Crime Deterrents

Eileen Long

Eileen Long graduated Magna Cum Laude from Ball State in May 2008 with a double major in Actuarial Science and Mathematical Economics and minors in Foundations of Business and Spanish. Eileen is currently working as an actuary with Watson Wyatt Worldwide in Seattle, WA. The advisor for this honors thesis was Dr. Tung Liu of the Economics Department.

Crime has always been an important topic in every culture. No one wants to live in fear of being stripped of their valuable belongings. In the United States, in particular, crime has consistently risen in the 1970s and 1980s, but significantly dropped in the 1990s. Statistics indicate that 2005 has been one of the safest years in the past thirty years. Overall, in the United States, crime has dropped from 758.1 incidents per 100,000 inhabitants in 1991 to 469.2 in 2005. This has led many analysts to contemplate the reasons behind the drop in crime. What has caused crime to drop so dramatically in the past decade? Is there one main deterrent factor, or is it hard to pinpoint? (See [1, 2, 3, 4, 5]). This research paper focuses on two possible deterrents that have been debated throughout the years, capital punishment and the number of police officers.

Models

We will look at two years of data, 1990 and 2000 and ten independent variables against one dependent variable. The dependent variable will be the violent crime rate, which is the rate per 100,000 people. The independent variables will be the bachelor degree rate, the percentage of black population, the divorce rate, the number of executions in the past ten years, the percentage of Hispanic population, the median income, the mobility rate, the number of police officers, people per square mile, and the unemployment rate. Typically, people who have a bachelor's degree have a higher level of education, and therefore, a greater chance of being employed, which can mean a lower need to commit crime. The minority populations are important to look at because many minorities have low incomes, which typically parallel a higher incentive to commit crime. The variables for the divorce rate and the mobility rate look at the stability of families. It is a social argument that claims that when families are not stable, children grow up being more susceptible to committing crime. We will look at the economic variables for income and unemployment because charac-

teristically, people with less money are more induced to commit crime. Also, we will look at people per square mile to see if the crime rate is affected by a larger concentration of people. For the death penalty, we will look at a decade worth of data. This will be analyzed to see what effect, if any, the execution rate has on crime. For example, the 1990 execution variable will incorporate all of the executions from 1980–1989. Also, we will study the number of police officers employed to see if criminals are deterred by the higher probability of being caught. Many arguments claim that the severity of punishment and the probability of punishment will have a preventative result. The data was collected by state, ignoring Washington D.C. because it was clearly an outlier in the data set. The years used in the regression are 1990 and 2000.

One model we will be looking at is the following:

$$\text{ViolentCrime}_{it} = \beta_0 + \beta_1 \text{Bachelor}_{it} + \beta_2 \text{Black}_{it} + \beta_3 \text{Divorce}_{it} + \beta_4 \text{Executions}_{it}$$
$$+ \beta_5 \text{Hispanic}_{it} + \beta_6 \text{Income}_{it} + \beta_7 \text{Move}_{it} + \beta_8 \text{Police}_{it}$$
$$+ \beta_9 \text{PPSQM}_{it} + \beta_{10} \text{Unemploy}_{it} + \delta_1 t_{2000} + \epsilon_{it}$$

where

$$i = \text{state},$$
$$t = 1990 \text{ or } 2000,$$
$$t_{2000} = 0 \text{ or } 1, \text{according to } t = 1990 \text{ or } 2000, \text{respectively},$$
$$\text{Bachelor} = \text{percentage of population with a bachelor's degree},$$
$$\text{Black} = \text{percentage of population that is Black},$$
$$\text{Divorce} = \text{percentage of population that is divorced},$$
$$\text{Executions} = \text{number of executions in the past decade},$$
$$\text{Hispanic} = \text{percentage of population that is Hispanic},$$
$$\text{Income} = \text{median income of the population},$$
$$\text{Move} = \text{percentage of population that move},$$
$$\text{Police} = \text{number of police officers employed},$$
$$\text{PPSQM} = \text{people per square mile},$$
$$\text{Unemploy} = \text{unemployment rate}.$$

This model will be tested with panel regression, controlling for time fixed effects through the use of the dummy variable for year 2000. This determines how the variables are affected throughout time, but also controls for omitted variables that are constant over each state but change over time. For example, this form of testing would correct issues of a uniform increase of the Hispanic population over each state.

Another model to be tested is a cross-sectional regression, looking at the change in each variable over time. This regression controls for variables that change through each state but stay constant over time. We will take the changes in each variable between 1990 and 2000. This can solve the omitted variable problem caused by those omitted variables that do not change over time. The model to be studied is the following:

$$\Delta \text{ViolentCrime}_i = \beta_0 + \beta_1 \Delta \text{Bachelor}_i + \beta_2 \Delta \text{Black}_i + \beta_3 \Delta \text{Divorce}_i$$
$$+ \beta_4 \Delta \text{Executions}_i + \beta_5 \Delta \text{Hispanic}_i + \beta_6 \Delta \text{Income}_i + \beta_7 \Delta \text{Move}_i$$
$$+ \beta_8 \Delta \text{Police}_i + \beta_9 \Delta \text{PPSQM}_i + \beta_{10} \Delta \text{Unemploy}_i + \epsilon_i$$

where each variable is the change in the data over years 1990 and 2000.

Results

Panel Regression

After running the data [6, 7, 8, 9] through *EViews*, we examine the standard errors that are controlled for heteroscedasticity. Our preliminary efforts find that the bachelor, black, execution, Hispanic, and income variables are significant in the model. We also find that the coefficients for divorce, move, police, PPSQM and unemployment do not need to be included for the model to be significant. We come up with the following regression:

$$\text{ViolentCrime}_{90} = 156.58 - 10.32 \ \text{Bachelor}_{90} + 16.52 \ \text{Black}_{90} - 1.23 \ \text{Executions}_{90}$$
$$\qquad\qquad\qquad (5.50) \qquad\qquad\qquad (2.51) \qquad\qquad (0.75)$$

$$+ 15.61 \ \text{Hispanic}_{90} + 0.01 \ \text{Income}_{90},$$
$$\qquad (1.72) \qquad\qquad\qquad (0.004)$$

$$R^2 = 0.61,$$
$$DW = 2.09.$$

The revised equation for year 2000 has the same coefficients but the intercept changes to 18.43

Cross-Section Regression

Repeating the same procedure with the cross-section data, we remove the statistically insignificant variables for this next equation. We find that the black, divorce, executions, move and PPSQM variables are not significant.

$$\Delta \text{ViolentCrime} = -240.30 - 57.99 \ \Delta \text{Bachelor} - 30.67 \ \Delta \text{Hispanic} + 0.03 \ \Delta \text{Income}$$
$$\qquad\qquad\qquad (21.03) \qquad\qquad\qquad (11.28) \qquad\qquad (0.01)$$

$$- 8.82 \ \Delta \text{Police} + 31.82 \ \Delta \text{Unemploy},$$
$$\qquad (5.21) \qquad\qquad (12.84)$$

$$R^2 = 0.36,$$
$$DW = 2.23.$$

Conclusion

Looking at the panel regression closely, we can see that the number of police do not have a significant effect on violent crime. However, the execution rate does seem to have a significant effect on crime. When we look at the data through two different years, it appears that when a punishment is severe, as the death penalty is, then it significantly impacts crime. Specifically, for every one execution 1.23 violent crimes are deterred. But a one to one ratio is not great, considering past studies have previously found that one execution deters seven violent crimes [1].

The cross-sectional regression fixes any possible omitted variable problems. It looks at one year of data subtracted from another year of data. Therefore, if a certain variable changes over each state, but does not change over each year, it will be insignificant in the model. This type of cross-sectional regression corrects for variables that would not have a significant effect over time. The current model shows us that the execution rate, along with the black population, divorce rate, moving rate, and people per square mile, does not affect the crime rate over time. However, it does show that the number of police employed does have a significant impact on the crime rate. The punishment of execution, although severe, is not very certain, so the execution effect on crime is not statistically significant. Although, it appears that a higher certainty of being caught by the police creates a fear factor that discourages violent crime.

It is interesting to look at the death penalty from a social standpoint. The sentence of being put to death does not seem to create an enormous impact for criminals. Looking at this with a more practical sense, a lot of violent crimes that are committed are acts of revenge, passion, or insanity. In other words, they are acts committed when people do not have a clear, rational head. If one is not thinking clearly, then he cannot be expected to respond rationally to incentives. The question then becomes, *Is it necessary to have the death penalty if it does not have a deterrent factor in violent crimes?* Proponents for the death penalty believe that it is for the benefit of the society by removing killers from the street and making sure they do not return. They believe that these killers deserve to have their lives ended as well. Opponents of the death penalty think that there is no reason to commit more killings just to prove a point, especially if it does not help the violent crime rate. They also do not see how it is possible for others to determine if someone deserves to die.

Police officers tend to create a feeling of safety and protection. But does the amount of police officers really affect the crime rate? Most criminals would be deterred by this because it would be more likely that they would be caught. The results of the cross-sectional regression do appear to point to a deterrent factor.

However, it can be seen that based on the way regressions are set up and which years of data or groups of data are used, the results can be different. It is important to look at many different ways of studying crime to determine a logical result. Researchers should study crime from many different perspectives, mathematically, economically, socially, and psychologically before making a decision.

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