



Crime Rates in the United States

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The volatility in crime rates in the United States has raised concerns about the safety and well-being of American citizens. The main focus of this study is to analyze the social and economic determinants of crime in the United States: specifically, the rates of violent and property crime. The results from several regressions provide explanations for various regressors, and multiple tests were performed to diagnose potential statistical problems. Race, median household income, and the presence of a shoot-first law in each state have some consistency across all models, suggesting they are relevant to crime rate. The aforementioned processes lead to various conclusions, suggesting that statistical problems are averted, and that the diversity between the models provides clarity on the potential causes of crime in the United States. The results are relatively robust across models.

The early 1990's provided a time where heightened crime rates were induced by a multitude of factors; drug epidemics, social and economic hardships, and demographic changes all contributed as drivers of crime rates. Since then, optimism lies with many researchers that crime is on the decline as the nation becomes more defensive against uncontrollable rises in violent and property crimes, and recent trends show signs of improvement. This study aims to derive some of the major contributors to crime in the United States through a series of statistical regressions and thoroughly explores a series of crime rate determinants.

Violent crime once ran rampant through the United States and threatened the quality of life of the American people. Several professional studies were conducted in order to explain some of the causes of violent crime, and many conclusions were consistent across multiple studies. The substance of crime concerns is indicative of the safety of the United States, and there are several stakeholders in the release of crime statistics. Thus, the variability in hypotheses regarding crime and the continual research have informed the public about the prevalence of crime, directly impacting personal decisions and economic and political agendas. As such, this study dives into more catalysts of crime that align with previous research, and also works to present dependable results that can be utilized for the benefit of citizens, legislators, educators, and many other stakeholders. To accomplish this, several models were created to identify key contributors. Most importantly, it is crucial to include a multitude of drivers of crime in order to extend the scope of this research to represent the paramount interest of the American people. This analysis provides valuable insight on the relevance of crime and the importance of its contributing factors.

I. Literature Review

In order to effectively determine the statistical effects of various coefficients on the rate of crime in the United States, a review of published works were performed. Among the researched variables are stated MDA laws (minimum dropout age), variation in age, gender, ethnicity, foreclosure activity, and several other factors. Through historical data, empirical analysis, and regressions, both causes of violent crime and potential mechanisms for reducing crime are posited.

The first article in this analysis focuses on the effects of MDA laws on juvenile crime and whether an increase in the legal age will deter crime or displace it to schools. The crucial

question posed in “In School and Out of Trouble? The Minimum Dropout Age and Juvenile Crime” is whether students who are forced to stay in school longer are less likely to commit crimes than dropouts. In order to answer this question, author D. Mark Anderson utilized prior research to form a background for his statistical analysis and “exploits the spatial and temporal variation in minimum dropout age laws.” The basis for this strategy is to support the theory that an increase in minimum dropout age reduces the amount of crime by students with substantial evidence. One method by which the posed question is answered is through county-level panel regressions. Data from the FBI’s Uniform Crime Reports are based on arrests per 1,000 citizens within a particular age range from 1980 to 2008 (Anderson).

The independent variables for this statistical analysis include population density and the percentage measure of blacks, males, and those between the ages of 13-15 and 16-18. In addition, a difference-in-difference-in-difference-type empirical strategy is utilized with a control group consisting of students who are below their respective state’s MDA. An equation has been formulated to estimate the MDA impact on juvenile arrest rates, where *ArrestRate* is the arrests per 1,000 of a specified age group, *MDA18* if that is a state’s mandated minimum dropout age, and *age16to18*, a dummy variable accounting for the disparity between two age groups. Finally, the equation uses β_3 as an interaction term, such that if the increased MDA leads to a decrease in crime rates among 16-18-year-old students, the variable will be negative (Anderson).

This article notes that the employed strategy accounts for each state’s dropout age with respect to variations in criminal activity and the average impact of the MDA law in that state. As a result of the regressions, males produced a negative β_3 , indicating that crime rates fell in the year that an MDA increase was put into effect. All estimates (i.e. all types of crime) except drug-related crimes were found to be statistically significant and have a large value. Another result from this test states that violent crime arrests decreased by 22.5% from the mean per 1,000 of the population aged 16-18. Further testing showed the sign and significance of variables concerning male arrest rates by crime type. All coefficients for property and violent crime are negative in sign, and a vast majority are statistically significant at the 10% level.

The widespread result of this study is that efforts towards deterring high school students from dropping out decrease the opportunity for crimes to occur. The positive impacts of raising the MDA not only deters crime, but also is effective for nonviolent crimes and budgetary purposes. Consistent for all types of crime excluding drug-related incidents, the variables are both large in value and statistically significant, indicating that an increased MDA diminishes opportunities for juveniles to commit crimes.

Moving into more social and economic factors to describe violent crime rates, “Race, economic inequality, and violent crime” describes the methods used to address one particular dimension of crime: the relationship between economic inequality and race-driven crime rates. As Stolzenberg (2006) describes, two theories of Messner and Golden supported the current study: the first is the relative deprivation explanation, which focuses on the realization of disadvantaged folks that they are experiencing economic inequality, and the consequential backlash from unfair access to wealth and resources. It was hypothesized that more race-based inequality causes more crime by Black citizens. Furthermore, Messner and Golden introduced a second hypothesis which was

built off of the macrostructural theory of intergroup relations. Their theory was that race-based inequality spurred less interracial crime (Stolzenberg).

In order to evaluate the relationship between race-based inequality and violent crimes, data was taken from the NIBRS and the census, which focuses on the statistics from 91 cities across fifteen states. The first dependent variable in the regression was the violent crime rate, calculated as reported offenses divided by city population and multiplied by 10,000. An important note is that this study only includes crime where the perpetrator was identified and the police obtained the report. The other dependent variables include dyads in which two variables are evaluated. The four dyads included in this study were White-on-Black, White-on-White, Black-on-White, and Black-on-Black crime rates (Stolzenberg).

Several independent variables were also used to explain the violent crime rates as a function of race-based economic inequality. First, interracial economic inequality was a measure of Black and White median incomes. Black-to-White unemployment and two intraracial measures were included for more precise measures, which involves household income distribution in each city and a measure of inequality regardless of race, otherwise known as a Gini index. A dissimilarity index that accounts for the racial segregation factor as a measure of violent crime runs on a 0-100 scale where 100 represents total segregation. The final factor in Stolzenberg's (2006) study is comprised of three components of disadvantage measured in percent form: households with public aid, citizens who lack a high school degree, and households run by a single mother.

The Ordinary Least Squares regression model headed this study and the results met expectations. While a few measures of the victim-offender dyads were inconsequential with this regression model, the general theories hold true. The results show that violent crime spikes in cities where income between Whites and Black is unequal, and overall city disadvantage led to more crime. As a reference, city disadvantage is composed of public aid income, lack of a high school degree, and households with a single mother. In reference to the macrostructural theory of intergroup relations, the racial segregation factor on White-on-Black crime was statistically significant. In addition, a spike in overall population and Black population leads to more White-on-Black crime, but not Black-on-White crime (Stolzenberg). Overall, this study found that a driving force behind violent crime in cities is the growth of the Black population – as that value grows, White-on-Black crime will be more prevalent than the inverse.

As stated in Stolzenberg's (2006) work, "controlling for racial segregation, city disadvantage, and a variety of other factors, interracial economic inequality had a strong positive effect on the overall crime rate." The most apparent effects are on Black-on-Black crime and White-on-Black crime with racial segregation as an independent variable, and their control variables were statistically significant and consistent with the theories behind this study. While Messner and Golden showed some disparity with prior research, the results still hold – economic inequality has a positive correlation with violent crime rates. The causes of violent crime grow beyond social interaction, and those forces must be accounted for.

A series of supplemental studies have been evaluated to explain the causes for changes in violent crime rates, including a variation in control and independent variables. An article by Stuart Rosenthal and Amanda Ross (2010) addresses violent crime rates in vibrant areas and the

presence of business activity in various cities. This study focuses on high and low-end restaurants, wholesalers and retailers, and the consideration of violent crime when bidding for business locations. In short, the evaluations in this study focus on population density – a contributing and consistent factor to violent crime rates in many other studies. The result of this analysis is that crime is positively associated with lower-tier restaurants and wholesalers are likely to be less sensitive to the threat of violent crime (Rosenthal).

A study conducted by Ingrid Gould Ellen in “Do Foreclosures Cause Crime?” draws similar conclusions to Rosenthal (2010) and Stolzenberg (2006). While Ellen’s study focuses on New York City, her evaluation through regressions accounts for the plethora of demographics, diversity, density, and quality of the housing market (e.g. affordability). The result of her study shows that properties in or nearing foreclosure spur proximal violent crime. In areas, specifically blockfaces, where more properties prone to foreclosure are present, violent crime tends to increase due to a larger population density. This study also addresses single-mother homes, a similar trait to the published article by Stolzenberg (2006). If citizens in the exploited neighborhoods in New York City are not exposed to fair opportunities and a means of separating themselves from the title of “disadvantaged” citizens then crime rates are likely to have a positive correlation with foreclosure.

The final article in this evaluation of violent crime touches on a government imposed project known as Project Safe Neighborhoods (PSN), conducted by Edmund F. McGarrell. Similar to D. Mark Anderson’s research on minimum dropout age increases, “Project Safe Neighborhoods and Violent Crime Trends in US Cities” addresses the assistance of regulations as a deterrent to violent crime. This article concludes that the problem solving approach, through PSN, aids in the reduction of violent crime. PSN initiatives are distributed in doses whereby more implementation of agency assistance leads to a larger decrease in violent crime rates. Similar to the MDA increase that was noted in prior research, government intervention can serve as a strong deterrent for violent crime, and this study in particular finds that for firearm-related crime, tighter restrictions prove to be beneficial to the community.

As a result of the analysis of these articles, there are several catalysts that can help to diminish the rate of violent crime throughout the nation. The diverse selection of variables used to explain changes in violent crime allows individuals to understand both the causes and possible solutions to maintenance violent crime issues. After reading these various articles, it can be concluded that more research should be conducted to account for long-term crime implications, the role of economic imbalance and the causes for disparity in allocation of resources, and the role of education. All of these pieces of research have produced evidence to back up the presented hypotheses, and violent crime proves to be an issue that can be explained statistically and economically.

II. Methodology

The following results were produced through the statistical analysis of crimes in the United States. This analysis includes N = 800 observations comprised of 16 years-worth of data, including 2000-2015. The data was compiled from the NCES, US Census, and other supplementary sources for legislation information and the unemployment rates. The dependent

variable, violent crime, is measured in crimes per 100,000 of population, while the African American population and home vacancies are measured as a rate. Notably, the dummy variables included in regressions are the minimum dropout age variables (MDA17, MDA18, and MDA1718) and the Shoot-First Law. This legislation allows defendants to use unlawful force without retreating, potentially spurring violence. The median household income for each state over the identified time period has been adjusted for inflation, as all values are measured in real dollars. To sharpen the results of various models and explain the nonlinear relationship between population and violent crime, the variable for population was squared. In addition, the log of population was taken because the values enter the millions; hence, the log has helped to simplify certain models and explain a percentage of crimes.

A few interesting observations were made from the descriptive statistics. Perhaps the most notable is the mean for each minimum dropout age dummy variable. The sum of these values is one, indicating that each dropout age measure is mutually exclusive. Furthermore, MDA1718 has the highest mean of all minimum dropout age variables, suggesting that it was best practice to remove the variable from each model. Another interesting conclusion can be drawn about several maximum and minimum values. Contrary to expectations, the state with the largest population (California in 2015) did not yield the most violent crimes or property crimes. Likewise, the state with the smallest population (Wyoming in 2001) did not yield the fewest crimes. In addition, median household income and the unemployment rate did not correlate with the maximum and minimum crime value. Overall, a significant relationship between the maximum and minimum values for the variables could not be found. This suggests that statewide data may not provide correlated maximum and minimum values; city or county data may provide a stronger explanation. Appendix Table 2 contains the descriptive statistics for all variables included in this analysis.

III. Data Results

The regression are analyzed for significance and potential statistical issues. Various methods were employed in order to sharpen the results. The dependent variable for each model is violent crime per 100,000. The first model is a semi-log right regression with population logged and the second is a polynomial model squared right regression where population is squared.

An initial inspection of the regression results suggests that, in terms of significance, there is variability among the variables as the models change. In the semi-log right test, population is the logged term. Perhaps the best of all models that were generated, all variables are statistically significant at the 1 percent level, excluding MDA17 and home vacancies. MDA17, unemployment, and the log of population do not match expectations for signs. The variable suggests that, for every 1 percent increase in population, violent crime decreases by 117.1755 (per 1000,000 population). This may suggest that more populous areas are affluent; townships employ stronger police forces, citizens are wealthier and less inclined to commit crimes, etc. As such, these areas are subject to less crime. The log of population appears to have the correct size, but as population increases, violent crime is expected to increase. The adjusted r-squared concludes that 93.1% of the variability in violent crimes is explained by the model, which indicated that the quality of this test was strong. An array of real-world implications exist, as the results are subject to many interpretations. For example, an increase in population may be a root

cause for future sustainability of socioeconomic equality (i.e. proper schooling opportunities for young students, enhanced policing efforts to deter crime, stronger legislation to prevent unlawful impositions of programs that put classes of citizens at a disadvantage, etc.). The violent crime rate estimated through this model poses an interesting question: which elements of society must be considered to diminish crime? Perhaps the concern does not rest in the minimum dropout age; instead, emphasis may need to be placed on job opportunities, or natural growth in the national economy that will spur economic and social equality.

The polynomial squared right model appears to yield the best quantification of the effects of each regressor on crimes. All significant variables are significant at the 1 percent level, and the most notable are the shoot first law and the African American rate. Presence of the shoot first law may provoke violence in certain states, so the sign and size align with expectations. Generally, stiff gun laws may trend towards decreasing the rate of violent crimes; however, consider the implementation of the shoot first law on its own. Assuming no changes to gun control legislation, the shoot first law can potentially create a loophole that may be exploited in areas with heavy gun traffic. This situation may, on its own, lead to an increase in violent crime. While the effect may be minimal, this situation would not be ideal as the safety of many citizens becomes threatened. The African American rate also matches expectations because it is a driver of the disadvantage throughout many states. This variable should be further analyzed as the African American demographic experiences more disadvantage in job opportunities, household income, and education. One potential explanation is the change in the nation's political landscape. As turnover occurs with the Presidency, Cabinet, Senate, and statewide legislators, new political agendas are set in place. American citizens have also expressed strong viewpoints regarding the President and other political leaders, which could lead to more crime. On a less granular level, an outcry for change, equality, and safety from the American people can have a significant impact on crime rates, regardless of the laws and policies that are in place. Additionally, incarceration rates may explain the rise in crime, as African American citizens are among the most disadvantaged citizens in that respect. Finally, an explanation may lie with employers; some citizens are simply refused an equal opportunity to obtain jobs that they are qualified for, solely based on their ethnicity. While this example cannot be taken as an absolute fact, this potential profiling by employers may negatively skew the behavior of some citizens. The squared population was the main change in this model, but the results do not match expectations. The expectation is that population is positive and the squared term is negative. As each variable is negative, the slope of the nonlinear function is negative and decreases at a decreasing rate. The adjusted r-squared for this term suggests that the model is of high quality.

Overall, many coefficients fluctuated in terms of sign and significance as the type of test changed, which could indicate some statistical problems. For example, the minimum dropout age coefficients were sporadic among each model as new variables were added, so omitted variable bias may be present. Fortunately, the fit of each model seems to be strong as indicated by the adjusted r-squared, suggesting that the variables in each model have explanatory power on the number of crimes in the United States. This statistical result opens the door for further investigation and analysis; interestingly, there is not a singular explanation for an increase or decrease in violent crime rates. Instead, rapid changes in the nation's response to crime, educational and social disadvantage, and socioeconomic inequality provide a plethora of possible

explanations for crime rate trends. Appendix Table 2 displays the regression results for both the semi-log right model and the polynomial squared right model.

IV. Diagnostics

Throughout this extensive economic analysis on the rate of violent crime in the United States, it is imperative that potential statistical concerns are addressed. As such, diagnostics were run to test for the following statistical problems in the semi-log right regression: multicollinearity, heteroscedasticity, and autocorrelation. To begin, Appendix Table 5 displays the output for the variance inflation factor diagnostic for the semi-log right model. In this regression, all of the Centered VIF values are below the threshold, suggesting that the regression does not present a multicollinearity issue. Generally, a VIF around 1 is acceptable to suggest that the predictors in the model have minimal correlation. For this model, confidence is built in the independent variables as they cover a wide range of explanations for violent crime rates. For example, the African American rate and median household income may be related, but they independently measure different causes of crime.

Furthermore, as shown in Appendix Table 6, the same model was tested for heteroscedasticity. In order to test for this issue, the Park Test was conducted, taking an independent variable from the model that may be susceptible to heteroscedasticity and regressing it on the squared residuals for that respective model. Due to the insignificance of this variable (p-value of 0.5256), the null hypothesis of no heteroscedasticity is not rejected. Finally, potential autocorrelation was addressed for the model. Appendix Figure 1 presents a scatter plot of the residuals for the semi-log right regression. Both the residuals and lagged residuals are positive, suggesting an autocorrelation issue. The positively signed error of one observation is likely followed by an error with the same sign. All diagnostics conclusions also apply to the polynomial model after testing for issues.

V. Conclusion

This economic analysis on the crime rates in the United States presents several implications of this lasting issue. America's citizens heavily value quality of life and the right to proprietary safety, displaying the significance of crime rate analyses. Fortunately, this study consists of a series of regressions and a thorough analysis of the results, including the testing for statistical issues. Two models were identified as the most reliable explanatory models, including a panel regression and the semi-log right model. The significant determinants within these models met expectations, and also align with several professional studies that were previously conducted. In particular, unemployment, demographic measures, and firearm legislation aid in the quantification of violent crime rates, suggesting that these measures are significant. These significant predictors should be considered when selecting additional variables to explain fluctuations in crime rates. In addition, potential multicollinearity issues were analyzed and it was determined that an issue is not presented in the extracted data. Controlling for geographic differences by analyzing crime per 100,000 averted many statistical issues. Due to the strong fit of these models, further research would include testing variables that speak to the existence of economic inequality and cultural diversity, potentially leading to a stronger model. In its current standing, this analysis provides a strong view of potential drivers of violent crime and displays any statistical issues that need to be addressed.

Crime Rates

In the end, this study provides an opportunity for the improvement of legislative recommendations, conveying that certain determinants of crime may not hold as much magnitude as suspected. For example, the minimum dropout age may not carry as much magnitude as some lawmakers may presume. Instead, students may need more funding in their schools or other forms of aid to heighten their involvement and success in the classroom. Raising the dropout age prolongs the time that students are required to be in school, but if their educational experience is not sufficient, the dropout age might not be a factor. Furthermore, gun laws have a widespread impact on human behavior. Not only would an alteration in legislation impact gun violence, but it may also have a hand in racially-motivated crimes and reaction to socioeconomic disadvantage. The purpose that this study serves is met, suggesting that certain economic and social factors play an important role in the occurrence in crime, and the manipulated regressions are reliable. Perhaps, this is an opportunity for adjustments to be made that will balance the inequality that the United States faces, and enhance the livelihood of America's citizens.

VI. Appendix

Variable	Mean	Median	Maximum	Minimum	Std. Dev.
Violent Crime	389.46	352.15	828.10	78.20	163.77
Property Crime	3,110.59	3,032.35	5,849.82	1,406.60	800.67
African American Rate	10.60	7.55	37.62	0.30	9.52
MDA17	0.18	0	1	0	0.39
MDA18	0.32	0	1	0	0.47
MDA1718	0.496	0	1	0	0.50
Home Vacancies	2.02	2.00	5.30	0.50	0.69
Unemployment Rate	5.85	5.40	13.70	2.30	2.01
Median Household Income	55,643.21	54,859.00	80,007.00	35,562.00	8,628.86
Shoot-First Laws	0.28	0	1	0	0.45
LOG(Population)	15.13	15.27	17.48	13.11	1.01
Population	6,011,114.00	4,290,486.00	39,144,818.00	493,754.00	6,629,235.00
Population ²	8.00E+13	1.84E+13	1.53E+15	2.44E+11	2.10E+14
Total Samples = 800					

Table 1: Descriptive Statistics for Violent Crime

Crime Rates

Variable	Semi-log Right	Polynomial Squared Right
Constant	1935.262***	240.974***
African American Rate	14.548***	12.992***
MDA17	-2.404	-3.724
MDA18	22.797***	19.131**
Home Vacancies	3.130	3.081
Unemployment Rate	-10.666***	-9.553***
Median Household Income	0.002***	0.002***
Shoot First Law	18.268***	18.649***
LN Population	-117.755***	-
Population	-	-9.63E-06*
Population ²	-	-2.31E-13
R-Squared	0.938	0.942
Adj. R-Squared	0.931	0.936
F-Statistic	151.472	161.762
Prob (F-Stat)	0.000	0.000

Significance: *** 1 percent level
 ** 5 percent
 * 10 percent

Table 2: Regression Results for Violent Crime

Dependent Variable: VIOLENT_CRIME
 Method: Panel Least Squares
 Date: 11/15/16 Time: 15:46
 Sample: 2000 2015
 Periods included: 16
 Cross-sections included: 50
 Total panel (balanced) observations: 800

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1935.262	435.6534	4.442205	0.0000
AFRICAN_AMERICAN_				
RATE	14.54763	3.882937	3.746553	0.0002
MDA17	-2.403546	7.468413	-0.321828	0.7477
MDA18	22.79656	8.279232	2.753463	0.0060
HOME_VACANCY	3.129896	3.786184	0.826662	0.4087
UNEMP_RATE	-10.66565	2.245335	-4.750137	0.0000
MEDIAN_HOUSEHOLD				
_INC	0.002252	0.000648	3.472667	0.0005
SHOOT_FIRST	18.26578	5.736058	3.184378	0.0015
LOG(POPULATION)	-117.7546	28.48006	-4.134633	0.0000
Effects Specification				
Cross-section fixed (dummy variables)				
Period fixed (dummy variables)				
R-squared	0.937505	Mean dependent var	389.4610	
Adjusted R-squared	0.931316	S.D. dependent var	163.7679	
S.E. of regression	42.91970	Akaike info criterion	10.44335	
Sum squared resid	1339207.	Schwarz criterion	10.87082	
Log likelihood	-4104.342	Hannan-Quinn criter.	10.60757	
F-statistic	151.4720	Durbin-Watson stat	0.612975	
Prob(F-statistic)	0.000000			

Table 3: Semi-Log Right Regression for Violent Crime

Crime Rates

Dependent Variable: VIOLENT_CRIME
 Method: Panel Least Squares
 Date: 11/14/16 Time: 18:33
 Sample: 2000 2015
 Periods included: 16
 Cross-sections included: 50
 Total panel (balanced) observations: 800

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	240.9735	60.81167	3.962618	0.0001
AFRICAN_AMERICAN_				
RATE	12.99190	3.768644	3.447368	0.0006
MDA17	-3.723668	7.199390	-0.517220	0.6052
MDA18	19.13094	7.996734	2.392344	0.0170
HOME_VACANCY	3.080684	3.648868	0.844285	0.3988
UNEMP_RATE	-9.553278	2.167183	-4.408155	0.0000
MEDIAN_HOUSEHOLD				
_INC	0.002267	0.000625	3.626974	0.0003
SHOOT_FIRST	18.64875	5.541907	3.365042	0.0008
POPULATION	-9.63E-06	5.72E-06	-1.683355	0.0927
POPULATION^2	-2.31E-13	1.48E-13	-1.556065	0.1201
Effects Specification				
Cross-section fixed (dummy variables)				
Period fixed (dummy variables)				
R-squared	0.942080	Mean dependent var	389.4610	
Adjusted R-squared	0.936257	S.D. dependent var	163.7679	
S.E. of regression	41.34727	Akaike info criterion	10.36983	
Sum squared resid	1241167.	Schwarz criterion	10.80315	
Log likelihood	-4073.931	Hannan-Quinn criter.	10.53629	
F-statistic	161.7619	Durbin-Watson stat	0.651830	
Prob(F-statistic)	0.000000			

Table 4: Polynomial Model Squared Right for Violent Crime

Variance Inflation Factors
 Date: 12/07/16 Time: 22:45
 Sample: 2000 2015
 Included observations: 800

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	189793.9	82424.97	NA
AFRICAN_AMERICAN_RATE	15.07720	736.1085	1.038541
MDA17	55.77720	2.055650	1.248862
MDA18	68.54568	4.318290	1.246137
HOME_VACANCY	14.33519	26.52079	1.149358
UNEMP_RATE	5.041530	76.22831	1.263970
MEDIAN_HOUSEHOLD_INC	4.20E-07	566.4572	1.144932
SHOOT_FIRST	32.90236	2.180332	1.039976
LOG(POPULATION)	811.1138	80598.23	1.004293

Table 5: Semi-Log Right Regression VIF's

Dependent Variable: RESIDSQ2
 Method: Panel Least Squares
 Date: 12/11/16 Time: 13:55
 Sample: 2000 2015
 Periods included: 16
 Cross-sections included: 50
 Total panel (balanced) observations: 800

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2757.967	1710.630	1.612252	0.1073
LOG(POPULATION)	-71.66074	112.8387	-0.635072	0.5256
R-squared	0.000505	Mean dependent var	1674.009	
Adjusted R-squared	-0.000747	S.D. dependent var	3224.162	
S.E. of regression	3225.367	Akaike info criterion	18.99798	
Sum squared resid	8.30E+09	Schwarz criterion	19.00969	
Log likelihood	-7597.191	Hannan-Quinn criter.	19.00248	
F-statistic	0.403317	Durbin-Watson stat	0.839863	
Prob(F-statistic)	0.525563			

Table 6: Semi-Log Right Regression Park Test

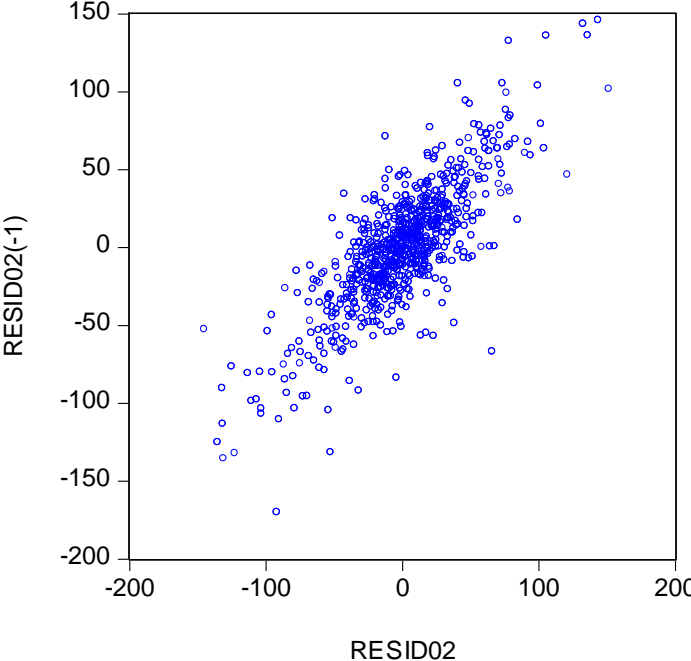


Figure 1: Semi-log Right Residual Plot

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