies of an individual's parents' socioeconomic status. Herrnstein and Murray argue that parents' socioeconomic status is the most important predictor of cognitive development, because they believe it is a direct reflection on IQ. Certainly,

socioeconomic status plays a huge part in cognitive development, and thus it must be controlled for in order to see the effects of the other inputs.

Specifically, the family inputs category includes a measure of the individual's mother's and father's highest grade completed, a measure of the number of siblings that the individual has, and a dummy variable concerning whether or not the individual grew up in a two parent home. Undoubtedly family income should be included here.

However, peculiarities with the NLSY database prevent a meaningful inclusion of parents' household income. It is reasoned, however, that parents' education level will serve as a meaningful substitute.

The variable regarding the number of siblings and the dummy variable concerning whether the individual grew up in a two-parent home attempt to measure the amount of time and money that the individual's parents had to invest in them. Assuming that both time and money are fixed, a high number of siblings or a single-parent environment would reduce the amount of attention devoted to each child.

Finally, as Havemen and Wolfe argue, individuals makes certain choices that reflect their own investment into their future. Most importantly, this effect should be captured by the highest grade completed variable. The dummy variable concerning whether or not the individual has ever used cocaine is aimed at capturing the effects of "bad" choices. Drug use would indicate that the individual was not making choices aimed at securing his or her future opportunities. The cocaine variable is a dummy variable, which asks the respondents if they have ever used cocaine. Due to inconsistencies within the NLSY database, this question was asked in 1984. It is, however, the only variable that does not come from 1981.

This individual inputs category also includes the year that the individual was born, whether they are male or female, and whether he or she is black or white. While these things do not represent choices made by the individual, they are characteristics that are likely to affect cognitive development. Assuming the ability is something developed through time, older individuals should score higher. Further, previous research, suggests that being female and/or being black is linked with lower cognitive development—at least so far as it is measured by AFQT score as there is likely race and gender bias inherent in the test. While this research will strive to explain racial differences in AFQT score by controlling for neighborhood effects, a dummy variable for race will still be included. In effect, the purpose behind including this variable is to show that it is not important.

The production function for cognitive development as outlined in this study is:

AFQT score = f (neighborhood inputs, family inputs, individual inputs)

I hypothesize that the racial difference in AFQT scores that Herrnstein and Murray report in The Bell Curve can be attributed in part to the neighborhood conditions affecting blacks and whites. The effects should be detectable once controls for family and individual inputs are included. In order to test for these differential neighborhood effects, the above described, three-part production function is estimated once for black NLSY respondents and once for white respondents. Furthermore, both regressions contain racial interaction variables so that any significant differences in the effects of a certain input for black respondents *vis a vis* white respondents can be determined.

## V. RESULTS

Table Two provides the detailed results of the multivariate regressions. Recall that two separate regressions are run. In the first model, white respondents serve as the base, and in the second model blacks are the base. The following equations illustrate, for one variable (rural), how the models function. In equation (i) white is the base race; thus the black dummy variable is included. The inclusion of the dummy variable and the black interaction variable allows for the determination of different intercepts and different slopes for black and white respondents, as shown in (ii) and (iii). While this example shows only the rural variable, in actuality both models included all 14 independent variables and 14 interaction terms.

(i)  $AFQT = a_1 + a_2 \text{ black} + a_3 \text{ rural} + a_4 (\text{black} * \text{rural}) + \dots$

(ii) For Whites:  $AFQT = a_1 + a_3 \text{ rural} + \dots$

(iii) For Blacks:  $AFQT = (a_1 + a_2) + (a_3 + a_4) \text{ rural} + \dots$

Structuring the model as in (i) allows for determining which white coefficients (e.g.  $a_3$ ) are significantly different from zero and which differences between white and black coefficients (e.g.  $a_4$ ) are significantly different from zero. These coefficients are reported in columns one and three. The black coefficients (e.g.  $(a_3 + a_4)$ ) are reported in column two. To determine which of these are significantly different from zero for blacks, the model is run in reverse, with black as the base race. In this second model, the non-interaction variables are the black coefficients.

Before turning to the individual coefficients, it must be noted that the sample size of these regressions is only 4313. While this figure is more than enough to justify these results, it is quite a significant drop from the 11,914 respondents who took the AFQT test.

Therefore, it is worth noting that this drop can be largely attributed to the inclusion of the school quality variables. These variables were collected by individual schools on a voluntary basis. Obviously, the compilers of the NLSY database had little power in ensuring that schools completed their questionnaires and for this reason, the responses to these variables are sharply limited.

Table Two: OLS Regression

| Variable                   | Coefficients<br>(t-stats) |                       |                     |
|----------------------------|---------------------------|-----------------------|---------------------|
|                            | White                     | Black                 | Difference          |
| <i>Neighborhood Inputs</i> |                           |                       |                     |
| Rural (dummy)              | -0.5346<br>(-0.623)       | -2.9288*<br>(-1.782)  | 2.3942<br>(1.292)   |
| Central (dummy)            | 1.1243<br>(1.001)         | 1.8825<br>(1.207)     | -0.7582<br>(-0.394) |
| % Unemployment             | -0.3303<br>(-0.857)       | 0.5303<br>(0.774)     | -0.8606<br>(-1.095) |
| % Disadvantaged            | -0.0683***<br>(-2.992)    | -0.0466^<br>(-1.577)  | -0.0217<br>(-0.581) |
| % White                    | 0.0597***<br>(2.891)      | 0.0358^<br>(1.423)    | 0.0239<br>(0.735)   |
| % Drop-out                 | -0.0354*<br>(-1.880)      | -0.0264<br>(-0.767)   | -0.0090<br>(-0.230) |
| <i>Family Inputs</i>       |                           |                       |                     |
| Mom's highest grade        | 1.1761***<br>(6.492)      | 0.9427***<br>(2.978)  | 0.2334<br>(-0.640)  |
| Dad's highest grade        | 1.2776***<br>(9.461)      | 0.6747***<br>(2.947)  | 0.6029**<br>(2.267) |
| # Siblings                 | -0.8671***<br>(-4.834)    | -0.5744**<br>(-2.507) | -0.2927<br>(-1.004) |
| Both parents (dummy)       | 0.8383<br>(-4.210)        | -0.4001<br>(-0.297)   | 1.2384<br>(0.757)   |
| <i>Individual Inputs</i>   |                           |                       |                     |
| Highest grade              | 8.0798***<br>(29.067)     | 6.7508***<br>(12.787) | 1.3290**<br>(2.233) |
| Cocaine use (dummy)        | 1.6957*<br>(1.822)        | 4.6761**<br>(2.057)   | -2.9804<br>(-1.213) |
| Female                     | -3.0069***<br>(-4.210)    | -2.2712*<br>(-1.737)  | -0.7357<br>(-0.494) |
| Age                        | 1.6570***<br>(7.678)      | 1.700***<br>(4.463)   | -0.0430<br>(-0.098) |
| Race                       | 1.1140<br>(0.036)         | -1.1140<br>(-0.036)   |                     |

\*\*\*indicates .01 level of significance

\*\* indicates .05 level of significance

\*indicates .1 level of significance

^ indicates .1 level of significance for a one-tailed test

Sample size 4313

Adjusted R2 white .510

Adjusted R2 black .510

Consistent with previous research done by Havemen and Wolfe on the categorical inputs into the education production function, family and individual level inputs are very important predictors of an individual's level of cognitive development, as proxied here by AFQT score. The family inputs all produce the expected signs and with the exception of the dummy variable concerning whether or not an individual grew up living with both parents, all the family variables are significant. Specifically, an individual's mother's and father's highest grade completed is a significant predictor of his or her own AFQT score. Further, having a high number of siblings is a negative influence on AFQT score. All three of these variables serve as proxies for socioeconomic status and thus the overarching result of the family input category is that socioeconomic status is directly related to AFQT score. While this result is not surprising, it is important for establishing that the analysis of the individual and the neighborhood variables is done while controlling for socioeconomic status.

The individual input category, the second control category of inputs, also yields statistically important results. Most importantly, the control for race is not significant in either model. Another important result is that the highest grade completed by the individual is significant to the .000 level in both models. This variable also shows a rather large magnitude of 8.083 in the white regression and 6.751 in the black regression. That is, for every one additional grade completed by the individual, the predicted AFQT score goes up by over eight points for whites and by almost seven points for blacks. With the exception of race, all the variables in this individual input category are significant.

However, it is interesting to report that an individual's year born and his or her cocaine use both fail to yield the predicted sign. Specifically, these results show that as the

year that the individual was born increases the AFQT score increases. That is, younger individuals produce higher AFQT scores. While this result at first seems highly counterintuitive, it is possible that it merely reflects a bias built into the AFQT test itself. Specifically, test takers who were currently in, or who had just finished, high school may do better in certain areas where the retention of specific, unused, knowledge is likely to diminish over time. Areas of the AFQT test such as arithmetic reasoning and numerical operations may, in fact, produce this tendency. That is to say, absent periodic use, individuals may tend simply to forget certain things, such as the rules of trigonometry. Another possible explanation for this result is the possibility of reverse causation between the control for highest grade completed and age. That is, the younger students in a given grade may have skipped ahead, while the older students likely fell behind a grade level.

Cocaine use also failed to produce the expected sign. This regression shows cocaine use to be directly related to AFQT score. No justification will be attempted for this result, except to say that it has been suggested that cocaine use is a phenomenon of the upper class and thus this variable may be a proxy for income.

The two demographic controls included in the individual input section both provide interesting results as well. Being female is a significant, negative predictor of AFQT. This is consistent, however with previous literature criticizing the gender bias in the AFQT test.

The final variable for analysis from the individual input category is the control for an individual's race. It is very important for this research to note that the race variable is not statistically significant in either of the two models. That is, *ceteris paribus*, race is not a significant predictor of an individual's AFQT score. This result is directly contradictory to the arguments presented by Herrnstein and Murray in The Bell Curve. Furthermore, this

result lends credence to the original hypothesis of this paper, which is that the observed racial differences in the mean AFQT test scores of blacks and whites can be explained when controls for neighborhood factors are examined.

Returning now to the results of the neighborhood inputs category, it is clear that these factors are powerful and significant predictors of cognitive development. These results provide quantitative support for the theories concerning the negative effects of concentrated poverty and other adverse neighborhood characteristics, as discussed by William Julius Wilson. While the location variables regarding residence in either a central city or a rural area fail to provide meaningful results in the white regression, living in a rural area does show a significant, negative effect for blacks.

The assumption that school quality and neighborhood quality are closely related is supported by the research on the funding of public schools. Therefore, the proxies of school quality provide insight into the effects on AFQT of an individual's neighborhood. The school quality proxies used in this research are the percent of the student body that is disadvantaged, the percent of the student body that is white, and the dropout rate. Recall from the earlier discussion, that percent disadvantaged clearly proxies the level of poverty and its associated adverse characteristics in a neighborhood. For this reason, it is highly important for the advancement of these hypotheses that percent disadvantaged has a significant, negative effect on AFQT score. This significance is true in both the black and white models. However, the level of confidence with which this claim can be made does fall substantially in the black model. Specifically, the percent disadvantaged variable is significant in the white equation at the .003 level of confidence, using a two-tailed test. In the black equation, however, it is only significant to the .053 level, using a one-tailed test.

In fact, what this result says is that a 20% reduction in the percentage of a student body that is disadvantaged, would yield an AFQT score that is 1.366 points higher for the individual attending that school. This increase in AFQT score is quite important when it is recalled that AFQT is an important predictor of future wages. In fact, as Appendix One shows, a 1 point increase in AFQT score predicts a \$.20 increase in future wages.

The second measure of school quality provides results that further confirm that neighborhood characteristics are important determinants of AFQT scores. This second variable, which is the percentage of students in the individual's school that are white, is significant and positively linked to AFQT score in both equations. The results show that a 20% increase in the proportion of a student body that is white would yield an AFQT score that is 1.194 points higher for the individuals in that school. Again, however, it is worth noting that the level of confidence falls considerably in the black equation. The significance of this variable is very important when recalling Wilson's research that blacks tend to live in areas of high racial concentration. This result helps to explain why blacks perform, on average, worse on the AFQT test.

The final school measure, the dropout rate, also provides support for the hypothesis that neighborhood conditions affect AFQT score. The dropout rate has a negative effect on an individual's AFQT score, regardless of the individual's own level of education. This variable, however, is not significant.

Turning now to the differences between the black and white variables, it is interesting to point out that only two variables show significantly different effects for blacks and whites. The first of these variables is the highest grade completed by the individual. The other is the highest grade completed by the individual's father. While the

magnitudes are different between the other variables, these are the only cases in which the difference is statistically significant. As Table Two shows, blacks earn fewer rewards from education. Specifically, blacks earn 1.333 less AFQT points per additional grade completed than do whites. Considering that the highest grade completed yielded one of the greatest magnitudes of any variable, in both regressions, this difference in the return to years of education is quite an important finding.

The most obvious result of these models is that race is not an important predictor of AFQT score. The race dummy variable was insignificant in both models, and only two of the fourteen independent variables produced results that were significantly different for blacks and whites. While clearly a large gap in mean black and white AFQT scores does exist, this difference is not a function of race and can be explained by looking at neighborhood, family, and individual inputs into the cognitive development production function.

## VI. CONCLUSIONS

The purpose of this research was to provide an alternative to the bleak policy implications provided by Richard Herrnstein and Charles Murray in The Bell Curve. Herrnstein and Murray believe that poverty is a function of IQ, in that IQ determines an individual's earnings potential. Furthermore, while they believe that IQ is at least 40% determined by an individual's home environment, they argue that little can be done to affect a person's IQ. This is because, according to Herrnstein and Murray, home environment is entirely a function of the parents' IQ level. Thus, heredity, and the environment that it predicts, serve to keep the poor in situations of poverty, generation

after generation. Even more dangerous, Herrnstein and Murray go on to use this framework for explaining the sustained poverty of the black community. Despite overwhelming sociological research, some even previously stated by Murray, they ignore the possible effects of racism on the development of cognitive ability.

Contrary to the findings of The Bell Curve, this research has used OLS regression to identify several factors that significantly contribute to an individual's AFQT score. What is most important, however, is that many of these factors, specifically the school quality proxies, are things that can be changed through the actions of the government and by concerned parents and administrators.

The potential to raise the AFQT scores of the disadvantaged by equalizing neighborhood effects is a very important finding. It has been shown that more intelligent parents can provide better family inputs, which serve to raise children's AFQT scores. Therefore, improving the school and neighborhood characteristics of the children of this generation can only lead to even greater improvements for the next generation, as these more intelligent parents provide better family inputs.

Care has been used to make the results of this research as comparable to the results of The Bell Curve as possible while still employing the more conventional form of statistical analysis. The same measure of IQ was used in this research as was used in The Bell Curve, that being the AFQT score. Further, the same database, the NLSY, was used. Despite these similarities, the results directly contradict Herrnstein and Murray's belief that "it is once again time for America to try living with inequality" (Herrnstein 1994).

Instead, this research should serve as a reminder of the potential that government policies have for affecting the lives of youth. Furthermore, this is a call for the continued efforts of those who have fought for equality in the education system.

## APPENDIX ONE: AFQT AND FUTURE WAGE

In a single variable model, AFQT was found to be a statistically significant predictor of future wage. Specifically, the 1981 based AFQT score was significant to the .000 level of significance for predicting an individual's 1998 wage. This was based on a sample size of 6425 and the model showed an Adjusted R<sup>2</sup> of .004.

| <u>Variable</u> | <u>Coefficient (t-stat)</u> |
|-----------------|-----------------------------|
| Constant        | 8.935 ***(4.296)            |
| AFQT            | 0.196*** (4.772)            |

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