

Making Your State Safer: Factors Influencing Interstate Homicide Rates in the United States

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When one looks at homicide rates across states, one is struck by the disparity in the numbers. Why do some states have a rate that is below two homicides per 100,000 population while others approach ten? Are there factors that influence these rates that can be addressed legislatively or administratively? These are the questions that we sought to answer through our regression analysis of interstate homicide rates. After reviewing relevant literature, we attempted to assess the following factors to determine whether they are predictive of a state's homicide rate: income inequality, education rate, percentage of population that is African American, unemployment rate, age, whether a state has a large urban area, and the level of gun regulation. Important findings include that, when holding all other included independent variables constant: education rate is statistically significant, decreasing homicide rate by 0.29 for each one percent increase in education rate; the percentage of the population that is African American has a statistically significant impact on homicide rates, increasing rates by 0.11 for every one percent increase in African American population; whether a state has at least one of the largest cities in the U.S. has a statistically significant impact on the state's homicide rate; and states that implemented restrictive gun laws were estimated to have a .6 decrease in homicide rates per 100,000 population compared with those states that did not. This result was not statistically significant, but may be cause for further research due to its policy implications. If focused legislative efforts can bring about such a reduction in homicide rates, they are clearly worthwhile.

When one looks at homicide rates across states, one is struck by the variability in the numbers. Why do some states have a rate that is below two homicides per 100,000 population while others approach ten? Are there factors that influence these rates that can be addressed legislatively or administratively? These are the questions that we sought to answer through our regression analysis of interstate homicide rates.

CNNMoney.com recently developed a report on the best places to live in the United States. The criteria they used to determine which places were the best to live in included economic growth forecasts, cost of living figures, and quality of life measures (Best Places to Live 2006). Of the seven items indexed to measure quality of life, four of them were related to crime rates. *Forbes* developed a report on the best states for business, and they also included measures on quality of life (Badenhausen 2006). Quality of life is evidently of utmost importance in measurements of the best places to live and do business, and crime rates have an understandable impact on a state's quality of life score. It is clearly in states' best interests to minimize crime rates as best they can if it is their desire to attract new business and new residents.

There are many crimes that might affect an area's desirability, and criminal activity in general detracts from an area's appeal. One of the most violent crimes that must be addressed and minimized if a state is to be safe is that of homicide. There is a wide variance in homicide rates among states, with North Dakota having a rate of 1.1 per 100,000 population and Louisiana and Maryland reporting 9.9 per 100,000 population. What factors influence a state's homicide rate?

Why is there such disparity among them? Are there things that government can do to reduce the rate?

Literature Review

A great number of research articles in the fields of sociology and criminology have examined the phenomenon of homicide for the past few decades. Scholars sought a fairly definitive model and built up robust theories to determine what primary factors contribute to societal homicide rates. Their findings were mixed.

Blumstein and Rosenfeld (1998) observed that during the period of the 1980s and 1990s, the national homicide rate continuously fluctuated up and down. It reached its highest point in 1980 at 10.2 homicides per 100,000 population, and then kept going down until 1985. After the downward trend, the homicide rate again climbed year after year and reached a second peak in 1991 at 9.8 homicides per 100,000 population. It then fell sharply down to a level of 6.8 in 1997 (Blumstein and Rosenfeld 1998 pp. 1175–76). Blumstein and Rosenfeld were interested in the behind-the-scenes influences that affected the changing trend in homicide rates. They started an investigation that included state and city level research. According to their research, they set forth a couple of key variables for explaining the change of homicide rates during the late 1980s and early 1990s, such as age (younger people commit more homicides), demographic shifts (particularly age and African American population), the role of weapons, occurrence in large cities, drug markets, economic cycles, family structures, and relevant enforcement policies (Blumstein and Rosenfeld 1998 p. 1175, pp. 1207–1216). Blumstein

and Rosenfeld's contemporaries were also curious about the causal relationship between homicide rates and social forces such as income inequality and demographic shifts.

Tracing back to the 1970s, scholars have explored the relationship between homicide rates and income inequality and poverty. Kovandzic, Vieraitis and Yeisley (1998) believed that early studies in this area demonstrated a limited perspective and claimed that poor economic conditions might induce more crime than previously thought. They worked with the theories of *absolute* and *relative economic deprivation*. The concept of *absolute economic deprivation* considers whether people who earn low incomes, obtain little education, and suffer unemployment are more likely to seek criminal approaches to solve their living crises. *Relative deprivation* considers whether individuals perceiving their relatively unfavorable socioeconomic circumstances and subsequent emotional frustrations are more easily involved in violent criminal behaviors. It is expected that an increase in income inequality increases an individual's relative or absolute deprivation and thus drive that individual to engage in highly violent crimes (Kovandzic, Vieraitis and Yeisley 1998 p. 571). The theory of economic deprivation has been further expanded to argue that the social values supportive of violence found in areas of deprivation are passed on within social organizations such as families, neighborhoods, and communities. Therefore, poverty, segregation, and isolation encountered by poor and minorities may lead to the creation violent subcultures (Kovandzic, Vieraitis and Yeisley 1998 pp. 570–574). In sum, research has established that factors affecting economic status and inequality, including unemployment, income, and education, (among others), are variables that may explain homicide rates (Kovandzic, Vieraitis and Yeisley 1998 pp. 576–577).

Though many studies probed the association between homicide rates and income inequality and poverty, they failed to establish a consensus regarding a comprehensive set of factors that affect homicide rates (Kovandzic, Vieraitis and Yeisley 1998 p. 569). Kovandzic, Vieraitis and Yeisley (1998) reassessed theories and created a new model for analysis in order to attempt to address these problems. They concluded that homicide was largely a central city phenomenon, so instead of using states and Standard Metropolitan Statistical Areas (SMSAs), they looked at U. S. cities having a population of 100,000 or more as the target analysis groups, and argued that employing cities as the unit of analysis made sense since they tended to be more homogenous social communities than larger aggregations (Kovandzic, Vieraitis and Yeisley 1998 p. 578).

In order to deal with multicollinearity between independent variables meant to measure poverty, Kovandzic, Vieraitis and Yeisley (1998) developed a new mechanism that rejected the measures that had been used before, including the Gini index. They argued that the Gini index's inability

to detect changes in the tail end of the income distribution affected its usability and thus they devised an alternative way to manipulate inequality of income and poverty. They compared the ratio of the income received by the top 20% of families to that of the lowest 20% of families and also the share of the income received by the top 20% of families (Kovandzic, Vieraitis and Yeisley 1998 p. 582). As they were considering cities as their unit of analysis, such transformation allowed them to compare income inequality and whether this influenced homicide rates. The other independent variables they included in their model basically followed former theoretical and empirical studies which were relevant to homicide rate, such as percent black, percent young, and unemployment (Kovandzic, Vieraitis and Yeisley 1998 pp. 582–584).

Some researchers have argued that a southern culture of violence exists. Kovandzic, Vieraitis and Yeisley (1998) included this regional factor in their model, but it did not yield a statistically significant result. Similar findings appeared in Huff-Corzine, Corzine and Moore's research in 1985, where they indicated that high homicide rates among white southerners and African Americans might tie to cultural difference; however, they could not support an argument that regional differences explain homicide rates (p. 919). We assume that variance in region does not play a role in predicting the level of homicide rate because of changes in social context and demographical conditions. We agree with the point Kovandzic, Vieraitis and Yeisley (1998) make: "migration of Southerners to the North, followed by migration of non-Southerners to the South during the Sunbelt expansion of the 1960s to 1980s" has caused the geographical dispersion of southern culture (p. 586).

Tracing back to the 1970s, scholars have explored the relationship between homicide rates and income inequality and poverty.

Specification of the Theoretical Model

Based on our literature review, we included measures to account for many items that previous theory indicates affect homicide rates. Using 2005 per capita state homicide rates as the measure of our dependent variable, we researched 2005 measurements for a number of independent variables in order to do a cross-sectional analysis. Blumstein and Rosenfeld (1998) found that age and African American population play an important role in homicide trends; we included 2005 census data for percent of state population between 18–24 years old and percent of state population that self-identified as African American or black to account for these items. They found that occurrence in large cities was important, as did Kovandzic, Vieraitis and Yeisley (1998). We included a dummy measure to determine whether states with the largest cities in the country have a statistically significant higher homicide rate than those that do not. To do this, we included

data for the 50 largest cities in the United States so that each state had an opportunity to be included.

Blumstein and Rosenfeld also found the role of weapons interesting, particularly juvenile use of weapons. The Brady Campaign Against Gun Violence has created a 2005 report card for each state based on its gun laws¹. The report card is based on an index that measures whether a state has the following legal restrictions on weapons:

- Juvenile Possession of Guns—Is it illegal for a child to possess a gun without supervision?
- Sale/Transfer of Guns to Juveniles—Is it illegal to sell a gun to a child?
- Safe Storage and Gun Owner Accountability—Are gun owners held responsible for leaving loaded guns easily accessible to children?
- Childproof Guns and Gun Design Safety—Are guns required to have child-safety locks, loaded-chamber indicators and other childproof designs? Are there restrictions on unsafe Saturday night specials?
- Preemption—Do cities and counties have authority to enact local gun laws?
- Secondary “Private” Gun Sale Background Checks—Are background checks required at gun shows and between “private” parties?
- Carrying Concealed Weapons (CCW)—Is it legal to carry concealed handguns in public?

We utilized the report card generated by these measures to test whether such bans and legal restrictions have a statistically significant impact on state homicide rates. If a state scored an A or a B on the report card, it was assigned a value of 1. If it scored less than a B, it was assigned a value of 0. We did this rather than assigning the variable an ordinal level of measure because the index seemed to be weighted such that a state could receive 2 F’s and 3A’s on index measurements and still receive a D or F overall. Since this indicated that the index was not precise, we divided the states into top and bottom tiers and assigned values this way.

Blumstein and Rosenfeld also found that other measures were important in understanding homicide rates, such as drug markets, economic cycles, family structures, and relevant enforcement policies (Blumstein and Rosenfeld 1998 p. 1175, pp. 1207–1216). We found that there are not standardized measures to account for these variables across states; in fact these variables are much more standardized for microanalysis across metropolitan areas. The data across states were not reliable and we often found that data that seemed to track one of these items actually did not. For example, to track enforcement we wanted to include a measure of the number of law enforcement officers in a state. Upon researching this item, though, we found that reliable data was not available for each

state. The only measure that was available reported the number of sworn highway patrol officers across states, and we had no reason to think that the number of highway patrol officers within a state would impact state homicide rates.

Kovandzic, Vieraitis and Yeisley (1998) noted that income inequality affected homicide rates, and we used state per capita income to measure state income and test the affect of inequality at a macro level². They also found that education and unemployment rates affected homicide rates, and we included census data regarding these variables to measure their affect. We specified education as those in the population with at least a high school diploma based on Blumstein and Rosenfeld’s (1998) observation that younger people are more likely to be involved in homicides. By utilizing high school education as a measure we hope to capture educational attainment of the demographic most likely to be involved in homicides.

Heteroskedasticity is a concern when estimating a regression equation based on cross-sectional data. It is especially a concern with state data since there is such variance between their sizes, incomes, etc. Studenmund (2006) explains that “Heteroskedasticity often occurs in data sets in which there is a wide disparity between the largest and smallest observed value of the dependent variable” (p. 348). In order to ensure that the homicide rate data we used accounted for this possible problem, we used rate per 100,000 population. Dividing by population allowed us to standardize raw numbers, which had an extremely large variance, to numbers with a much smaller variance that accurately reflected differences in homicide rates between states³.

We expect that all of our independent variables will

2 We discovered post-analysis that per capita income did not appropriately capture the effect of income inequality on homicide rates at the state level. Our analysis demonstrated that per capita state income is not a statistically significant predictor of a state’s homicide rate, but we only captured the affect of income on homicide rates rather than capturing the affect of income inequality.

3 We specified two equations for this analysis. The first included Washington, D.C. as a state and the second did not. The equation that excluded Washington, D.C. had a better overall fit. Including Washington, D.C. was problematic on several levels. In some data we reviewed, it was reported as a city, in others it was reported as a state. Much control over D.C. is in the hands of Congress, so it is difficult to treat D.C. as an autonomous unit in the same way as states are. Further, many of the trends D.C. demonstrates are congruent with that of large cities rather than those of states. It also had a homicide rate more than three times than that of the states, which significantly increased the variance in the dependent variable and thus increased the chance for heteroskedasticity to be present. Due to all of these items, this paper focuses only on the equation that estimated a model based on the states themselves and excludes Washington, D.C.

1 See <http://www.stategunlaws.org/> for details regarding this report card; the index listed here that was utilized to grade states’ performance is taken verbatim from this website.

have a linear relationship with the dependent variable and that OLS will be the best linear unbiased estimator for our analysis.

Sign Hypotheses

We hypothesize that the signs for each coefficient will be as follows:

- **Income (–)**
Research Hypothesis: This variable will have a negative relationship with the dependent variable in that as the income level increases the homicide rate will decrease.
- **Education (–)**
Research Hypothesis: As education level increases homicide rate will decrease, meaning that this variable will also have a negative relationship with the dependent variable.
- **Percentage of population that is African American (+)**
Research Hypothesis: Based on previously conducted research, we expect that the proportion of African American population will be positively correlated with homicide rate, meaning that as the proportion of African American population increases homicide rates will also increase.
- **Brady Campaign Report Card (–)**
Research Hypothesis: If a state has an A or a B on the Brady Campaign Report Card it will have a lower homicide rate than those states that score below a B.
- **State’s unemployment rate (+)**
Research Hypothesis: States with higher unemployment rates will have higher homicide rates than those with lower rates, meaning that we expect that they will be positively related.
- **Percentage of population between 18–24 years old (+)**
Research Hypothesis: Those states with younger populations will have higher homicide rates than those with older populations. Therefore, we expect that as the percentage of the population 25 years old and younger in-

creases, homicide rates will also increase.

- **Large City (+)**

Research Hypothesis: Per Blumstein and Rosenfeld (1998), changes in city aggregate homicide rates have a large affect on overall homicide rates. We expect that large cities will have higher homicide rates due to the concentration of population, and thus it is expected that states with large cities will have higher rates than those without them.

The equation we will estimate is:

$$\text{State Homicide Rates} = B_0 - B_1 \text{ Income} - B_2 \text{ Education} + B_3 \text{ PercentPopAfricanAmerican} - B_4 \text{ BradyReport Card} + B_5 \text{ Unemployment} + B_6 \text{ PercentPop18-24} + B_7 \text{ LargeCities} + c$$

Data to be Analyzed and Descriptive Statistics

Utilizing 2005 data from the Census Bureau, the FBI, Bureau of Labor Statistics, and Brady Campaign, we hope to capture the factors that influence homicide rates. There is variance within 2005 homicide rate among states, as reported by the FBI. In order to allow for easy state-to-state comparisons, homicide rates have been standardized to rate per 100,000 population. The education rate we use is based on the reported census rate for individuals in the state with at least a high school diploma. State per capita personal income represents our effort to determine whether the variance in interstate income has a statistically significant impact on homicide rates. Previous research in the field has shown that income variance has an impact in urban areas. African American population, also garnered through census data, has similarly been shown to influence homicide rates in urban areas. The younger the population demographic, the higher the crime rate is expected to be. To capture this, we used census data representing the 18–24 year old age group. Unemployment rate, as measured through Bureau of Labor Statistics data, is also expected to increase the crime rate in states.

Descriptive measures of the above data are listed below in Table 1:

Table 1. Descriptive Measures of Independent Variables

Descriptive Statistic	Homicide Rate	Education Rate	State Per Capita Income	Percent of Population African American	Percent of Population 18–24	Unemployment Rate
Mean	4.71	85.69	33441.68	9.89	10.14	4.88
Median	4.70	86.30	32657.00	6.60	10.00	4.90
Maximum	9.90	91.30	47819.00	36.50	12.90	7.90
Minimum	1.10	78.50	24820.00	0.40	8.70	2.80
Std. Dev.	2.37	3.64	4894.02	9.54	0.79	1.06

n = 50

There is wide variance in some of the factors among states. For example, in 2005 Mississippi had an African American population of 36.5% while Idaho's population was only 0.4%. Hawaii's unemployment rate was only 2.8% while Mississippi's was 7.9%. Such variance will allow us to better test whether these factors have a statistically significant impact on homicide rates.

We also included measures from the Brady Campaign Report Card in order to test whether a state's gun laws influenced its homicide rates, assigning 1 to states with an A or B and 0 to states with less than a B. We did not assign an ordinal level measure to this due to the weighted index the campaign utilized to generate a final grade. Instead, we chose to consider top tier states compared with lower tiered states. With a mean of .2 for this variable, we can see that fewer states scored a 1 than those that scored a 0.

In addition, we utilized a measurement to account for the fact that many homicides occur in urban areas with dense populations. If a state had one of these urban areas, we expected that it would have a higher homicide rate. We assigned those states with such urban areas a 1 and those without a 0. We included the top fifty most populous cities in the country so that each of the fifty states had a chance of ending up with a 1. With a mean of .58, we can see that slightly over half of the states have at least one of these urban centers, meaning several have more than one.

Results

Our regression analysis yielded the following result:

that we can reject the null hypothesis that our group of independent variables has no effect on the dependent variable.

State Per Capita Personal Income, a variable that we selected to measure income inequality among states, was not statistically significant and was actually found to be close to zero with a small positive coefficient. This was shocking, and leads us to believe that this variable was incorrectly specified since the result is completely inconsistent with previously completed research. Clearly state per capita personal income is not the best mechanism to capture the affect of income inequality on interstate homicide rates. Much literature indicates that income should influence homicide rates, but this literature focuses on a micro level view of homicide, specifically focusing on homicide in urban areas. It is possible that such an affect is more difficult to capture at the macro level. It is also possible that a measure that standardizes the percentage difference in income between the top and bottom tiers in a state would better capture the affect of income inequality on interstate homicide rates.

The t-statistic for Education of -3.41 indicates that this variable is strongly statistically significant at above the 95% confidence level, holding other included independent variables constant. The coefficient of -0.29 indicates that for every one percentage point increase in high school education rates, homicide rates per 100,000 population will drop by 0.29. Though this number may seem small, it is important to remember that most states had a homicide rate around four per 100,000 population. For a state with exactly such a homicide rate, a single percentage point increase in education rate would drop the homicide rate by 0.29. For example, a state

Table 2. Regression Analysis Results

Variables	Coefficients	Standard Errors	t-Statistics	Probability
Constant	22.93	6.51	3.52	<0.01
Income	.00006	.00007	0.91	0.37
Education	-0.29	0.09	-3.41	<0.01
% Population African American	0.11	0.03	4.27	<0.01
Unemployment Rate	0.09	0.21	0.43	0.67
% Population 18–24	0.26	0.33	0.79	0.47
Brady Campaign Report Card	-0.65	0.64	-1.01	0.32
Largest Cities	1.20	0.41	2.95	0.01
R-squared: 0.73		F-statistic: 16.27		
Adjusted R-squared: 0.69		F-statistic probability: <0.01		

The adjusted R-squared of .69 indicates that 69 percent of the variability in state homicide rates is explained by our estimation, controlling for the number of independent variables. This means that about one third of the variability is not explained by this equation. Our F-statistic of 16.27 indicates

with a population of 500,000 and a homicide rate of four per 100,000, a one percentage point increase in the number of people with at least a high school diploma would drop homicide rates from 20 per year (4 per 100,000 * 5) to 18.5 per year. Though this may seem like a small change, it is all the

change in the world to the family who does not lose a loved one. As population or homicide rate increases, the number of lives saved by increasing education rate also increases proportionally.

The percentage of a state's population that is African American also has a strongly statistically significant impact on the state's homicide rates, with a t-statistic of 4.27. The magnitude of the impact is 0.11 for every one percent change in population, holding all other included independent variables constant. This means that in our previous example, the homicide rate would increase from 20 per year to 20.55 if the state's African American population increased by one percentage point. This clearly has important implications, especially for states with a high African American population. It is important to note that race itself is not necessarily the cause of the increase in homicide rates; the regression analysis tells us that an increase in the rate occurs as African American population increases, but it does not tell us *why*. Subculture values and socioeconomic systemic issues should be examined to determine their influence on the correlation between African American population and an increase in homicide rates. Such systemic issues may be reflected in an increased occurrence in the African American community of other areas that have been found to increase the rates (for example, increased income inequality).

The coefficient for unemployment, 0.09, indicates that for every one percentage point increase in unemployment, the homicide rate increases by 0.09. This relationship was not statistically significant, with a t-probability of 0.67. This finding is inconsistent with the previous research we reviewed. However, it is possible that unemployment does not play the role now that it did in the 1990s. It is also possible that unemployment plays a role on the urban level that it does not play on the state level.

Percentage of the population between 18–24 was also not statistically significant, with a t-statistic of only 0.79. Its coefficient indicates that for every percentage point increase in this demographic, the homicide rate would increase by .26. Strong theoretical evidence indicates that young people are more likely to be involved in homicide than other age demographics. It is possible that this variable was not correctly specified and did not capture enough of the under-24 age group to demonstrate a statistically significant impact on homicide rates. Perhaps reporting the age group demographic at the 15–24 level would have provided a better specification.

The Brady Campaign Report Card was not statistically significant at the 95% confidence level, but the findings are nonetheless interesting. The findings indicated that a state scoring high on the Brady Campaign Report Card (either an A or B) has .65 fewer homicides per 100,000 population than those that scored below a B. In our example of a state with 500,000 people and a homicide rate of 4 per 100,000 people,

the annual homicide rate would go from 20 per year to 16.75. This comes to a 16.25% decrease in the homicide rate. If legislation can have such a strong impact, it is worth further research.

Finally, as expected, those states with one of the fifty largest cities in the United States can expect to have a higher homicide rate than those that do not. This finding is statistically significant at higher than the 95% confidence level, with a t-statistic of 2.95. Having at least one of the largest cities in the U.S. increases homicide rates by 1.2 per 100,000, holding all other included variables constant. This means that a state with a population of 500,000 and four homicides a year would increase that rate to 10 per year if it had at least one of the country's largest cities. Cities are truly hubs of homicidal activity.

Simply increasing high school graduation rates can decrease homicide rates.

Conclusions

There are several important findings for states based on these results. First, education has a significant impact on homicide rates, and it doesn't have to be a college degree to make a difference. Simply increasing high school graduation rates can decrease homicide rates. This can be added to the many reasons states should emphasize high school completion. Having said that, there are ultimately limitations to this finding. It is probably unrealistic to expect that states will be able to increase their education rate by one percent or more each year, though our findings indicate that every increase in education rate, no matter how small, will have some impact on decreasing homicide rate.

Second, it is troubling to find that an increase in African American population increases homicide rates. This finding has implications beyond the state level and should be examined to determine urban level consequences as well. New research questions emerge from this finding, such as whether aggregations of African American population increase homicide rates in urban areas, and if so, why? Our research is congruent with other research that indicates that a relationship exists, but it does not tell us why it exists.

Third, the results regarding the Brady Campaign Against Gun Violence Report Card were not definitive but indicated that more research should be done to clarify the relationship between gun laws and homicide rates. If a state could significantly reduce its homicide rate simply by passing and enforcing more restrictive legislation, it seems that it would be a very worthwhile endeavor. It may also be worthwhile to run a regression analysis based on the grade each state received on each of the indexed items used to determine the Brady Campaign report card to see if each item has a statistically significant impact on a state's homicide rate.

Fourth, it may be worthwhile for standardized measurements utilized in metropolitan areas to be utilized to exam-

ine state-level data. As Blumstein and Rosenfeld (1998) noted that measures such as drug markets, economic cycles, family structures, and relevant enforcement policies are important in understanding homicide rates, developing and including standardized statewide measures to account for these within our model may increase its explanatory power.

Finally, if large cities are the locus of most homicides, states should review their partnerships with them to determine whether there are ways to improve prevention. City law enforcement officials are on the frontlines and might offer valuable insight on how to best deter the crime to begin with. Enhancing partnerships in order to improve efforts to decrease homicide rates can only benefit both states and cities as they both seek to improve the quality of life for residents and businesses.

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