

An Analysis of the Relationship between Financial Aid for Higher Education and Crime Rate

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1) Introduction

Education is argued to have not only individual returns but also social returns. Within a human capital framework, the idea that education brings people higher wage rates supports a negative education-crime relationship as well. People with a higher wage rate have the increased value of any time that would be lost if they were involved in criminal activity. Therefore, they face a higher opportunity cost of planning and being involved in illegal activities (Lochner 2004). The duration of incarceration makes people especially reluctant to commit crimes. In white-collar crime cases, however, the education level may have a positive or ambiguous impact (Lochner 2004). On the other hand, education is widely known to have a number of positive externalities: higher productivities, which lead to a higher standard of living, and income redistribution effects. Based on the argument of the social returns to education, many governments build public schools and subsidize the cost of education for K-12 and higher education. In 2009, Minnesota undergraduate students received \$1 billion in grants or scholarships (Minnesota Office of Higher Education, 2009). In the year 2007, 51.7% of undergraduates throughout the nation received some type of grants, with the average amount being \$4,100 (Education Department's National Center for Education Statistics, 2009).

There has been a large body of literature on how financial aid affects students' college decisions due to the expensive cost of subsidizing higher education. However, there is little evidence on the impact of financial aid on crime rates. Statistics from the Federal Bureau of Investigation (2010) show that the crime rate for many types of crime has steadily declined in most of the states in the U.S from 2000 to 2009; the number of violent crime offenders per 100,000 inhabitants has gone down from 506.5 to 429.4 and for property crime 3,618.3 to 3036.1. This paper will contribute to the extensive literature on crime and education by using cross-sectional data from 2,120 U.S. counties from 2007 and 2008 in order to understand how financial aid relates to crime rate. A theoretical model is presented for an individual's decision on committing a crime with financial aid as an explanatory variable. Strong evidence is found that an increase in financial aid leads to lower property, violent, white-collar crime rates.

2) Literature Review

Most of literature on financial aid for higher education focuses on individual returns such as individuals' college choice or attainment rates; some literature examines the impacts of the government's expenditure for higher education on social returns such as national income or inequality, but none addresses crime rates. This paper is one of the few to examine this question: does financial aid lead to a decrease in crime rates? Previous literature for this paper is divided into three areas: the cost of higher education and individuals' college choice, social returns to higher education, and education and crime rates.

First, there is literature on the cost of higher education and individuals' college choice. Many researchers agree that a decrease in the net price of education should lead to a higher education attainment as financial aid helps students work less than they would otherwise (Bound & Turner 2002; Dynarski 2002; Klaauw 2002; Abraham & Clark 2006). Klaauw (2002) uses individual data from a college on the east coast of the U.S. in the academic year 1991-1992. The results suggest that for financial aid applicants, the enrollment elasticity with respect to college grants was estimated to be 0.86. Abraham and Clark (2006) use data from the District of Columbia Tuition Assistance Grant Program (DCTAG) that allows students in D.C. to go to public colleges nation-wide at in-state tuition rates. Their results indicate that the DCTAG program has raised the percentage of high-school-graduation age D.C. residents who enrolled as freshmen by roughly 8.9%, or 3.6% for every \$1,000 of aid. Dynarski (2002) presents similar results by using data from Georgia HOPE grant and Pell grant programs; every \$1,000 of subsidy increases college attendance rates by roughly 4%. Bettinger (2004) focuses on outcomes in college rather than enrollments. Using data from the Ohio Board of Regents, Bettinger (2004) finds that every \$1,000 increase in students' imputed Pell grants leads to a 6.4% reduction in the likelihood that students would withdraw from college. Furthermore, considering the types of financial aid, Singell (2001) and Ahlburgs, DesJardins, and McCall (2002) agree that merit-based aid programs have larger impacts on students' enrollment decisions than need-based aid programs.

Second, researchers have found positive social returns to higher education based on an education-wage relationship within a human capital theory framework. This theory predicts that investment in human capital through education or job training increases one's returns to work and financial independence (Gould et al. 2002). In that vein of education-wage relationship, Baldwin and Borrelli (2008) test to see if a government's expenditure on higher education leads to a growth in per capita income. Their results indicate that the expenditure on higher education is significantly associated with income growth. Moretti (2004) finds that a percentage point increase in the supply of college graduates raises not only college graduates' wages but also high school drop-outs' and high school graduates' wages in the same geographical region.

Third, a large body of literature estimates the relationship between education and crime rates. An individual with a higher wage rate faces a higher opportunity cost of illicit behavior, as it takes time to prepare a criminal activity, and the duration of incarceration for punishment raises an individual's economic consequences (Lochner & Moretti 2004). Lochner (2004) shows a strong negative effect of education on both property and violent crimes. Lochner and Moretti (2004) estimate the effect of compulsory school attendance law on crime. Their results indicate that one year increase in education levels tends to decrease both violent and property crime rates by 10.3%. They suggest that an increase in the high school completion rates of all men aged 20-60 would save the United States as much as \$1.4 billion per year in crime prevention. In another study, Lochner (2010) finds a negative school-crime relationship using a two time period model. Merlo and Wolpin (2008) suggest that attending school at age 16 prevents African American males from ever committing a crime by 13%.

The research results on the relationship between college education and crime rates are mixed. Buonanno and Leonida (2009) found little evidence of the relationship between college completion and crime rate reduction, while a 10% increase in high school completion would bring about a 4% decrease in property crime rates. However, Lochner (2004) finds that among males aged 20 to 23 year-old, 33% of those with 10 or 11 years of education earned an income from crime, whereas only 17% of those

continuing to college did. In the report released by Karpowitz and Kenner (2004), it is shown that 41% to 71% of those released from prison are likely to commit a crime again. However, incarcerated individuals with associate, bachelor, or master's degrees have a 13%, 5.6%, or 0%, respectively, likelihood of committing a crime again after being released from prison.

Current economic literature does not provide a clear answer to the affect of financial aid on crime rate; although some literature suggests that financial aid influences students' college enrollment rates and higher education level may decrease crime rates. For an education-crime relationship, college education may have an impact on crime rates (Karpowitz & Kenner 2004), and there is strong evidence of high school achievements effect on crime rates (Lochner 2004; Lochner & Moretti 2004). A \$1,000 increase in subsidies for higher education tends to increase enrollment rate by 4% to 6%. In this paper, I hypothesize a negative relationship exists between financial aid and crime rates. This paper contributes to the literature in three ways. First, it aims to estimate the social returns to college education. Second, it examines the impact of government subsidy for higher education. Third, it provides models by types of crime: violent crime, property crime, and white-collar crime.

3) Theoretical Model

Economists assume that humans are rational. Based on this assumption, economic theories analyze humans' behaviors. In this section, I begin with the standard utility maximization model to analyze individuals' purchasing decisions and then apply the model to education attainment decision. Grounded on the basic assumption that an individual's education level has a negative impact on one's criminal activities, this section aims to present an expanded education-crime model including a financial aid variable based on economic theories.

A consumer will make purchasing decisions to maximize one's utility given a fixed amount of income. In a utility maximization model, a rational individual seeks to optimize their utility, given the limited income, by allocating their income at the point where a budget constraint line and a utility curve

barely touch each other. In this model, one's income and the price of two goods (X and Y) influence the individual's purchasing decision. As the price of good X decreases, the slope of the budget constraint changes, which allows the individual to reach a higher utility curve (Figure 1). Therefore as the price of good X decreases, the original purchasing combination changes to the new one, consisting of more quantities of good X and less quantities of good Y.

$$\text{Purchasing decision} = f(\text{income, price of good A, price of good B, individual's state})$$

By applying this theory to the decision on education, it explains how an individual chooses to allocate one's limited time between education and other activities such as work and leisure. The decision making process on his/her time is influenced by the net price of education (tuition and financial aid), the price of other activities, and one's taste.

$$(1) \quad \text{Education attainment decision} = g(\text{Net price of education,} \\ \text{Prices of the other activities, Individual's taste})$$

If the net price of education decreases due to the increased financial aid, it affects the slope of budget constraint line. This brings the new purchasing decision of more time spent on education and less time on other activities, given that the prices of other activities stay the same.

The idea that an individual's education level negatively affects one's *criminal* decision allows me to suggest the Becker's supply of offenses model including the individual's education level as an explanatory variable (Becker 1968).

$$(2) \quad \text{Decision on committing a crime} = h(\text{Education level, Returns to crime,} \\ \text{Socioeconomic characteristics})$$

By replacing education level by Equation (1), I obtained

$$(3) \quad \text{Decision on committing a crime} = h(\text{Net price of education, Price of other activities,} \\ \text{Returns to crime, Socioeconomic characteristics})$$

4) Empirical Model

This section aims to construct linear regression equations to test the theoretical foundation given by

$$(3) \quad \textit{Decision on committing a crime} = h(\textit{Net price of education}, \textit{Price of other activities}, \\ \textit>Returns to crime}, \textit{Socioeconomic characteristics})$$

Assuming that individuals' criminal decisions will affect the crime rate in a specific geographical area, I define the dependent variable, crime rate, as the number of individual who commits a crime divided by the total population in the area. As the number of white-collar crime offenders is not reported, I used the number of arrested under forgery, counterfeiting, fraud or embezzlement in each state from the Uniform Crime Reports as a proxy for the number of white-collar crime offenders. This proxy is used by Lochner and Moretti (2004).

The net price of education depends on both tuition fees and financial aid grants received. The subsidy on higher education will increase individuals' schooling, and higher education level will decrease the chances of committing a crime. Thus, I expect to see a negative sign on the coefficient of the financial aid variable and a positive sign on the coefficient of the tuition variable. As the U.S. Department of Education does not provide average tuition fee at county-level, this variable is omitted for the property and violent crime models. Educational level may have a different impact on some types of crime because the incarceration period for property crime is generally shorter than for violent crime, which means property criminals have less income loss during the incarceration compared to violent criminals (Lochner 2004). Therefore, the education impact on property crime may not be as significant as violent crime. Since white-collar crime tends to require a higher education level (Lochner & Moretti 2004), financial aid might have a positive impact on the white-collar crime rate.

The returns to criminal activities are subject to the actual gains from crime, the opportunity cost of crime, and the probability of being arrested. In criminals' perspectives, the benefits from crime are

understood as the damage of victims (Levitt 1995). Freeman (1996) points it out that the average reported victimization may be higher or lower than the total reported. Unfortunately, I was forced to omit the gains from crime because no data is available for victimization. The opportunity cost of crime can be measured by wage rate as the wage rate is the value of time loss in preparing and committing a crime. Furthermore, wage rate measures the economic consequences of the incarceration period. I anticipate a negative impact of wage rate on crime rate. There is no data available for the probability of being arrested. Ehrlich (1973) suggests the number of offenders imprisoned per known offenses as a proxy for the probability of arrests. However, the FBI does not provide arrest information at county-level. Gyimah-Brempong (2006) points out that the probability of arrest varies due to the different intensity of police patrol that may or may not be correlated with income levels.

The socioeconomic characteristics that influence one's crime decisions are as followed; age (Freeman 1996; Lochner 2004), race (Lochner & Moretti 2004; Merlo & Wolpin 2009), gender, and the state of being unemployed (Chiricos 1987; Howsen & Jerrell 1987; Raphael & Winter-Ember 2001; Gould et al. 2002).

Lochner (2004) addresses that the age-criminal activity graph has its peak during the late teens for both property and violent crimes. He explains that for youth who are prior to entry into the labor market, criminal activities increase with age. However, once they begin to work, there are potential chances of higher wage rates in the future if they continue to work. Therefore, people face a higher opportunity cost of criminal activities so that illicit behaviors decreases with age. I use the ratio of youth aged 15 to 24 over total population in a geographical area for the YOUTH variable. I expect to see a positive coefficient of this variable.

Freeman (1996) estimates that African American male high school dropouts age 15- 24 have the highest imprisoned-rates compared to other races. Lochner and Moretti (2004) estimate that education impact is greater for African Americans than whites; their results estimate that one extra year of schooling

decrease the probability of incarceration for whites by 0.10% and for African Americans by 0.37%. By calculating ratio of African Americans over total population, I obtained the AFRICAN AMERICAN variable. As empirical research suggested, a positive sign of the coefficient is expected.

Chiricos (1987) shows unemployment rate is one of the influential factors to crime rate. Chiricos explains that being unemployed without any income means less opportunity cost of committing a crime and no income loss for potential penalty. Howsen & Jerrell (1987) also consider the unemployment rate as the opportunity cost of criminal behaviors. I expect to see a positive coefficient of UNEMPLOYMENT variable.

Region dummy variables are used to distinguish regional effects. Ehrlich (1973) found a positive relationship between the participation in illegitimate activities and the southern regional effect. Lochner and Moretti (2004) used a dummy variable for cohorts born in the south. The south dummy is expected to have a positive coefficient whereas other region may have ambiguous impact on crime rate.

- The final theoretical regressions with anticipated signs in parenthesis are
- (4) $Property\ crime\ rate = \alpha_0 + \alpha_1 Cost\ of\ schooling (+) + \alpha_2 Financial\ Aid (-)$
 $+ \alpha_3 African\ American (+) + \alpha_4 Youth (+)$
 $+ \alpha_5 Unemployment\ rate (+) + \alpha_6 Probability\ of\ being\ arrested (-)$
 $+ \alpha_7 Income (-) + \alpha_8 South (+) + \alpha_9 Northeast (?) + \alpha_{10} West (?) + \varepsilon$
- (5) $Violent\ Crime\ rate = \alpha_0 + \alpha_1 Cost\ of\ schooling (+) + \alpha_2 Financial\ Aid (-)$
 $+ \alpha_3 African\ American (+) + \alpha_4 Male (+) + \alpha_5 Youth (+)$
 $+ \alpha_6 Unemployment\ rate (+) + \alpha_7 Probability\ of\ being\ arrested(-)$
 $+ \alpha_8 Income (-) + \alpha_9 South (+) + \alpha_{10} Northeast (?) + \alpha_{11} West (?) + \varepsilon$
- (6) $White-collar\ crime\ rate = \alpha_0 + \alpha_1 Cost\ of\ schooling (?) + \alpha_2 Financial\ Aid (+/?)$
 $+ \alpha_3 African\ Americans (+) + \alpha_4 Youth (?)$
 $+ \alpha_5 Unemployment\ rate (+) + \alpha_6 Probability\ of\ being\ arrested(-)$
 $+ \alpha_7 Income (-) + \alpha_8 South (+) + \alpha_9 Northeast (?) + \alpha_{10} West (?)$
 $+ \varepsilon$

5) Summary Statistics

In this section I present how the data was collected and characteristic of each variable. From various data centers, information for dependent and independent variables was collected. The Federal Bureau of Investigation's (FBI) Uniform Crime Reports provides the reported number of property and violent crime offenders in each city, county and state in the United States. However, the number of white-collar crime offenders is not reported. I used state-level data from UCR that contains the number of arrests for forgery, counterfeiting, fraud and embezzlement. Due to this limitation of data, county-level data was used for the violent crime and property crime models and state-level data is used for the white-collar crime model.

5) – a. U.S. County-level Data for Property and Violent Crimes.

The U.S. Department of Education Data Center provides about 6080 degree granting institutions data with the number of federal, state and institutional financial aid recipients and the amount of the aid given in the year 2007 and 2008. After sorting the institution level elements by the county, 2896 counties' data was gathered for both years. The Uniform Crime Reports provides the reported number of property and violent crime offender information on the U.S. counties only in 44 states excluding Connecticut, Delaware, Illinois, Massachusetts, New Jersey, Rhode Island. Hence I had to drop the financial aid information on counties from those states. I gathered the number of violent crime offenders and property crime offenders in each county. All inputted crime rates were scaled to result in measures per 100,000 members of the population to give consistent units. The U.S. Census Bureau has estimated residence population by age, sex, race for counties each year. I collected total population, the number of male, the number of African Americans, and those age 15 to 24 for counties matched with the financial aid data from 2007 and 2008. I also collected the estimated household median income from the Small Area Estimates Branch in U.S. Census Bureau. Annual average unemployment rates were collected from the Bureau of Labor Statistics. After I dropped elements with missing information from the original financial data set, a total of 2,086 observations fit for regression in property crime model and 2032 observation in violent crime model were left.

The average amount of financial aid per recipient was obtained by dividing the total amount of federal, state and institution financial aid grants of each county by its number of recipients. This value ranges from \$38.58 (Colbert in Alabama) to \$26211.751 (Blount in Tennessee) with a mean of \$5,530. Unfortunately, due to the lack of data for tuition at county-level, the tuition variable had to be dropped.

The number of property crime offenders in every 100,000 people ranges from 0 (Franklin in New York) to 8,796 (Roger in Oklahoma) with a mean of 892. The number of violent crime offenders ranges from 0 through 1,549 (Radford in Virginia) with a mean of 114. I used log transformation for both property and violent crime variables to satisfy the normality assumption; figure 2 shows the histograms that support log transformation to satisfy normality. The logged number of property crime offenders ranges from -0.744 to 9.08 with a mean of 6.3 and a standard variation of 1.1. The logged number of violent crime offenders has a minimum of -2.25 and a maximum of 7.34. This transformation forced me to drop one observation in the property model and 43 observations in the violent model. TABLE 1-a, b show summary statistics of variables for both regression equations.

I was concerned about the years that my data came from, 2007 and 2008. According to the National Bureau of Economic Research, the United States entered a recession in December 2007; which lead to a severe decline in economic activities in 2008. To control macroeconomic effect of each year, a year 2008 dummy variable is used; 1 indicates the observation is from the year 2008, 0 indicates from the year 2007. TABLE 2-a shows the summary statistics each year. It presents that both property and violent crime rates have decreased from 2007 to 2008 whereas the average financial amount per recipient increased. A dummy variable for the south region is used to control the regional effect on crime, as mentioned in the empirical model section in this paper. TABLE 3-a shows summary statistics of the south region. Compared to the total sample mean, the south area shows higher crime rates in all three types.

As mentioned earlier in the theoretical model, being unemployed reduces the opportunity cost of crime as those who do not have a job have more time to prepare and commit a crime and the consequence

of the penalty is not as large as those who have some income. The average of each state's unemployment rate is in the U.S. 5.3% throughout the sample from 2007 and 2008. I separated data into lower unemployment rate and higher unemployment. TABLE 4-a shows that those counties with higher unemployment rates have higher crime rates.

5) -b. State-level Data for White-Collar Crimes

The National Center for Education Statistics provides state-level financial aid data. I collected this data set from 2004 through 2008. I obtained the average aid value by adding the amount of federal grants and state government grants received by undergraduate students and dividing the total by the number of recipients. The Education Statistics Data Center provides average tuition and fee of each state every year. To control the different cost of living among observations and throughout the year 2004 to 2008, the tuition variable is adjusted to scale of household median income equaling to \$1,000. Tuition values range from \$62.78 (Alaska 2004) to \$279.27 (Pennsylvania 2008) with a mean of \$138.3 given that the household median income equals \$1,000. The white-collar crime variable, defined as the number of arrested under forgery, counterfeiting, fraud or embezzlement, is adjusted to the scale to population of 100,000. The number of people arrested for white-collar crimes every 100,000 members of population ranged from 23 (Illinois 2008) through 727.8 (Kentucky 2005) with a mean of 146.35 and a standard deviation of 110.69. The logged white-collar crime ranges from 3.14 to 6.6 with a mean of 4.8. Compared to the county-level data used in the property and the violent crime models, state-level data has small ranges and become even smaller after applying logarithm. TABLE 1-c shows summary statistics for all explanatory variables used in the white-collar crime model. Although my data does not show a big different of white-collar crime rates from 2004 to 2008, to control macroeconomic impact, year dummies are used. TABLE 2-b shows summary statistics for each year. Similar to the property and the violent crime models, region dummy is used. The south region has a higher white-collar crime rate compared to U.S. as a whole. TABLE 3-b shows summary statistics for those states in the south area.

6) Regression Result

The crime equations that I estimate is given as :

$$(7) \log \text{PROPERTYCRIME}_i = \beta_0 + \beta_1 \log \text{AID} + \beta_2 \log \text{YOUTH} + \beta_3 \log \text{AFRICAN AMERICAN} + \beta_4 \log \text{INCOME} \\ + \beta_5 \log \text{UNEMPLOYMENT} + \beta_6 \text{Y2008} + \beta_7 \text{SOUTH} + \beta_8 \text{NORTHEAST} \\ + \beta_9 \text{WEST} + \gamma$$

$$(8) \log \text{VIOLENTCRIME}_i = \beta_0 + \beta_1 \log \text{AID} + \beta_2 \log \text{YOUTH} + \beta_3 \log \text{AFRICAN AMERICAN} + \beta_4 \log \text{INCOME} \\ + \beta_5 \log \text{UNEMPLOYMENT} + \beta_6 \text{MALE} + \beta_7 \text{Y2008} + \beta_8 \text{SOUTH} \\ + \beta_9 \text{NORTHEAST} + \beta_{10} \text{WEST} + \varepsilon$$

$$(9) \log \text{WHITECOLLARCRIME}_i = \beta_0 + \beta_1 \log \text{AID} + \beta_2 \log \text{TUITION} + \beta_3 \log \text{AFRICAN AMERICAN} \\ + \beta_4 \log \text{INCOME} + \beta_5 \log \text{UNEMPLOYMENT} + \beta_6 \text{Y2005} + \beta_7 \text{Y2006} \\ + \beta_8 \text{Y2007} + \beta_9 \text{Y2008} + \beta_{10} \text{SOUTH} + \beta_{11} \text{NORTHEAST} + \beta_{12} \text{WEST} \\ + \delta$$

where ε , γ , and δ are stochastic error terms and all other variables are as defined in the summary statistics.

All variables except male and dummies are applied logarithm. Sampling distributions for all three dependent variables support that the logged variables satisfy normality assumption (Figure 2-a, b, and c). Despite these advantages, I had to drop 43 observations for the violent crime model through logarithm transformation. Omitting meaningful samples could lead to a biased regression results. In concern of those dropped observations, level-level regression equation for violent crime will be estimated in robustness check.

In my final regression equation, there are 2,092 observations, 1,989 observations, and 244 observations in the property, violent, and the white-collar crime model respectively. Gujarati and Porter (2009) suggest common problems of regression analysis: autocorrelation, multicollinearity, heteroskedasticity, and specification error.

When two or more explanatory variables are correlated, multicollinearity occurs. An easy way to check for multicollinearity is through its correlation matrix. TABLE 5-a,b, and c present the correlation matrix results for the three models. It does not show any correlation coefficient greater than 0.8, which implies that my model is not likely to have multicollinearity issue. A formal way to detect

multicollinearity is Variance Inflation Factor (VIF) with a 5 or 10 and above indicates multicollinearity. VIF result in TABLE 6 supports no multicollinearity since none of VIFs exceed 5 in all three models.

When small, medium and large firms are sampled together, heteroskedasticity may occur (Gujarati & Porter 2009). The county-level data covers Mason, Kentucky with population of 1,914 through Los Angeles, California with its population of 9,878,554. The logged property crime values range from -.74 through 9.08 and the logged violent crime values range from -2.45 to 7.34. Due to the variety of the observations, there are high chances of heteroskedasticity, which causes biased standard errors on the estimates of the coefficients in OLS method. Figure 3 shows the residual plots of all three regression equations. The property model residual plot does not show a symmetric shape indicating that the model might have a heteroskedasticity issue. After confirming the normality of the residuals (FIGURE 4-a,b, and c), I conducted Breusch-Pagan test with the null hypothesis of constant variance. The test results indicate the heteroskedasticity with p-values of 0 for the property crime model whereas the results did not find any evidence of heteroskedasticity at the significant level of 0.01 for the violent and white-collar crime models. To correct heteroskedasticity, I applied the White's heteroskedasticity-corrected standard errors, known as robust standard error option in Stata SE 11 to the property crime regression. TABLE 7 presents the final regression results of the three models. Robust option does not change the coefficients from original results, but gives trustworthy standard errors that affect the significance of each variable.

The estimated coefficients are valid only when a model has all relevant explanatory variables and the hypothesized equation has the correct form. Ramsey's Regression Specification Error Test (RESET) is a general test to check the omitted variables, incorrect functional form, and correlation between variables (Chen et al. n/a). RESET results found no evidence of the omitted variable issue or the incorrect form of function issue at the significance level of 0.05; the property, violent, and white-collar crime models have p-value of .053, 0.0651 and 0.16 respectively. Considering incorrect functional form, I used level-level model in the robustness check later in this paper.

As presented in the TABLE 7, overall dependent variables explain the percentage change property crime rate at 19%, violent crime rate at 25%, and white-collar crime rate at 14%. The coefficient for the average amount of grants per recipient has a negative sign in both of the property and violent crime models as expected by theoretical foundation. The coefficient for the aid variable in white-collar crime model has also a negative sign, whereas a positive or ambiguous impact was anticipated. The property and violent crime equations have relatively good fit as indicated by the regression statistics. Overall signs of coefficients are shown with as expected in both property and violent crime models. For the white-collar crime model, on the other hand, only two explanatory variables (Aid and West region dummy variables) are statistically significant. A 1% increase in the average amount of federal, state and institution grants per recipient will lead to a 0.06% decrease in the number of property crime offenders among 100,000 people at the significant level of 0.05. It will also lead to a 0.14% and a 0.89% decrease in the number of violent and white-collar crime offenders among 100,000 people, respectively, at the significant level of 0.01.

Given that the household's median income is \$1,000, the coefficient on average tuition shows a negative sign with insignificance in the white-collar crime model. Even though the theoretical model predicted an ambiguous relationship between the cost of education and white-crime rates, this result is not consistent with the aid variable that has a strong negative impact on white-collar crime rates. This might be because of the failure to control the different cost of living in each state; although the average tuition was adjusted to dollar value in 2008 and controlled by households' median income, it did not fully represent the different cost of living within a state.

The coefficients on the percentage change in the proportion of the youth aged 15 to 24 show positive strong impact on both property and violent crimes as expected by literature. 1% increase in the proportion of youth will lead to 0.51% increase in property crime rate and 0.45% increase in violent crime rate. For the white-collar crime model, it proves the insignificance of youth proportion. It makes sense because white-collar crime, defined as forgery, counterfeiting, fraud or embezzlement, may require some skills that those age 15 to 24 do not have (Lochner 2004).

The coefficient on the ratio of African American is significant with a positive sign only in the violent crime model. 1% increase in the ratio of African Americans increases the number of violent crime offenders per 100,000 people by 0.11% at the significance level of 0.01.

1% change in the households' median income leads to a 0.12% decrease in the number of violent crime offenders, which follows the income-crime theory. For both the property and the white-collar crime models, however, the income variable did not show any statistical significance.

The unemployment variable shows a strong positive impact on both property and violent crime rates, which is consistent with previous literature (Chiricos 1987); 1% change in unemployment rate will lead to a 0.5% decrease in property crime rate and a 0.42% decrease in violent crime rate. The coefficient in the white-collar crime has a negative sign with statistically insignificance.

Male ratio variable shows an insignificant positive impact on violent crime rates (p-value of 0.13), which is not consistent with what literature has found. The coefficient of the south region dummy shows an expected positive sign with the statistical significance in both of the property and violent crime models. Controlling for the other explanatory variables, counties located in the south tend to have 55% and 86% higher crime rates compared to the rest of the U.S. In the white-collar crime model, the south dummy proves its insignificance with p-value of 0.73. This is mainly because of the features of white-collar crime. Unlike property and violent crimes, white-collar crime does not require a criminal to be at a specific geographical region to commit. Through the year dummy variable, it is shown that in 2008 counties in the U.S. have 16% and 14% less property and violent crime rates, separately than 2007. However, for the white-collar crime model, any year did not show significance. The signs of the coefficients for year dummy variables are all negative except year 2008, which consistent with the fact the unemployment rate in 2008 is higher than any other years.

7) Robustness Checks

I initially constructed log-log regression equation. Through the logarithm transformation, I had to omit 43 observations that have zero violent crime offenders. As the absence of meaningful observations may cause biased OLS results, level-level regression equation will be estimated in robustness check.

The non-logged regression equation, with the expected sign of coefficients, is given as:

$$(10) \text{ VIOLENTCRIME}_i = \beta_0 + \beta_1 \text{ AID} + \beta_2 \text{ YOUTH} + \beta_3 \text{ AFRICAN AMERICAN} + \beta_4 \text{ INCOME} \\ + \beta_5 \text{ UNEMPLOYMENT} + \beta_6 \text{ MALE} + \beta_7 \text{ Y2008} + \beta_8 \text{ SOUTH} \\ + \beta_9 \text{ NORTHEAST} + \beta_{10} \text{ WEST} + \varepsilon$$

The OLS estimates of equation (10) for the entire sample (2032 observations) are presented in TABLE 8. Column 2 presents the estimates for *VIOLENTCRIME* along with the original results at the first column. The adjusted R-squared is 0.18 which is smaller than 0.24 obtained from the original equation. The signs of coefficients are the identical to those in the original regression results. VIF indicates the absence of multicollinearity issue at the significance level of 0.05. RESET finds sufficient evidence of omitted variables in the model at p-value = 0.05. To test normality of residuals in the non-logged model, the normal probability plot of the residual is shown in FIGURE 4-d. It presents a S shape curve, which indicates the error terms are not normally distributed in the non-logged model. To check the heteroskedasticity, residual plots are presented in FIGURE 3-d. As the volume of fitted value gets greater, the variance of residual becomes bigger and then later it becomes smaller, which indicates a severe heteroskedasticity issue in the non-logged violent crime model. White test also finds sufficient of evidence of heteroskedasticity issue at the significance level of 0.01. To fix the heteroskedasticity issue, *Robust* option is applied and the results are shown at the third column of TABLE 8. The aid variable is still significant in both models.

8) Conclusion

My research hypothesis is that the substitute on higher education will cause less crime rate as increased the education level bring higher income, which increase the cost opportunity of committing a crime. Also, because previous studies explain that white-collar crime may be

positively related to educational level, the relationship between financial aid and white-collar crime was expected to be positive. My paper finds that there exist statistically significant negative impacts of financial aid on property crime rate at a significant level of 5%; 1% increase in the average amount of financial aid received per recipient leads to a 0.06% decrease in the number of property crime offenses among 100,000 people. For violent and white collar crime rates, education effects are greater; 1% increase in the average amount of financial aid received per recipient leads to a 0.14% decrease in the number of violent crime offenses among 100,000 people and a 0.81% decrease in the number of white-collar crime arrests both at the significant level of 1%. It is consistent with previous research considering that education level plays a more significant role in violent crime than in property crime (Lochner 2004). However, the results from the white-collar crime model are different than what theory predicts; theoretical model and empirical research support a positive relationship between educational level and white-collar crime. Even though this paper found a statistically significant effect of financial aid on crime rate, it does not have economic significant effect because of the small coefficients.

For future research, county-level data or individual-level data will be preferred to estimate white-collar crime rates as it will bring more clear regression results. In addition, to correct the potential omitted variable issue, better proxy for the chance of arrest and accurate tuition information for each county will be needed.

TABLE 1 -a Summary Statistics for Property Crime Regression

Variable	Mean	Std. Dev	Min	Max	Explanation
Propertycrime	892.57	837.1591	0	8796.9	The number of property crime offenders among 100,000 residence.
Aid	5530.2	3519.203	38.585	26212	The average amount of federal, state, and institutional grants received per recipient for the 2007 and 2008
Youth	14.829	3.511478	8.374	34.42	The percentage of age 15 to 24 over the total population
African Americans	0.101	0.13626	0.002	0.858	The percentage of African Americans over the population
Income	45204	11132.03	20999	104984	The household median income from the year 2007 and 2008.
Unemployment	5.3067	1.85455	1.7	18	Annual not seasonally adjusted unemployment
Observation	2093				
Sources	U.S. Education Department, U.S. Census, Federal Bureau Investigation, Bureau of Labor Statistics				

TABLE 1 -b Summary Statistics for Violent Crime Regression

Variable	Mean	Std. Dev.	Min	Max	Explanation
Violent Crime	114.72	138.1197	0	1549.2	The number of property crime offenders among 100,000 residence.
Aid	5518.1	3519.289	38.585	26212	The average amount of federal, state, and institutional grants received per recipient for the 2007 and 2008
Youth	14.812	3.519056	8.374	34.42	The percentage of aged 15 to 24 over the total population
African American	0.1035	0.137612	0.002	0.858	The ratio of African Americans over the population
Income	45040	11083.08	20999	104984	The household median income from the year 2007 and 2008.
Unemployment	5.3048	1.872267	1.7	18	Annual not seasonally adjusted unemployment
Male	0.4942	0.015459	0.443	0.671	The ratio of males over the population
Observation	2032				
Sources	U.S. Education Department, U.S. Census, Federal Bureau Investigation, Bureau of Labor Statistics				

TABLE 1 -c Summary Statistics for White-Collar Crime Regression

Variable	Mean	Std. Dev	Min	Max	Explanation
White-Collar Crime	146.35	110.6881	23	727.8	The number of arrests for forgery, counterfeiting, fraud and embezzlement among 100,000 residence.
Aid	2506.7	399.7227	1690	3700	The average amount of federal and state grants received per recipient for 2004 and 2008
Tuition	138.26	40.43416	62.78	270.27	The average tuition of each state adjusted to scale of household median income equaling to \$1,000
Youth	13.848	1.08365	11.426	17.391	The percentage of age 15 to 24 over the total population
African American	0.0999	0.094137	0.0029	0.3752	The ratio of African Americans over the population
Income	48003	8257.475	31504	70545	The household median income from the year 2004 to 2008.
Unemployment Rate	4.8623	1.149043	2.5	8.4	Annual not seasonally adjusted unemployment
Observation	244				
Sources	U.S. Education Department, U.S. Census, Federal Bureau Investigation, Bureau of Labor Statistics				

TABLE 2-a Summary Statistics by Year for Property and Violent Crime models

	Variable	Mean	Std. Dev	Min	Max	Obs
Year 2007	Property Crime	949.9393	910.355	0	8796.856	1009
Year 2008	Property Crime	839.0657	759.1209	0.856	7472.178	1083
Year 2007	Violent Crime	4.183569	1.257749	-2.253795	7.345499	961
Year 2008	Violent Crime	4.114057	1.193167	-0.3424903	6.741046	1028
Year 2007	Aid	5280.513	3492.732	38.585	25110	1021
Year 2008	Aid	5764.941	3529.431	699	26211.75	1086
Year 2007	Youth	14.81946	3.640315	8.374	34.42	1021
Year 2008	Youth	14.83889	3.387543	9	34	1086
Year 2007	African American	0.1010637	0.1369148	0.002	0.858	1021
Year 2008	African American	0.1010331	0.135704	0.002	0.846	1086
Year 2007	Income	44469.13	10931.36	20999	104984	1021
Year 2008	Income	45893.93	11278.92	22365	101867	1086
Year 2007	Unemployment	4.744172	1.59965	1.9	18	1021
Year 2008	Unemployment	5.835635	1.921576	1.7	17.7	1086
Year 2007	Male	0.493951	0.0157698	0.446	0.671	1021
Year 2008	Male	0.4946575	0.0148737	0.443	0.639	1086

TABLE 2-b Summary Statistics by Year for White-Collar Crime Model

	Variable	Mean	Std.	Min	Max	Obs
Year 2004	White-collar Crime	150.112	100.2278	31.8	608	50
Year 2005	White-collar Crime	144.686	116.0463	35	727.8	50
Year 2006	White-collar Crime	144.1191	110.0104	23	495	47
Year 2007	White-collar Crime	128.9939	75.9113	32	384	49
Year 2008	White-collar Crime	164.0585	142.9845	28	716.7	48
Year 2004	Aid	2495.494	377.8415	1760	3500	50
Year 2005	Aid	2349.096	300.5526	1770	3547.29	50
Year 2006	Aid	2509.942	439.6908	1690	3628.92	47
Year 2007	Aid	2588.698	433.916	1710	3700	49
Year 2008	Aid	2595.736	399.8677	1830	3310.21	48
Year 2004	Tuition	128.6424	36.67351	62.78	252.81	50
Year 2005	Tuition	134.8994	39.38686	63.62	258.39	50
Year 2006	Tuition	138.9013	41.29197	69.51	257.36	47
Year 2007	Tuition	142.2463	41.3016	70	264.41	49
Year 2008	Tuition	147.0796	42.61072	71.69	270.27	48
Year 2004	Youth	13.2296	1.01448	11.42601	16.83995	50
Year 2005	Youth	13.23448	0.9623	11.63496	16.68884	50
Year 2006	Youth	14.34372	0.95485	12.86769	17.39094	47
Year 2007	Youth	14.30256	0.97892	12.6083	17.27006	49
Year 2008	Youth	14.18152	0.88312	12.63347	16.73059	48
Year 2004	Income	44324.24	7166.224	31504	61359	50
Year 2005	Income	45918.8	7301.503	33452	61672	50
Year 2006	Income	48168.21	7886.629	34473	65144	47
Year 2007	Income	49761.14	8174.203	32938	68080	49
Year 2008	Income	52050.9	8677.439	31642	70545	48
Year 2004	Unemployment	5.142	0.9907923	3.2	7.4	50
Year 2005	Unemployment	4.982	1.147791	2.7	7.8	50
Year 2006	Unemployment	4.493617	1.097508	2.5	6.9	47
Year 2007	Unemployment	4.344898	0.9863783	2.7	7.2	49
Year 2008	Unemployment	5.335417	1.230722	3	8.4	48
Year 2004	African Americans	0.0961745	0.0930308	0.0028994	0.3593293	50
Year 2005	African Americans	0.0960489	0.09251	0.0041502	0.352634	50
Year 2006	African Americans	0.1003499	0.0967631	0.0046656	0.3735094	47
Year 2007	African Americans	0.102953	0.0959915	0.0060097	0.3751736	49
Year 2008	African Americans	0.1044544	0.0961027	0.0052224	0.374834	48

TABLE 3-a: Summary Statistics of the South Region for the Property and Violent Crime Models

Variable	South Region					U.S.	
	Mean	Std. Dev	Min	Max	Obs	Mean	Std. Dev.
Property Crime	1162.643	932.184	1.975	8796.856	1071	892.569	837.1591
Violent Crime	157.8455	158.8873	0	1549.208	1057	114.7157	138.1197
Aid	5212.038	3295.855	38.585	26211.75	1072	5530.2	3519.203
Youth	14.43436	3.299175	8.374	34	1076	14.82947	3.511478
African Americans	0.1660372	0.1606724	0.002	0.858	1076	0.1010479	0.1362597
Income	42719.63	11385.4	20999	104984	1076	45203.51	11132.03
Unemployment Rate	5.307807	1.814908	1.9	16.5	1076	5.306739	1.85455
Male	0.4915604	0.01639	0.443	0.671	1076	0.4943151	0.0153149

TABLE 3-b : Summary Statistics of the South Region for the White-Collar Crime Model

Variable	South Region					U.S.	
	Mean	Std.Dev.	Min	Max	Obs	Mean	Std. Dev.
White-collar Crime	180.2528	132.8075	40	727.8	72	4.783107	0.6109326
Aid	2477.57	428.9532	1690	3628.92	72	7.814225	0.1584202
Tuition	134.2215	28.76437	70.47	198.05	72	4.886319	0.2971419
Youth	9.522395	0.0637122	9.396545	9.644546	72	9.532906	0.0771095
Income	43132.5	8522.281	31504	70545	72	10.76461	0.1696412
Unemployment	1.596532	0.2186194	1.098612	2.054124	72	1.553387	0.2395283
African Americans	0.2002242	9763.641	2987.028	37517.36	72	8.629376	1.230723

TABLE 4-a: Summary Statistics Separated by Unemployment Rate for the Property and Violent Crime models

Variable	Unemployment Rate > 5.3%				Unemployment Rate <= 5.3%			
	Mean	Std.Dev.	Min	Max	Mean	Std.Dev.	Min	Max
Property Crime	986.4648	765.1064	0	6438.269	822.5583	880.9037	0.475	8796.856
Violent Crime	127.6395	138.0718	0	846.446	105.1748	137.436	0	1549.208
Aid	5633.188	3666.235	159.13	26211.75	5454	3405.864	38.585	25110
Youth	14.23339	2.701812	10	34.42	15.2705	3.950182	8.374	34.14
African Americans	0.128853	0.163679						
Income	8	8	0.002	0.858	0.0804748	0.1072501	0.002	0.818
Unemployment	41709.99	8939.413	20999	88525	47788.31	11868.13	25817	104984
Male	6.980692	1.536904	5.4	18	4.068208	0.7929993	1.7	5.3
	0.493017							
Observation	896*				1211			
					1199 for			
	893 for log(propertycrime)				log(propertycrime)			
	849 for log(violentcrime)				1140 for log(violentcrime)			

TABLE 5-b: Correlation Matrix for the Violent Crime Model

	Violent Crime	Aid	Youth	African American	Income	Unemployment	male
Violent Crime	1						
Aid	-0.1582	1					
Youth	-0.1193	0.044	1				
African American	0.2886	0.0425	0.0024	1			
Income	-0.1665	0.1047	0.0335	-0.0695	1		
Unemployment	0.1352	0.0133	0.1732	0.202	0.3269	1	
Male	-0.0299	0.0617	0.0991	-0.1721	0.155	-0.0859	1

TABLE 5-c : Correlation Matrix for the White-Collar Crime

	White-collar Crime	Aid	Tuition	Youth	Income	Unemployment	African Americans
White-collar Crime	1						
Aid	-0.1421	1					
Tuition	0.1188	0.1251	1				
Youth	-0.1077	0.0784	-0.125	1			
Income	-0.0706	0.1294	0.0576	0.0189	1		
Unemployment	0.0498	0.0115	0.2711	-0.1534	-0.132	1	
African American	0.2736	0.0642	0.1821	-0.162	0.0098	0.4151	1

TABLE 5-a : Correlation Matrix for the Property Crime Model

	Property Crime	Aid	Youth	African American	Income	Unemployment
Property Crime	1					
Aid	-0.1059	1				
Youth	-0.1575	0.044	1			
African American	0.2069	-0.0425	0.0024	1		
Income	-0.1325	0.1047	-0.0335	-0.0695	1	
Unemployment	0.1446	0.0133	-0.1732	0.202	-0.3269	1

TABLE 5-b: Correlation Matrix for the Violent Crime Model

	Violent Crime	Aid	Youth	African American	Income	Unemployment	male
Violent Crime	1						
Aid	-0.1582	1					
Youth	-0.1193	0.044	1				
African American	0.2886	-0.0425	0.0024	1			
Income	-0.1665	0.1047	-0.0335	-0.0695	1		
Unemployment	0.1352	0.0133	-0.1732	0.202	-0.3269	1	
Male	-0.0299	-0.0617	0.0991	-0.1721	0.155	-0.0859	1

TABLE 5-c : Correlation Matrix for the White-Collar Crime

	White-collar Crime	Aid	Tuition	Youth	Income	Unemployment	African Americans
White-collar Crime	1						
Aid	-0.1421	1					
Tuition	0.1188	0.1251	1				
Youth	-0.1077	0.0784	-0.125	1			
Income	-0.0706	0.1294	-0.0576	0.0189	1		
Unemployment	0.0498	-0.0115	0.2711	-0.1534	-0.132	1	
African American	0.2736	0.0642	0.1821	-0.162	-0.0098	0.4151	1

TABLE 6: VIF coefficients for the property, violent, and white-collar crime model

Variable	The Property Crime Model	The Violent Crime Model	The White-collar Crime Model
	VIF	VIF	VIF
Aid	1.06	1.07	1.15
Tuition	--	--	2.37
Youth	1.11	1.12	1.72
Income	1.38	1.4	2.14
Unemployment	1.53	1.53	1.9
African American	1.73	1.74	2.96
Male	--	1.09	--
y2005	--	--	1.65
y2006	--	--	2.12
y2007	--	--	2.3
y2008	1.18	1.18	2.24
South	2.25	2.26	2.61
Northeast	1.18	1.2	2.12
West	1.45	1.55	2.97
Mean VIF	1.35	1.41	2.17

TABLE 7 : OLS Estimates of Crime Models

	Coefficients		
	log(PropertyCrimes)	log(violentcrimes)	log(white-collar crimes)
log(aid)	-0.0629861 (2.035)*	-0.1441765 (3.28)**	-0.812738 (3.31)**
log(tuition)	--	--	-0.1628818 (0.88)
log(youth)	0.5109098 (4.8)**	0.4546602 (3.97)**	0.2720512 (0.44)
log(African American)	0.0224566 (0.93)	0.1120953 (5.06)**	0.0848857 (1.85)
log(Income)	-0.0310123 (0.26)	-0.232262 (1.98)*	-0.1779293 (0.57)
log(unemployment)	0.5057742 (6.95)**	0.4159213 (4.77)**	-0.1582036 (0.78)
male	--	2.415822 (1.5)	--
south	0.5861646 (7.81)**	0.8607181 (11.95)**	0.0398456 (0.35)
northeast	-1.111853 (6.1)**	-0.7356669 (6.53)**	0.1137298 (0.94)
west	0.2043693 (3.6)**	0.6619088 (8.64)**	-0.4354457 (3.08)**
y2008	-0.1648855 (3.4)**	-0.138557 (2.67)**	0.0054558 (0.04)
y2007	--	--	-0.1532243 (1.15)
y2006	--	--	-0.1479519 (1.12)
y2005	--	--	-0.1035273 (0.9)
_cons	6.991695 (3.24)**	7.084042 (4.32)**	9.004714 (1.48)
Observations	2085	1982	244
Adjusted R-squared		0.2465	0.1426
R-squared	0.1982		

Absolute value of t statistics in parentheses

*p-value significant at 5%; ** p-value significant at 1%

Property crime model is adjusted for hetetoskedasticity

TABLE 8 : Robustness Check

	Coefficients		
	log(violentcrimes)	Violent Crimes (1)	Violent Crimes (2)
aid	-0.1441765 (3.28)**	-0.0017129 (2.11)*	-0.0017129 (2.51)*
youth1524	0.4546602 (3.97)**	2.714548 (3.26)**	-2.714548 (3.01)**
AA	0.1120953 (5.06)**	222.7757 (8.98)**	222.7757 (6.13)**
hhminc	-0.232262 (1.98)*	-0.0001251 (0.44)	-0.0001251 (0.46)
unemployment	0.4159213 (4.77)**	5.06103 (2.84)**	5.06103 (2.89)**
male	2.415822 (1.5)	321.3983 (1.69)	321.3983 (1.29)
south	0.8607181 (11.95)**	73.20343 (9.33)**	73.20343 (11.39)**
ne	-0.7356669 (6.53)**	-26.80833 (2.14)*	-26.80833 (6.13)**
west	0.6619088 (8.64)**	44.74167 (5.04)**	44.74167 (6.69)**
y2008	-0.138557 (2.67)**	-17.49227 (2.93)**	-17.49227 (2.98)**
_cons	7.084042 (4.32)**	-74.91258 (0.79)	-74.91258 (0.63)
Observation	1982	2032	2032
Adjusted R-squared	0.2465	0.1789	
R-squared			0.1829

Absolute value of t statistics in parentheses

*p-value significant at 5%; ** p-value significant at 1%

Violent Crime (2) is adjusted for heteroskedasticity

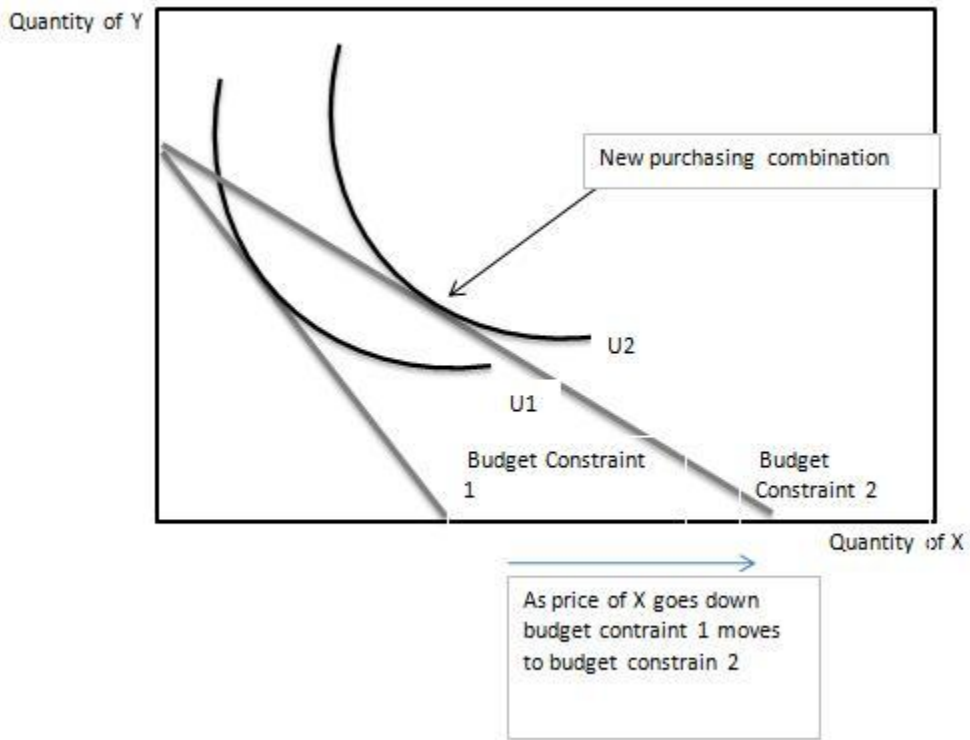


FIGURE 1 Utility Maximization Model

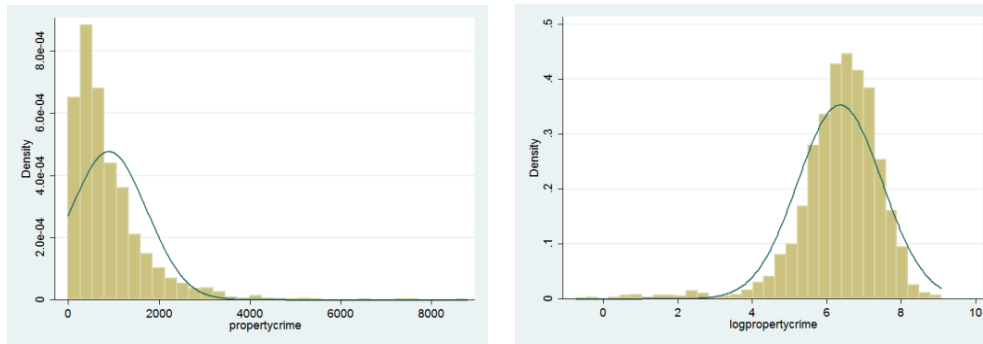


FIGURE 2-a Sampling distributions of property crime rates, in their original and logged form

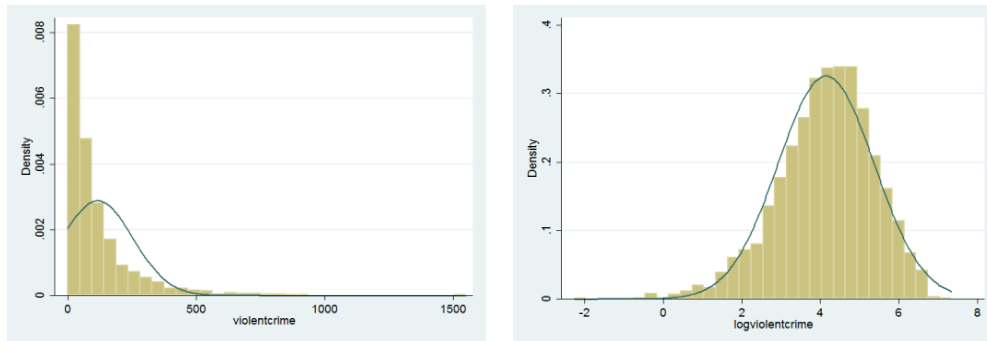


FIGURE 2-b Sampling distributions of violent crime rates, in their original and logged form

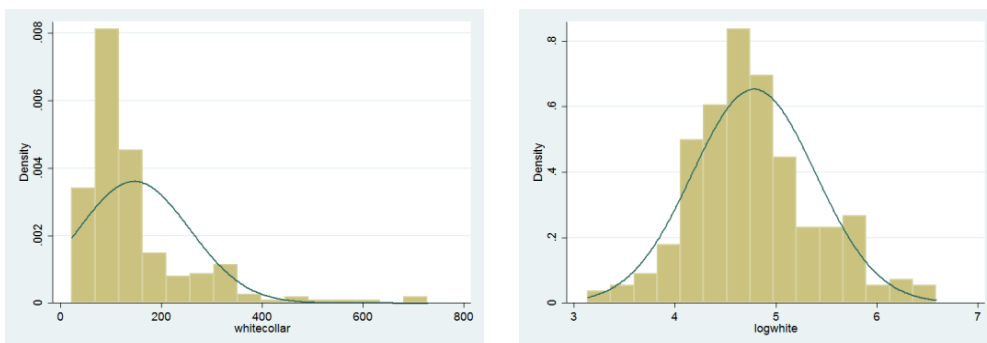


FIGURE 2-c Sampling distributions of white-collar crime rates, in their original and logged form

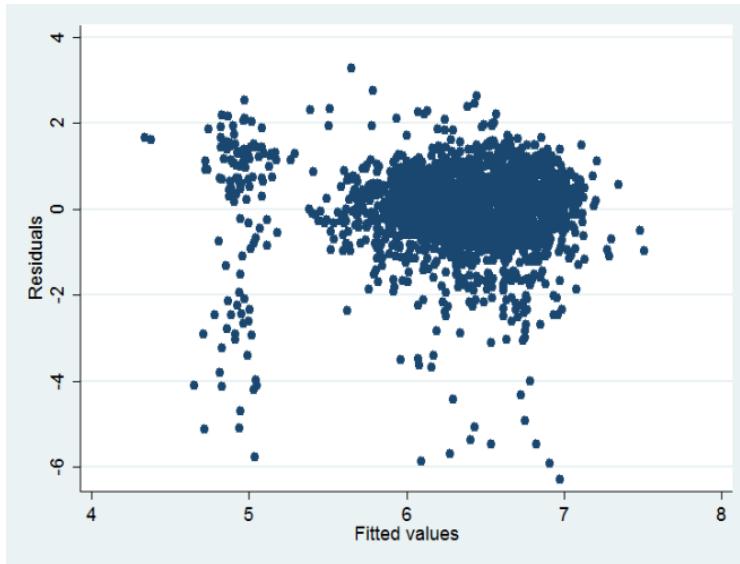


FIGURE 3-a : Plot of fitted values generated by the initial property crime model, by the respective sizes of their residuals.

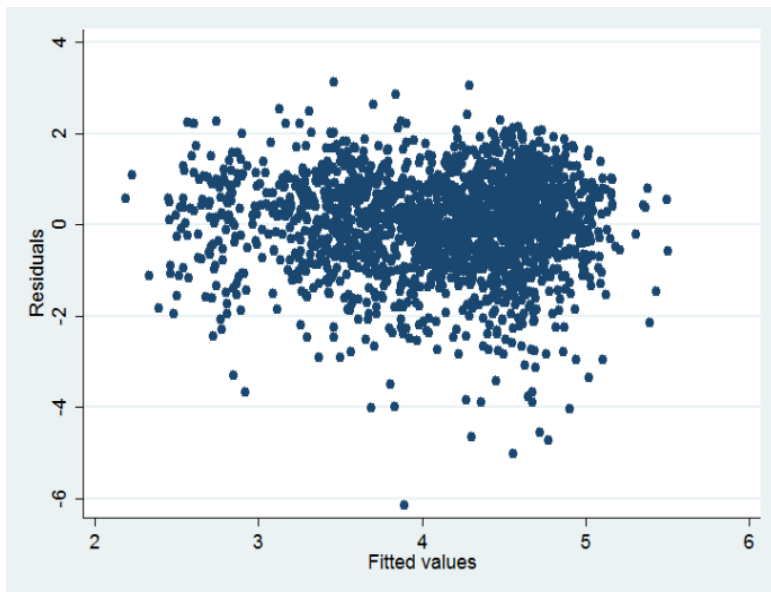


FIGURE 3-b : Plot of fitted values generated by the initial violent crime model, by the respective sizes of their residuals.

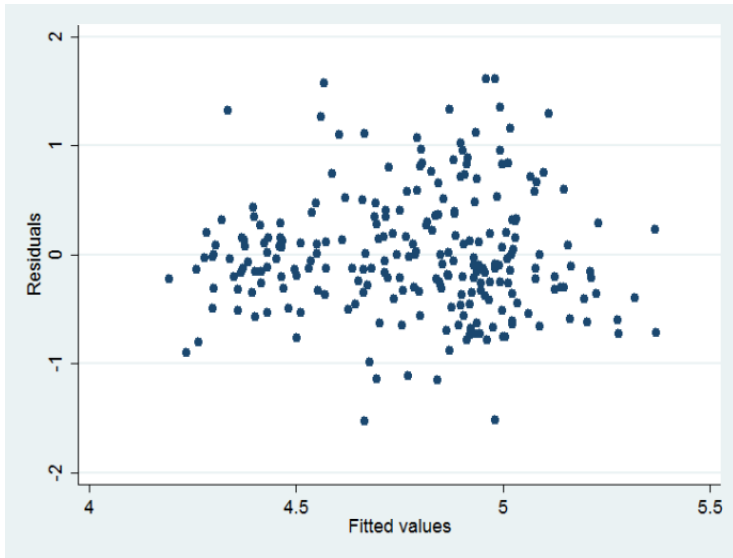


FIGURE 3-c : Plot of fitted values generated by the initial white-collar crime model, by the respective sizes of their residuals.

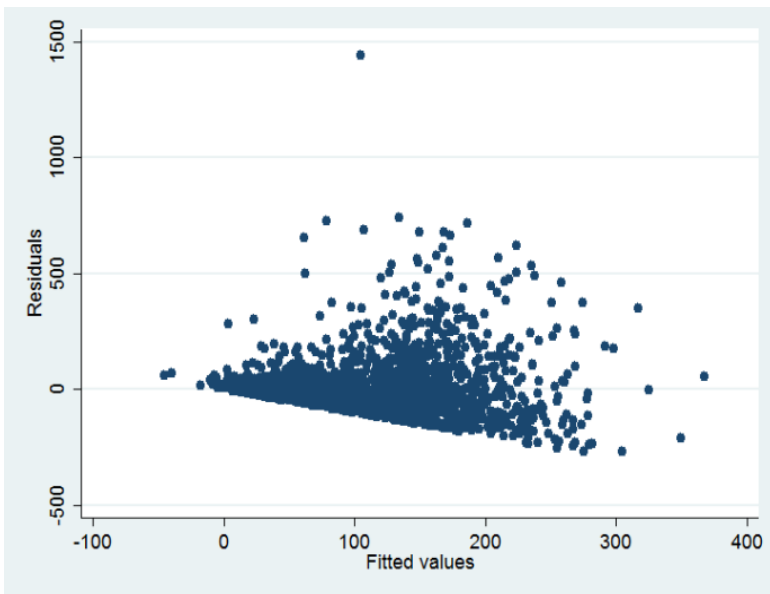


FIGURE 3-d : Plot of fitted values generated by the non logged violent crime model in Robustness Chek, by the respective sizes of their residuals.

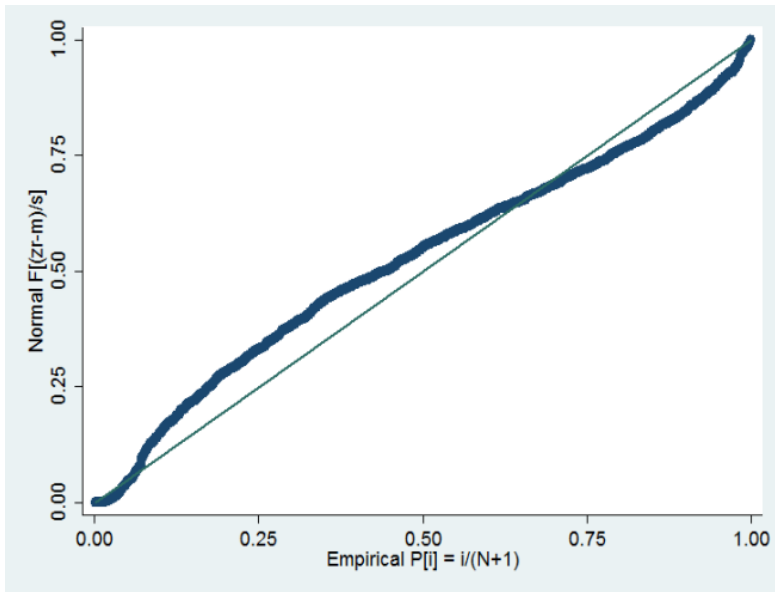


FIGURE 4-a : Normal probability plot of the residuals generated by logged property crime model.

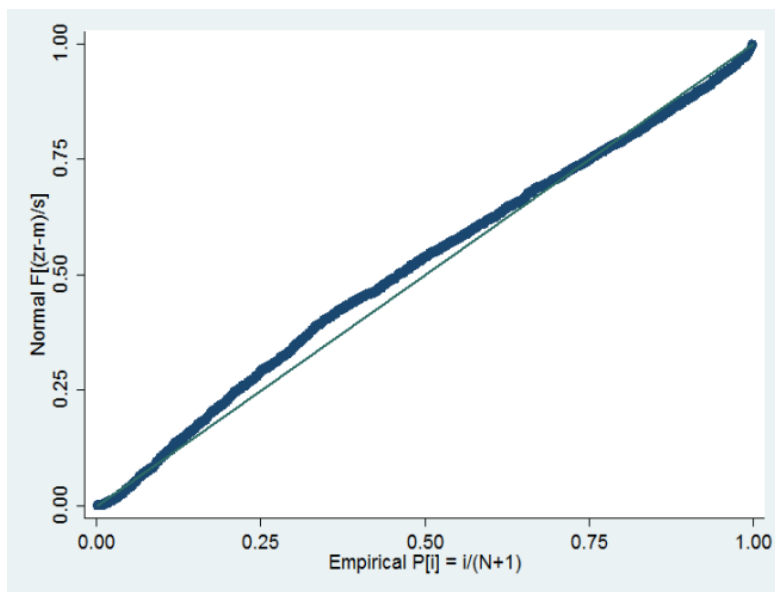


FIGURE 4-b : Normal probability plot of residual generated by logged violent crime model.

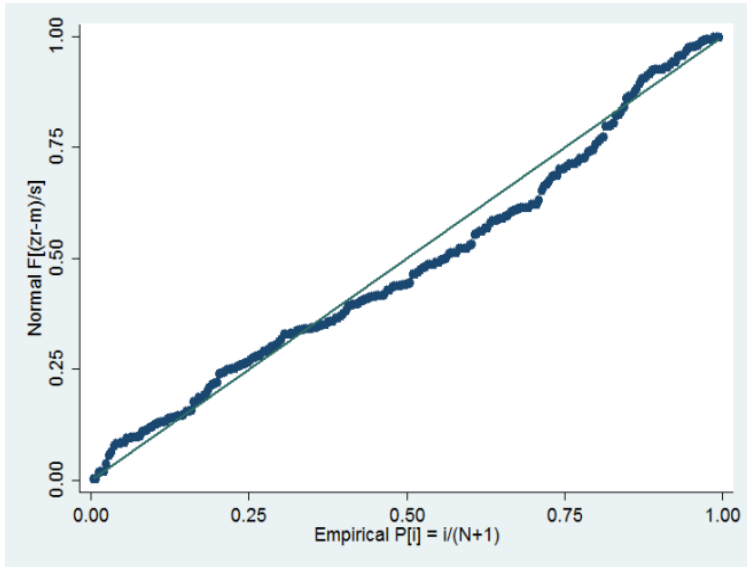


FIGURE 4-c : Normal probability plot of the residuals generated by logged white-collar crime model.

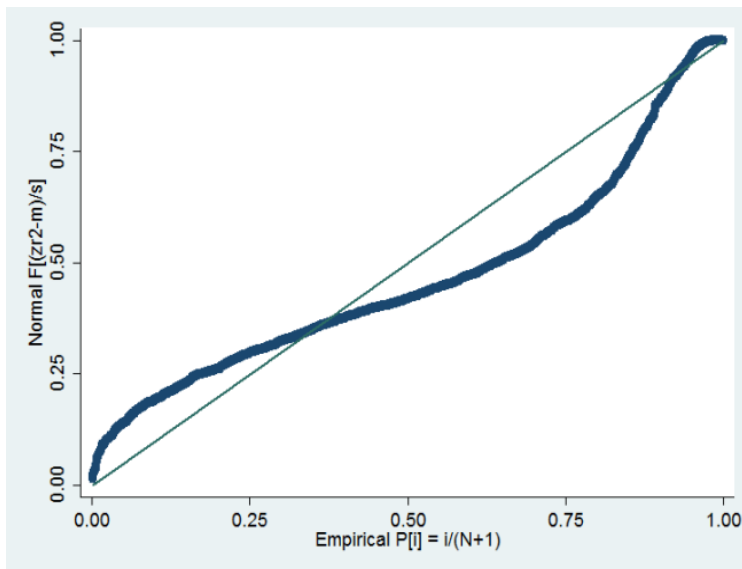


FIGURE 4-d : Normal probability plot of residual generated by non-logged violent crime model.

Bibliography

- Abraham, Katharine G., and Melissa A. Clark. "Evidence from the District of Columbia Tuition Assistance Grant Program," *The Journal of Human Resources* 41 (2006): 578-610.
- Ahlburg, Dennis A., Stephen L DesJardins, and Brian McCall. "Stimulating the longitudinal effects of changes in financial aid on student departure from college." *The Journal of Human Resources* 37 (2002):653-679.
- Baldwin, Norman., and Stephen Borrelli. "Education and economic growth in the United States: cross-national applications for an intra-national path analysis." *Policy Sciences* 41(2008): 183-204.
- Becker, Gary. "Crime and punishment: an economic approach." *The Journal of Political Economy* 76(1968): 169-217.
- Bettinger, Eric. "How Financial Aid Affects Persistence," *College Choices: The Economics of Where to Go, When to go, and How to Pay For it* (2004): 207-238.
- Bound, John., and Sarah Turner. "Closing the gap widening the divide: the effects of the G.I. bill and World War II on the educational outcomes of black Americans." *Journal of Economic History* 63(2003): 145-177
- Buonanno, Paolo., and Leone Leonida. "Non-market effects of education on crime: evidence from Italian regions," *Economics of Education Review* 28 (2009): 11-17.
- Chen, Xiao., Philip B. Ender, Michael Mitchell, and Christine Wells. Introduction to SAS. UCLA: Academic Technology Services, Statistical Consulting Group.
from <http://www.ats.ucla.edu/stat/stata/webbooks/reg/chapter2/statareg2.htm> (accessed May 20, 2011).

- Chiricos. Theodore G. "Rates of Crime and Unemployment: An analysis of aggregate research evidence". *Social Problems* 34(1987): 187-212.
- DiIulio, John, and Anne Piehl, "Does Prison Pay?," *Brookings Review* 4(1991) 29-35.
- Dynarski, Susan. "The behavioral and distributional implication of aid for college," *The American Economic Review* 92 (2002): 279-285.
- Ehrlich. Isaac. "Participation in illegitimate Activities: a theoretical and empirical investigation" *The Journal of Political Economy* 81(1973). 521-565.
- Freeman. Richard B. "Why Do So Many Young American Men Commit Crimes and What Might We Do About It?" *The Journal of Economic Perspectives* 10(1996). 25-42.
- Gould, Eric., Weinberg, Bruce A., and Mustard David B. "Crime Rates and Local Labor Market Opportunities in the United States: 1970-1997" *The Review of Economics and Statistics* 12(2002). 45-61.
- Gujarati, Damodar N. and Dawn Porter. *Basic Econometrics*. New York: Douglas Reiner, 2009.
- Gyimah-Brempong, Kwabena. "Neighborhood income, alcohol availability, and crime rates" *The Review of Black Political Economy* (2006) : 21-44.
- Howsen, Roy M. and Stephen B. Jarrell, "Some Determinants of Property Crime: Economic Factors Influence Criminal Behavior but Cannot Completely Explain the Syndrome" *American Journal of Economics and Sociology* 46 (1987): 445-457.
- Karpowitz, Daniel., and Max Kenner., "Education as Crime Prevention: The case for Reinstating Pell Grant Eligibility for the incarcerated."
- <http://www.stcloudstate.edu/continuingstudies/distance/documents/EducationasCrimePreventionTheCaseForReinstatingthePellGrantforOffendersKarpowitzandKenner.pdf>

- Klaauw, Wilbert van der. "Estimating the Effect of Financial Aid Offers on College Enrollment: A Regression-Discontinuity Approach," *International Economic Review* 43 (2002):1249-1287.
- Levitt, Steven. "The Effect of Prison Population Size on Crime Rates: Evidence from Prison Overcrowding Litigation," mimeo, Harvard University, February 1995
- Lochner, Lance. 2004. Education, work, and crime: a human capital approach. *International Economic Review* 45:811-843.
- . _2010. "Education policy and crime." <http://www.hber.org/papers/w15894>
- Lochner, Lance., and Enrico Moretti. "The effect of education on crime: evidence from prison inmates, arrests, and self-reports." *The American Economic Review* 94(2004):155-189
- Merlo, Antonio. and Kenneth I. Wolpin,. 2008. <http://ssrn.com/abstract=1270633>
- Migali, Giuseppe. and Ian Walker. 2009.
- http://www.eale.nl/Conference2009/Programme/PapersE/add103639_qMdCG4gcYB.pdf
- Moretti, Enrico. "Estimating the social return to higher education: evidence from longitudinal and repeated cross-sectional data" *Journal of Econometrics* 121 (2004): 175-212.
- Raphael, Steven., and Rudolf Winter-Ember,. "Identifying the effect of unemployment on crime." *Journal of law and economics* 44(2001):259-283.
- Singell, Larry D. "Come and Stay a While: Does Financial Aid Effect Enrollment and Retention at a Large Public University?" Connell Higher Education Research Institution (2001). Paper 12.
- U.S. Department of Education, National Center for Education Statistics. (2009). *2007–08 National Postsecondary Student Aid Study (NPSAS: 08) Student Financial Aid Estimates for 2007–08, Selected Findings* .; <<http://nces.ed.gov/fastfacts/display.asp?id=31>>

Minnesota Office of Higher Education. Financial Aid Awarded to Undergraduates at Minnesota

Institutions Source <http://www.ohe.state.mn.us/tPg.cfm?pageID=819&1534->

[D83A_1933715A=56e4c8cdd6b17030a8281b3313b5572e98026880/](http://www.ohe.state.mn.us/tPg.cfm?pageID=819&1534-D83A_1933715A=56e4c8cdd6b17030a8281b3313b5572e98026880/) [accessed March 22, 2011].

U.S. Census Bureau . Small Area Estimates Branch: 2008

U.S. Department of Justice. Preliminary Annual Uniform Crime Report: <[http://www.fbi.gov/about-](http://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2010/preliminary-annual-ucr-jan-dec-2010/data-tables/table-3/@@template-layout-view?override-view=data-declaration)

[us/cjis/ucr/crime-in-the-u.s/2010/preliminary-annual-ucr-jan-dec-2010/data-tables/table-](http://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2010/preliminary-annual-ucr-jan-dec-2010/data-tables/table-3/@@template-layout-view?override-view=data-declaration)

[3/@@template-layout-view?override-view=data-declaration](http://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2010/preliminary-annual-ucr-jan-dec-2010/data-tables/table-3/@@template-layout-view?override-view=data-declaration)>