Winter 2010

Capital Punishment and Specific Offense Deterrence

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Capital Punishment and Specific Offense Deterrence

BY

Brian Giardina

BA, University of New Hampshire, 2009

Thesis

Submitted to the University of New Hampshire
In partial fulfillment of
The requirements for the degree of

Master of Arts

in

Justice Studies

December, 2010
This thesis has been examined and approved.

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12/13/10

Date
TABLE OF CONTENTS

LIST OF TABLES .............................................................................................................. iv
ABSTRACT ......................................................................................................................... vi

CHAPTER PAGE

INTRODUCTION .................................................................................................................. 1

I. A RECENT HISTORY OF CAPITAL PUNISHMENT IN THE UNITED STATES .................. 3

II. EXISTING CAPITAL PUNISHMENT RESEARCH ....................................................... 8

III. EXPLANATION OF CURRENT STUDY .................................................................. 17

A. DATA AND MEASURES ......................................................................................... 17

B. METHOD ................................................................................................................. 19

IV. RESULTS ............................................................................................................... 22

A. PRELIMINARY RESULTS ...................................................................................... 22

B. FIRST HYPOTHESIS ............................................................................................... 22

C. SECOND HYPOTHESIS ......................................................................................... 23

V. DISCUSSION AND FURTHER RESEARCH ............................................................. 25

VI. LIST OF REFERENCES ............................................................................................ 29

VII. REFERENCE NOTES .............................................................................................. 32

VIII. APPENDIX ........................................................................................................... 33
# LIST OF TABLES

<table>
<thead>
<tr>
<th>TABLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Regression Coefficients for Multiple Regression analyses for law enforcement Officer Deaths in 2000</td>
<td>34</td>
</tr>
<tr>
<td>2. Regression Coefficients for Multiple Regression analyses for law enforcement Officer Deaths in 2001</td>
<td>35</td>
</tr>
<tr>
<td>3. Regression Coefficients for Multiple Regression analyses for law enforcement Officer Deaths in 2002</td>
<td>36</td>
</tr>
<tr>
<td>4. Regression Coefficients for Multiple Regression analyses for law enforcement Officer Deaths in 2003</td>
<td>37</td>
</tr>
<tr>
<td>5. Regression Coefficients for Multiple Regression analyses for law enforcement Officer Deaths in 2004</td>
<td>38</td>
</tr>
<tr>
<td>6. Regression Coefficients for Multiple Regression analyses for law enforcement Officer Deaths in 2005</td>
<td>39</td>
</tr>
<tr>
<td>7. Regression Coefficients for Multiple Regression analyses for law enforcement Officer Deaths in 2006</td>
<td>40</td>
</tr>
<tr>
<td>8. Regression Coefficients for Multiple Regression analyses for law enforcement Officer Deaths in 2007</td>
<td>41</td>
</tr>
<tr>
<td>9. Regression Coefficients for Multiple Regression analyses for law enforcement Officer Deaths in 2008</td>
<td>42</td>
</tr>
<tr>
<td>10. Regression Coefficients for total executions in year (t-1) and law enforcement officer deaths in 2000</td>
<td>43</td>
</tr>
<tr>
<td>11. Regression Coefficients for total executions in year (t-1) and law enforcement officer deaths in 2001</td>
<td>44</td>
</tr>
<tr>
<td>12. Regression Coefficients for total executions in year (t-1) and law enforcement officer deaths in 2002</td>
<td>45</td>
</tr>
<tr>
<td>13. Regression Coefficients for total executions in year (t-1) and law enforcement officer deaths in 2003</td>
<td>46</td>
</tr>
</tbody>
</table>
14. Regression Coefficients for total executions in year (t-1) and law enforcement officer deaths in 2004.................................................................47

15. Regression Coefficients for total executions in year (t-1) and law enforcement officer deaths in 2005.................................................................48

16. Regression Coefficients for total executions in year (t-1) and law enforcement officer deaths in 2006.................................................................49

17. Regression Coefficients for total executions in year (t-1) and law enforcement officer deaths in 2007.................................................................50

18. Regression Coefficients for total executions in year (t-1) and law enforcement officer deaths in 2008.................................................................51
ABSTRACT

Capital Punishment and Specific Offense Deterrence

by

Brian Giardina

University of New Hampshire, December, 2010

Deterrence has historically been a justification for capital punishment. Recent studies have found deterrent effects as strong as eighteen murders prevented per execution (Dezhbakhsh, Rubin and Shepherd, 2003). Most prior studies have tested for deterrent effects on homicide rates generally. The current study looks for a deterrent effect on a specific type of capital crime; the felonious killing of law enforcement officers. Two separate hypotheses were tested. First, the presence of a capital punishment statute will deter this specific type of homicide in a given year. Second, executions for any reason will reduce the likelihood of this specific type of homicide in the subsequent year. Results indicate no causal connection between rates of law enforcement officers being killed and the presence of a capital punishment statute. Further research at state and local levels is needed to test for more instances of potentially deterrable capital crimes.
INTRODUCTION

In 2009 the New Hampshire General Court passed House Bill 520 creating a commission to review the implementation, legality, and future of capital punishment. The bill charges a 22-member commission with the task of determining whether capital punishment serves the interests of the State of New Hampshire as well as victims and citizens. Differing expert opinions and justifications have been brought before the commission to explain the use of capital punishment. This commission, like similar bodies in other states, is faced with a difficult task. Gaps in the literature and differing moral perspectives frequently complicate the debate over capital punishment.

Previous capital punishment research has been focused on deterrence theory. The central tenets of deterrence theory were outlined by Cesare Beccaria in *Of Crimes and Punishments* (1764). According to Beccaria a punishment must meet four requirements in order to serve as a deterrent: celerity or quickness, certainty of punishment, severity or proportionality and exposure to general public. Deterrence theory lost favor among criminologists in the earlier part of the 20th century, but it was revived by those who sought to apply economic principles to crime (Becker, 1968). Raising the costs associated with committing crime lowers the expected gain and, according to the theory, makes committing crime less profitable or advantageous. Isaac Ehrlich applied economic principles to this issue in a groundbreaking study (1975). He found that for every execution, eight innocent lives are saved (Ehrlich, 1975). The methodology used in that study has been criticized by criminologists and recalculated in the following 25 years, (Walker, 2001; Bowers and Pierce, 1975). The data was found to be inaccurate, sensitive
to tweaking by removing certain years and generally inconclusive (Bowers and Pierce, 1975). This has not stopped the reapplication of econometric principals of analysis to capital punishment and deterrence.

Currently deterrence theory exists in two forms, both general and specific. General deterrence is when punishments are aimed at deterring the entire public, including those who did not commit a crime. This particular type of deterrent effect is measured by testing crime rates and, in the case of the death penalty, homicide rates. Research on capital punishment and general deterrence is divided. Some studies show that homicides can be prevented by using capital punishment (Shepherd, 2005; Rubin 2002). Other studies have used similar methods and data and found no significant deterrent effect (Kovandzic, Vieraitis and Boots, 2009). Specific deterrence is when a deterrent effect is measured only for the individual who committed the crime. This can be measured by reoffending and recidivism rates. Due to the "final" nature of capital punishment, specific deterrence is not researched in capital punishment literature. However, both types of deterrence theory can be combined to look for a deterrent effect on capital crimes. This has been done in the past, (Peterson & Bailey, 1994 and Fagan, Zimring and Geller, 2006), but no deterrent effect was found.

The deterrence question has sometimes been framed as, "Does capital punishment deter as well or better than life without parole?" (Bedau, 2004) This question, one of marginal deterrence, has been the subject of prior research (Fagan et al., 2006). However, the question asked here is different, i.e., does the presence, or use, of capital punishment grant law enforcement officers extra protection they would otherwise not have? The
extra protection would be the deterrent effect, reducing the number of felonious law enforcement deaths and making it safer to be a police officer.
CHAPTER I

RECENT HISTORY OF CAPITAL PUNISHMENT IN
THE UNITED STATES

Capital punishment had been practiced in Europe and most cultures around the
globe for centuries before exploration of the new world. Early European settlers brought
capital punishment customs with them to this continent. The first execution by the
settlers took place in 1608 when a Virginia man was put to death for being a Spanish spy
(Encyclopedia of Criminology, 2005). All of the original colonies had capital punishment
statutes, some which outlined as many as 12 death-eligible crimes. Executions were
public affairs, meant to deter and dissuade potential offenders. In this time executions
were mandatory if a person was found guilty of a death-eligible crime. Men, women and
young adult offenders were subject equally to these harsh laws. Capital punishment has
existed for most of human history and is experiencing an increase in types of reform
during the past half century. Judicial and legislative actions are at the forefront of
controlling capital punishment.

Reform, over time, has changed capital punishment from public hanging to its
procedurally dominated current incarnation. States moved executions out of the public
eye in order to prevent the riots that typically followed, forgoing any deterrent effect in
favor of public safety. In 1838 Tennessee was the first state to pass a statute that allowed
for discretion in seeking capital punishment. Previously all states had mandatory death penalty statutes for anyone convicted of a capital crime. All similar mandatory statutes were not removed from state law until 1963.

The pivotal moment for capital punishment in America was the 1972 case *Furman v. Georgia*. The *Furman* Court decided that the arbitrary nature of capital punishment, which had partly been introduced earlier in the century with the removal of mandatory death sentences, had made the punishment unconstitutional. While the *Furman* Court did not rule that capital punishment was categorically unconstitutional, this decision did overturn all current state statutes. Many states quickly passed new capital punishment laws to correspond with the courts decision. To conform to the ruling states introduced reforms including a bifurcated trial process involving a guilt phase and sentencing phase and the inclusion of enumerated mitigating and aggravating factors to guide the sentencing process. The new laws were tested in court and a ruling in *Gregg v. Georgia* approved “guided discretion” statutes ([Encyclopedia of Criminology, 2005](#)). The court imposed moratorium lasted 5 years, and the execution of Gary Gilmore in 1977 began the modern period of capital punishment in the United States ([Encyclopedia of Criminology, 2005](#)).

Recently the Supreme Court has gotten involved again with the shape and direction of capital punishment in the United States. Three cases all decided between 2002 and 2008 have affected profoundly the way Americans perceive and use capital punishment.

*Atkins v. Virginia*, decided in 2002, was a landmark case because the US Supreme Court decided that those who are found to have some mental disease or defect are not
punishable by death. Previous to this decision Supreme Court jurisprudence had allowed for the execution of the mentally handicapped. Writing for the majority in the 1989 case Penry v. Lynaugh Justice O'Connor wrote:

"[There is not] sufficient objective evidence today of a national consensus against executing mentally retarded capital murderers, since petitioner has cited only one state statute that explicitly bans that practice and has offered no evidence of the general behavior of juries in this regard."

Both public opinion and the Court shifted away from that point of view. The majority believed that procedures testing competency to stand trial and the insanity defense would protect the severely mentally retarded. On these beliefs the Penry Court concluded that the Eighth Amendment did not categorically exclude capital punishment of the mentally handicapped. The fact that the Atkins Court reversed that conclusion only 13 years later is evidence that the moral standards, at least as they bear on the legal standards surrounding capital punishment, are constantly under review.

In 2005 the Court in Roper v. Simmons altered capital punishment by preventing an offender from facing the death penalty if the crime was committed before the offender was 18. 16 years earlier the Court determined that the Constitution did not prohibit the execution of offenders who were younger than 18 at the time they committed capital murder. The Roper Court reasoned that a national consensus had developed against the practice since its ruling in Stanford v. Kentucky.

In 2008 the Supreme Court further limited the applicability of capital punishment to offenses resulting in a homicide or crimes against the state. Kennedy v. Louisiana pronounced a Louisiana law allowing for capital punishment of child rapists who did not kill their victims unconstitutional. The decision had a sweeping impact on all similar
statutes throughout the country. Now, in the majority of cases, the only person who can have his/her life taken is one who has taken a life.

Capital punishment as an American enterprise has evolved significantly through both the judiciary and the legislature. Support for capital punishment remains strong in certain states and within certain populations\textsuperscript{iii}. However, the justifications and usage patterns of the practice have evolved significantly over time. Political decisions, including judicial review and legislative action, will continue to dictate the use and evolution of capital punishment. As rates of law enforcement deaths trend upwards\textsuperscript{iv}, a way to protect law enforcement officers is necessary. If capital punishment is found to protect law enforcement it would strengthen its value to both the public and to lawmakers.
CHAPTER II

EXISTING CAPITAL PUNISHMENT RESEARCH

Prior capital punishment research on deterrence can be split into two separate types; deterrence of homicide generally and deterrence of specific types of homicides. Findings are split between a null effect and deterrent effect. Past studies have looked at both national and state levels for evidence of deterrence. Along with competing strategies for analysis there are competing view points. Capital punishment and deterrence are debated by criminologists and economists, each focusing on separate indicators and reaching different conclusions.

A study by Shepherd (2005), an economist, used aggregated data to compare state-to-state homicide rates with individual state execution rates. This study tested whether each state experienced its own deterrent effect relative to the number of executions it performs. Shepherd concluded that national averages that measure deterrence are raised by a few states with high execution rates and high ratings of deterrence. Only six of the eligible states experienced a deterrent effect, but 13 experienced a "brutalization" effect. Brutalization is when statistical tests indicate that capital punishment has increased the murder rate when compared to jurisdictions without capital punishment. States with capital punishment statutes do experience a significant deterrent effect but only after they have reached the threshold number of executions to
cause deterrence (Shepherd 2005, p. 240). States can also experience a deterrent effect by returning capital sentences without performing an execution. Most states experienced neither a deterring nor brutalizing effect. These results suggest that the presence of capital punishment can be a deterrent even if it was never used. Shepherd also concludes that executions can deter all types of murder, including crimes of passion. The addition of the threshold as a consideration for deterrence improved upon past research. By looking at each state separately Shepherd was able to separate the states that experience deterrent effects from states that experience brutalization or null effects. However, this study was aimed at the deterrent effects of capital punishment on all homicides and not on a particular subset.

Econometric analyses have also been performed recently that use state data to find an opposite effect from Shepherd (Kovandzic, Vieraitis and Boots, 2009). Taking recent criticisms of Ehrlrich’s 1975 study into account, Kovandzic et al. tested deterrence theory from 1977 to 2006. This study used more recent and reliable data, estimated further past the year 2000 and used more efficient methods for estimating standard error. The authors tested for several possible deterrent effects including: the presence of a death penalty statute, returning a sentence of capital murder, execution of an offender and frequency of executions. The authors hypothesized that any one of these factors, or a combination of them, would produce a deterrent effect. Any or all of the perceived factors would supposedly enter the mind of an offender and be used in a crime calculation.

Kovandzic et al. also included an extensive list of possible controlling factors. These factors were sociopolitical in nature, covering everything from the crack/cocaine epidemic to the number of youths in a state, the passage of
concealed carry handgun laws and the gallons of beer consumed in any given state. The authors believed that these factors could control for differences between DP and non-DP states. While some of the variables were eliminated after further analyses, it is possible that collinearity existed between controlling variables. Having too many controlling variables, or having them be collinear, could have affected the results of this study. It could be one of the reasons why this study did not find the same deterrent effects as earlier, similar studies.

Kovandzic et al. also focused on the criminal calculus, i.e., the concept that offenders consider the costs and benefits of an anticipated criminal action. They determined that, for any deterrent effect to exist, the perceived risk factors of execution would have to be sufficiently high. A reason for this focus could be the economic nature of the researchers and the analysis. This study cites research to show that, when offenders perform the criminal calculus, they very infrequently consider long term results. When they do they are more focused on the potential gains rather than the punishments (Kovandzic et al., 2009 p. 834). Social science has shown that offenders engaged in the criminal calculus are prone to discount risk and inflate the value of their actions based on skills or knowledge they have. The ineffectiveness of factors relating to capital punishment to enter the criminal calculus, and thus the criminal mind, before committing an offense, has the authors conclude that any deterrent effect would be very small if at all and that any national deterrent effect is biased by a few states. However, the research that is cited here does not mention capital murder. All of the criminal anecdotes discussed are from lower-level offenders (Kovandzic et al., 2009 p. 834). The Criminal calculus will be different depending on the risk assumed. An identity thief does
not assume the same risk as someone who kills a police officer, therefore the potential to
gain is different. The nature of the criminal calculus is complex and most likely different
for every individual. Trying to characterize all criminals as thinking one way or another
is impossible.

One drawback to this study is that states that passed capital punishment legislation
before the year 1977 were excluded from parts of the analysis. This affected the test for
deterrence using the existence of a statute as the major indicator. Studies in the past have
found that the presence of the death penalty can be a deterrent even without its use
(Shepherd, 2005). This methodological shortcoming limited the ability to test this
hypothesis fully. The majority of states with capital punishment statutes passed current
laws before 1977. This would cause them to be excluded from this test. Those states
were considered in later analyses in this study, but this problem makes one of the major,
possibly-deterring factors invalid. The presence of capital punishment within a state is
important because it may contribute to deterrence not of homicide generally, but of some
homicides in particular. It is possible that some civilians do not know whether or not
their state practices the death penalty, but most offenders would be aware if the state they
reside in uses of capital punishment. For this reason the presence of the statute could be a
deterring factor and this test should be redone to account for the missing states.

Econometric studies rely on complex statistical methods to generate results.
Kovandzic et al., (2009) criticize earlier studies methodologies for their failure to correct
for serial autocorrelation and heteroscedasticity. These statistical problems may have
caused some of the earlier studies to underestimate their standard errors. Underestimated
standard errors will cause factors that would normally be statistically insignificant to
appear significant. However, not all econometric studies on deterrence use the same correction method as Kovandzic et al. Paul Zimmerman (2009) describes some of the faults of the cluster correction method for autocorrelation. It can cause intervening measures that would have some effect to appear as though they had no effect. According to Zimmerman, there are other methods to correct for serial autocorrelation and heteroscedastic data. No one method is accepted for resolving this problem. Possibly that the method used by Kovandzic et al. underestimated the significance of potential deterring factors by using cluster sampling correction methods. Due to differences in statistical estimation methods econometric analyses of capital punishment at the national level are inconclusive.

One criticism of capital punishment research is that it relies on aggregated national or state level data. This type of data is not ideal for tracking small variations in homicide rates. Small variations caused by a deterrent effect could be more likely in a state like New Hampshire with both a low homicide and low execution rate. Studies have been conducted with disaggregated data looking for a localized deterrent effect (Hjalmarsson, 2009). Hjamlmarsson (2009) used disaggregated data to compare homicide rates immediately following sentencing and executions in three Texas cities. When executions are carried out there are 23.6% fewer capital murders in the three days following an execution (Hjalmarsson, 2009). Despite this study that found no significant long-term effect when considering all types of homicides, the results may not reflect New Hampshire or other states. Many social and demographic variables about the cities in this study do not correspond to conditions in many states. These variables could affect both the homicide rate and the propensity to be deterred. The regional and cultural differences
could also affect unseen variables that govern these relationships, like average education or kinship felt between towns. The three cities considered by Hjamlmarsson (2009) all have populations significantly higher than the state of New Hampshire as well as different racial and socioeconomic breakdowns from most US states (US Census.gov).

The method of using disaggregated data and tracking media exposure will have different results in distinct demographic and geographic situations and could produce results favorable to deterrence theory. Hjamlmarsson’s work suggests that the deterrent effect of the death penalty can be measured with both aggregate and disaggregated data. The same research could be modified to look over longer periods of time and at specific types of homicides. Further research is needed with disaggregated data in other locations to find a deterrent effect.

Economists are conducting the most recent empirical research. Econometric analyses have dominated the public policy debate on the effectiveness of capital punishment. As seen above, the results of econometric analyses, while complex and very specific, are subject to judgments involving methodology. Due to differences in methodology, economists are divided on the efficacy of capital punishment. However, criminology as a field, is not. The American Society of Criminology only has two positions it endorses as matters of policy. Adopted in 1989 the official policy of the ASC regarding capital punishment reads:

Be it resolved that because social science research has demonstrated the death penalty to be racist in application and social science research has found no consistent evidence of crime deterrence through execution, The American Society of Criminology publicly condemns this form of punishment, and urges its members to use their professional skills in legislatures and courts to seek a speedy abolition of this form of punishment.

13
Radelet & Lacock (2009) conducted a survey of leading criminologists' current views on capital punishment. Findings show that a large majority of criminologists do not believe that capital punishment adds any significant deterrent effect not already produced by life without the possibility of parole. Only 9.2% of the criminologists surveyed believed “the death penalty significantly reduces the number of homicides” to be a true statement (Radelet & Lacock, 2009). Results also indicate that criminologists in 2008 are less supportive of capital punishment than ever before. Comparing responses from this study to a similar study from 1996, opposition to capital punishment and disbelief in deterrence either increased or stayed the same in all questions. When asked if executing people deters others from committing murder only 2.6% of the criminologists who responded agreed compared to 89.6% disagreeing (Radelet & Lacock, 2009).

In critiques of econometric or deterrence-based capital punishment research, criminologists have adopted the idea that possible deterrence of specific types of homicides (Fagan, Zimring and Geller, 2006) A question in general deterrence research has been the percentage of homicides that are either “death-eligible”, or, able to be deterred. No variation in the percentage of death eligible killings was found even as execution rates increased. Death eligible killings amount to 25% of total criminal homicides (Fagan et al., 2006). The largest portion of these is felony murder, where a homicide occurs in the commission of another felony. This conclusion is questionable because not all states have such a comprehensive felony murder statute. According to the study, 43.7 % of capital punishment eligible homicides occur during the commission of a robbery (Fagan et al., 2006). However, of the homicides considered in this study, only 1.1% were related to the felonious killings of law enforcement officers. This study,
conducted in Texas, used the Texas statutory framework for capital punishment. Texas is of special interest to capital punishment and deterrence research for several reasons. According to Fagan et al. (2006) Texas accounts for more than one-third of executions since the Supreme Court reversed itself in 1976. The capital punishment statute in Texas does not reflect capital punishment statutes in other parts of the country. Felony murder, the crime most likely to be charged with to create a capital case, is not a death eligible crime in some states, including New Hampshire. Texas performs more executions than any other state. Some criminologists have claimed that, by excluding Texas, the deterrent effects found in econometric studies are removed\textsuperscript{ix}.

Criminological research on the likelihood that capital punishment protects law enforcement officers through deterrence has been conducted (Sellin, 1959; Bailey 1982; Bailey & Peterson, 1994). Sellin (1959) found that, the average police homicide rates between cities with and without capital punishment were nearly identical. This study with conducted by comparative methods and did not use multivariate regression. Sellin (1959) calculated rates of police killing by general population while later studies, (Bailey,1982; Bailey & Peterson, 1987, Bailey & Peterson,1994) used an average calculated by deaths per 1000 police officers.

Multivariate regression analyses were performed by Bailey (1982) and Bailey and Peterson (1987). These studies analyzed data for years 1961 to 971 and 1973 to 1984 respectfuiy. Multivariate regression was used to determine and eliminate the influence of controlling variables. No evidence of deterrence was found in either study.

Bailey & Peterson (1994) improved on prior research by measuring media exposure of executions while comparing police killing rates to execution rates. The
inclusion of measures to calculate certainty and quickness and quickness of an execution along with media exposure tests more of the components of deterrence theory. This study tested the components of deterrence theory on the specific question of capital punishment and its ability to potentially protect law enforcement officers. Several of the controlling variables used in this study are adapted for use in the current study. Results did not show any indication of deterrence.

Past studies looked for deterrence within the law enforcement community (Sellin, 1959; Bailey, 1982, Bailey & Peterson, 1982 Bailey & Peterson, 1994) or on deterrence in general (Shepherd, 2005; Kovandzic et al., 2009). Both econometric and criminological approaches have been used. Criminology and economics are both testing the deterrence hypothesis in different ways. Previous studies had one or more of several issues; multiple regression analysis was not used, the question was not of specific deterrence, not being focused on an offence punishable by death in all 50 states, or a statistical issue(s) that caused results to be questioned.
Chapter III

EXPLANATION OF CURRENT STUDY

Data and Measures

The dependent variable in both sets of models is the felonious killing of police officers. Data were gathered from the years 2000 to 2008 from the FBI's Uniform Crime Report. It is hypothesized that the relationship between law enforcement deaths will be dependent, net of controlling factors, on the presence of a capital punishment statute. To show deterrence the relationship would appear negative; with the presence of a capital punishment statute resulting in lower law enforcement deaths. It is also hypothesized that executions in a previous year will reduce the number of officers killed in the following year. Felonious law enforcement deaths were selected as a more specific measure of deterrence because all US jurisdictions with capital punishment have a provision for law enforcement death. Recent research on deterrence of specific offense types was focused on crimes that were not universally punishable by death (Fagan et al., 2006). The Current study aims to produce results which are applicable to all capital punishment jurisdictions.

For the first test the independent variable is the presence of a capital punishment statute. It is meant to test the hypothesis that the presence of a statute would offer extra protection to law enforcement officers. In the second test the independent variable is total executions in a state from the previous year. It is hypothesized that an execution of
any kind in a given year will have impact on law enforcement deaths in the following year.

Additional measures were included to explain variation between the states. These variables make it possible to compare states with drastically different crime rates and law enforcement needs. Five controlling variables were included: urbanization, homicide rate, percent non-white, average high-school graduation and population. Controlling variables were added in different models to test their explanatory power on the dependent variable.

Data for this study were gathered from multiple sources. All crime data, homicide rates and law enforcement homicides by year, were gathered from the FBI’s Uniform Crime Report. The Uniform Crime report is a compilation of officially reported crimes in the United States. Though the accuracy of official report data has been called into question in the past (see Elliott & Ageton, 1980; add other citations and also should describe some examples of why and how official data might be said to sometimes be inaccurate), the reliability of the homicide data is believed to be higher in comparison with other official report data (add citations for this). Crimes go unreported or unnoticed, but homicide rates are believed to be more accurate crime predictors.

Demographic data, including state population and state racial breakdowns, were gathered from the United States Census website. Data on average high-school graduation rates were also gathered from the US Census Bureau.

Data on total executions and executions by year was gathered from the Death Penalty Information Centerx. The sample size for this study was 50. Washington D.C. and all non-state territories were excluded from this analysisxi. Mediating and controlling
variables for each state were calculated and included in order for models to more accurately represent reality. By measuring and mediating the differences in the control variables the results will reflect the differences related to law enforcement deaths and the presence of capital punishment.

As a measure for urbanization a list was compiled of the 100 largest cities in the United States. Each state was ranked based on how many of the cities were within that state. States ranged from having 0 of the 100 most populous cities; 17 had zero, including New Hampshire. California had the most with 15 of the largest 100. These data was gathered from a website which compiles data on US cities\textsuperscript{xi}.

A variable was included to control for racial distribution among states. Earlier studies on this topic (Bailey & Peterson, 1994; Bailey, 1982) included measures for racial diversity. These studies used percent African-American which has been adapted to percent non-white to be a better measure of racial diversity. Data were based on the 2000 US Census data. A measure was included to control for average educational attainment. The percentage of high-school graduates within a state was attained by using census data. In this study it is hypothesized that educational attainment will equalize some differences between states and regions of the country.

**Method**

Multiple non-linear regression analyses were performed in Small STATA 10. Several estimation methods were used to find the best fit for the data and to ensure the validity of the results. OLS regression was not chosen due to the use of “count” data; non-negative sequential integers. Poisson is the modeling method preferred for count
data but was rejected for the first hypothesis due to a violation of a core assumption.

Poisson regression and negative binomial regression were used at different points during the analyses. Poisson regression requires that the mean and the variance are equal to be consistent (Hilbe, 2007). Poisson regression is often avoided due to a problem known as over-dispersion. Over-dispersion will deflate the standard errors. This causes significance to appear falsely for some controlling variables. This is similar to a Type-I error, finding a significant relationship when one does not really exist. More than half of the years analyzed in the first test were found to be over-dispersed. For this reason negative binomial regression is the method on which the first hypothesis is modeled. The second hypothesis was not over dispersed and is modeled using poisson regression.

**The first hypothesis;** the presence of a capital punishment statute will reduce the number of law enforcement homicides. To determine significance several independent and controlling variables were used. The dependent variable was set as the number of police officers feloniously killed in the line of duty with the existence of a capital punishment statute over a nine-year period as the independent variable. Control variables include: homicide rate, percent non-white of state population, urbanization and average high-school graduation. Homicide rate, percent non-white and urbanization were adapted from Bailey & Peterson (1994) with average high-school graduation added for exploratory purposes. Five models were run with each year with the fifth model including all controlling variables being the most accurate. Controlling variables were checked for covariance and no significant correlation was found.

**The second hypothesis;** the presence of an execution, for any offense, in a preceding year will reduce the number of law enforcement officers feloniously killed in
the line of duty in the following year. Poisson models were used to test the dependent variable the number of officers feloniously killed. The independent variable was total executions in the previous year. Controlling variable in this model included state population and homicide rate.

The homicide rate for each year analyzed is included to determine whether changes in the number of law enforcement homicides are a function of changing homicide rates within individual states. States that have higher murder rates are going to have a higher need for policing. A measure of crime is created using homicide rate and population. This measure is similar to the studies conducted by Sellin (1959). Population is used as a predictor of law enforcement assuming larger populations require more law enforcement officers. Peterson and Bailey (1994) used the number of police officers rather than overall population in their analyses on deterrence. However, controlling variables for racial differences and urban differences from that study were adapted to this one. By combining measures from both Sellin (1959) and Peterson and Bailey (1994) a new group of measures is created.
CHAPTER IV

RESULTS

Preliminary results

Poisson regression was used to test the first hypothesis. Two out of nine years had significant results in the predicted direction. However, three out of the nine years were significant in the opposite direction. This modeling method was eventually rejected due to over-dispersion and the negative binomial regression method was selected. Over-dispersion was evident based on the mean and variance values displayed during testing. Values are assumed to be identical for Poisson but were more than three times apart in the over-dispersed years.

First Hypothesis

A negative relationship between the presence of a capital punishment statute and the total number of law enforcement killings per year would indicate deterrence. None of the years considered produced results to indicate that the presence of a capital punishment statute would reduce the number of officers killed. Several years produced coefficients with the sign that would be consistent with the hypothesis but they were not found to be statistically significant.
The homicide rate was significant in six out of nine years. The relationship was positive with higher general homicide rates being accompanied by higher rates of law-enforcement deaths. This relationship was predicted due to similar results appearing in an earlier study (Bailey & Peterson, 1994).

In six out of the nine years analyzed urbanization was a significant predictor. States that were higher on the urbanization scale used were statistically more likely to have higher rates of law enforcement homicide. Percent non-white was not significant in any of the models. Average high-school graduation was significant in two years, but in a different direction for each year.

In five out of the nine years results suggested the opposite of deterrence, with the presence of a capital punishment statute resulting in the likelihood of more law enforcement deaths. Due to limitations in these analyses no causal direction can be determined. In four of those years the significant positive relationship was eliminated with the inclusion of controlling variables. However, one of the nine years had a significant relationship in the positive direction that was not mitigated by the inclusion of controlling variables.

Overall puesdo-R² values varied from .08 to .23 for these tests. This could mean that some of the models derived were not accurately tracking the differences between the independent and dependent variables.

**Second Hypothesis**

In testing whether an execution during a given year reduces the likelihood of law enforcement deaths in the following year the Poisson model was reinstituted. These data did not suffer from over-dispersion like the first hypothesis. In three out of the nine years
tested the executions were significant, but not in the predicted direction. Results indicate that an execution will not reduce the amount of law enforcement deaths in the following year and that states that have had an execution are statistically more likely to have law enforcement officers killed than states that do not. Population was a significant predictor in all models. States with higher populations were statistically more likely to have law enforcement officers killed.

Homicide rate was significant in all but one of the years. The finding that higher general homicide rate results in more officers being killed is not surprising. It also supports results from the first hypothesis. Even when a control for population was introduced, higher homicide rates were the best predictors of law enforcement officers being killed. R² values ranged from .08 to .32.
CHAPTER V

DISCUSSION AND FURTHER RESEARCH

No evidence for deterrence was found from either test and the results require the rejection of both hypotheses. Based on these results capital punishment does not offer additional protection to law enforcement officers from lethal assault. However, the analyses performed here are methodologically limited. Improvements on the methodology could strengthen the conclusions and drive future research.

These results are questionable due to low pseudo-$R^2$ values. In some years the values indicate that the controlling variables had little to no impact on law enforcement homicides. It is possible that the pseudo-$R^2$ values for non-linear regression are lower than for OLS regression. It is also possible that some intervening or mediating variables that affect law enforcement deaths were left out of these analyses. These analyses only covered a nine-year period between 2000 and 2008. A longer time series could more accurate model what is going on. The control variables in the current study could be improved for future research. This could be done with both the inclusion of new variables and the refinement of existing variables. Factors might include, unemployment, percent of population within 18-25, and average income could control for differences between states and regions to give a clearer picture of capital punishment. The variable for
urbanization in this study, while an effective predictor, could be improved.
Counting the number of cities with a population of 100,000 or cities with over a
 certain amount of police officers has the potential to be a better measure of
urbanization for these tests.

Washington D.C. and all Federal capital offenses were excluded from
these analyses. Initially, Washington D.C. was included but all significant
relationships were erased with the inclusion of the additional factor. Washington
D.C. is unique in that it has a high population with a high crime rate but does not
have capital punishment. Future research could explore the potential impact of
Washington D.C. in studies that claimed to find a national deterrent effect.
A future study on specific offense deterrence and law enforcement could better
incorporate all of the attributes of deterrence, similar to Peterson & Bailey (1994)
or Hjalmarsson (2009). Deterrence is founded on: celerity, severity, certainty and
public exposure. These studies included measures of media exposure of
executions. It is possible that executions that are more public will have greater
deterrent effect than executions done in private. Throughout history executions
were performed in public to increase the deterrent effect. This practice was
stopped because of the immediate danger to public safety that was caused.

However, in the modern world of television, newspaper and internet news
an execution could be very public without as much immediate danger to public
safety. Separating what is “public” and what is “public knowledge” becomes
important. In the past, with limited mass communication and media, executions
were done in public places for maximum effectiveness. Their public location was
at the same time their publicity. In the modern era publicity and public locale are not as congruent. Executions could be very public without gathering a large group into a potential dangerous situation. Increasing the amount of media coverage or allowing for spectators remotely are ways that the publicity of executions could be raised. These changes would affect the amount of deterrence any individual execution carries. A future study could test executions for differences in media exposure and determine how much deterrence is affected by these differences.

The role of deterrence research in legislative or judicial action is unclear. States are reviewing the implementation of capital punishment and deterrence is a possible justification. Research showing capital punishment improves police safety, or public safety, would be a powerful tool in this debate. The US Supreme Court is clear in its support for capital punishment. The Court has recently been more willing to quantify and restrict certain specific attributes of capital punishment. The evolving moral standards require that capital punishment is monitored and that its application is not detrimental to society. The Court has shown its willingness to restrict the practice of capital punishment to conform to moral standards. Research that demonstrates where, when and how capital punishment could be more effective, or effective at all, would be influential to this policy making process. The more the issue of capital punishment becomes debated by legislatures the more important the position of the Supreme Court.

The question on deterrence is frequently reduced to one of marginal deterrence; does it deter better than life without the possibility of parole? Studies
on the possibility of deterring certain groups of people, certain localities (Hjalmarsson, 2009) or certain crimes (Bailey and Peterson, 1994; Fagan, 2006) fail to answer that question. Future research on deterrence should be as specific as possible within these groups in search of a deterrent effect.
List Of References


from http://www.asc41.com/policies/policyPositions.html


**Supreme Court Cases**


Reference Notes

1 The actual moratorium on executions was from 1976 to 1977. However, this was not required by the Supreme Court. States limited their use of capital punishment due to the highlighted problems in the Furman and Gregg cases.

2 Crimes against the state that do not necessarily have homicides associated with them are treason and espionage.

3 A Gallup Poll conducted in October, 2009 found that 65% of those polled were in favor of capital punishment for someone convicted of murder and that 31% were against.


7 Multicollinearity is a problem in regression modeling because it can compromise the reliability of predictors in a given model. When two predictor variables are highly correlated, so that they may be predicting almost the same thing, including both in the analyses can compromise the validity of the results on those predictors. This affects Kovandzic et al. (2009) because of the number of included predictors increases the chances for multicollinearity.


7 Auto Correlation is a measure of the connected relationship between values during a time series set of data. When many variables over time have the same value it can be said to be auto-correlated.

8 Heteroscedasticity is when random variables have different variances. This can violate an assumption required for some statistical tests. The result can be biased standard errors which make variables appear significant when they are not (Hilbe, 2007).

9 A study by Mocan & Gittings (2003) found that executions deter around five homicides and that commutation of executions increase the homicide total by the same amount. A critique of this study by Richard Berk found that excluding Texas caused any deterrent effect to disappear. Mocan & Gittings are economists and Berk is a criminologist. The debate on this topic is split between the two disciplines.

8 The Death penalty Information Center is the foremost abolitionist organization in the United States. They work towards abolishing capital punishment in every state. However, they also compile lots of accurate data and that was extremely helpful in the creation of a dataset for this paper.

xi The same analyses were preformed with Washington D.C. included. Washington D.C. was an anomaly that caused other relationships to be obscured. For this reason the study was focused on just the 50 states.

xii www.City-Data.com has been recognized by CNN and gets their information from public records. It is owned and operated by Advameg.

xiii Pseudo $R^2$ values are indicators of goodness-of-fit. Values range between zero and one. The value indicated the degree of linear connection between the predictor variable(s) and law enforcement deaths.
Appendix
Regression Coefficients for Multiple Regression Analysis for Law Enforcement Officer Deaths in 2000

<table>
<thead>
<tr>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.170.17</td>
<td>0.17</td>
<td>0.14</td>
<td>0.2</td>
<td>0.0</td>
</tr>
<tr>
<td>0.02</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>-0.003(06)</td>
<td>-0.011(02)</td>
<td>-0.01(03)</td>
<td>-0.011(02)</td>
<td>-0.01(03)</td>
</tr>
<tr>
<td>-0.14(05)</td>
<td>-0.13(05)</td>
<td>-0.13(05)</td>
<td>-0.14(05)</td>
<td>-0.14(05)</td>
</tr>
<tr>
<td>0.03(56)</td>
<td>0.03(57)</td>
<td>0.08(64)</td>
<td>0.08(64)</td>
<td>0.08(64)</td>
</tr>
</tbody>
</table>

Note: *p* > 0.10, **p* > 0.05, ***p* > 0.01
<table>
<thead>
<tr>
<th>Percent with High School Diploma</th>
<th>Non-White</th>
<th>Urbanization</th>
<th>Homicide Rate 2001</th>
<th>Presence of the Death Penalty</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.11</td>
<td>0.1</td>
<td>0.1</td>
<td>0.04</td>
<td>0.02</td>
</tr>
<tr>
<td>60</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>60</td>
</tr>
<tr>
<td>0.02</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>0.04</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>0.02</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1.42</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1.43</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1.37</td>
<td>0.06</td>
<td>0.07</td>
<td>0.04</td>
<td>0.43</td>
</tr>
<tr>
<td>0.44</td>
<td>0.02</td>
<td>0.04</td>
<td>0.4</td>
<td>0.43</td>
</tr>
<tr>
<td>0.44</td>
<td>0.02</td>
<td>0.04</td>
<td>0.4</td>
<td>0.43</td>
</tr>
<tr>
<td>0.36</td>
<td>0.02</td>
<td>0.04</td>
<td>0.4</td>
<td>0.43</td>
</tr>
</tbody>
</table>

Note: *p* < 0.05, **p** < 0.01, ***p** < 0.001
Note: $p > 0.1$, $p > 0.05$, **$p < 0.1$**, ***$p < 0.05$***

<table>
<thead>
<tr>
<th>Model</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>R²</td>
<td>0.01</td>
<td>0.03</td>
<td>0.05</td>
<td>0.06</td>
<td>0.08</td>
</tr>
<tr>
<td>N</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

Percent with High-School Diploma

Percent Non-White

Literacy

Homicide Rate 2002

Presence of the Death Penalty

Regression Coefficients for Multiple Regression Analyses for Law Enforcement Officer Deaths in 2002
<table>
<thead>
<tr>
<th>Model</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>R²</td>
<td>0.04</td>
<td>0.05</td>
<td>0.06</td>
<td>0.07</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>60</td>
<td>60</td>
</tr>
</tbody>
</table>

Note: *p* < 0.05, **p** < 0.01, ***p*** < 0.001

<table>
<thead>
<tr>
<th>Percent with High-School Diploma</th>
<th>1.1 (0.2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent Non-White</td>
<td>0.02 (0.02)</td>
</tr>
<tr>
<td>Urbanization</td>
<td>0.11 (0.09)</td>
</tr>
<tr>
<td>Homicide Rate 2003</td>
<td>33.1 (13)</td>
</tr>
<tr>
<td>Presence of the Death Penalty</td>
<td>45.5 (7)</td>
</tr>
</tbody>
</table>

Table 4: Regression Coefficients for Multiple Regression Analyses for Law Enforcement Officer Deaths in 2003
<table>
<thead>
<tr>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>R²</td>
<td>0.014</td>
<td>0.03</td>
<td>0.005</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Percent with High-School Diploma 12(0.05) 02(0.02) 07(0.07) 02(0.02)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 5**

Regression Coefficients for Multiple Regression analyses for Law Enforcement Officer Deaths in 2004

*Note: p > 0.05, **p > 0.01, ***p > 0.001*
<table>
<thead>
<tr>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.02</td>
<td>0.13</td>
<td>0.16</td>
<td>0.19</td>
<td>0.20</td>
</tr>
<tr>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Percent with High-School Diploma</th>
<th>Percent Non-White</th>
<th>Urbanization</th>
<th>Homicide Rate 2005</th>
<th>Presence of the Death Penalty</th>
</tr>
</thead>
<tbody>
<tr>
<td>~0.08 (~0.4)</td>
<td>~0.02 (~0.1)</td>
<td>~1.01 (~0.3)</td>
<td>~0.8 (~0.1)</td>
<td>~0.8 (~0.1)</td>
</tr>
</tbody>
</table>

**Note:** $p < 0.05$, $p < 0.01$, $p < 0.001$
<table>
<thead>
<tr>
<th>Model</th>
<th>Regression Coefficients for Multiple Regression analyss for Law Enforcement Officer Deaths in 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Note: $p > 0.10$, **$p > 0.05$**, ***$p > 0.01$***
\begin{table}
\centering
\begin{tabular}{ccccccc}
    & 0.23 & 0.22 & 0.22 & 0.06 & 0.01 & \textit{R^2} \\
\hline
N=60 & 60 & 60 & 60 & 60 & 60 & \textit{N=60} \\
\% with high-school diploma & - & - & - & - & - & \textit{Percent with High-School Diploma} \\
\% of non-white & - & - & - & - & - & \textit{Percent Non-White} \\
Urbanization & - & - & - & - & - & \textit{Urbanization} \\
Homicide Rate 2007 & - & - & - & - & - & \textit{Homicide Rate 2007} \\
Model 5 & Model 4 & Model 3 & Model 2 & Model 1 & & \textit{Model Coefficients for Multiple Regression Analyses for Law Enforcement Officer Deaths in 2007} \\
\end{tabular}
\caption{Table 8}
\end{table}
### Table 9: Regression Coefficients for Multiple Regression analyses for Law Enforcement Officer Deaths in 2008

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent with High-School Diploma</td>
<td>0.16 (0.07)</td>
<td>0.16</td>
<td>0.15</td>
<td>0.13</td>
<td>0.12</td>
</tr>
<tr>
<td>Percent Non-White</td>
<td>0.03 (0.03)</td>
<td>0.09 (0.05)</td>
<td>0.09 (0.05)</td>
<td>0.08 (0.08)</td>
<td>0.08 (0.08)</td>
</tr>
<tr>
<td>Urbanization</td>
<td>0.10 (0.14)</td>
<td>0.09 (0.05)</td>
<td>0.09 (0.05)</td>
<td>0.11 (0.09)</td>
<td>0.11 (0.09)</td>
</tr>
<tr>
<td>Presence of the Death Penalty</td>
<td>2.7 (1.05)</td>
<td>2.7 (1.05)</td>
<td>2.7 (1.05)</td>
<td>2.8 (1.05)</td>
<td>2.8 (1.05)</td>
</tr>
<tr>
<td>Homicide Rate 2008</td>
<td>1.09 (0.2)</td>
<td>1.09 (0.2)</td>
<td>1.09 (0.2)</td>
<td>1.09 (0.2)</td>
<td>1.09 (0.2)</td>
</tr>
</tbody>
</table>

Note: p < 0.05, ** p < 0.01, *** p < 0.001
<table>
<thead>
<tr>
<th>Model</th>
<th>1999 Executions in 1999</th>
<th>2000 Homocide Rate 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 3</td>
<td>0.07 (0.1)***</td>
<td>0.04 (0.05)***</td>
</tr>
<tr>
<td>Model 2</td>
<td>0.07 (0.01)***</td>
<td>0.28 (0.05)***</td>
</tr>
<tr>
<td>Model 1</td>
<td>0.25e-08 (1.69e-08)</td>
<td>-</td>
</tr>
</tbody>
</table>

Regression Coefficients for Total Executions in Year (1-1) and Law Enforcement Officer Deaths in 2000

\( \text{Note} \rightarrow p > 0.10, * p > 0.05, ** p > 0.01, *** p > 0.001 \)

\( R^2 \)

\( N=50 \)
<table>
<thead>
<tr>
<th>Model</th>
<th>Executions in 2000</th>
<th>Homicide Rate 2001</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td>0.05 (0.09)***</td>
<td>0.01 (0.07)***</td>
<td>0.01 (0.005)***</td>
</tr>
<tr>
<td>Model 2</td>
<td>0.06 (0.09)***</td>
<td>0.02 (0.05)***</td>
<td>0.01 (0.005)***</td>
</tr>
<tr>
<td>Model 3</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

Regression coefficients for total executions in year (1-1) and law enforcement officer deaths in 2001.
<table>
<thead>
<tr>
<th>Model</th>
<th>Population</th>
<th>Homicide Rate 2002</th>
<th>Executions in 2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>4.62e-08(1.52e-08)</td>
<td>~0.03(0.02)</td>
<td><del>0.05(0.03)</del></td>
</tr>
<tr>
<td>2</td>
<td>~0.03(0.02)</td>
<td><del>0.05(0.03)</del></td>
<td><del>0.05(0.03)</del></td>
</tr>
<tr>
<td>1</td>
<td><del>0.05(0.03)</del></td>
<td><del>0.05(0.03)</del></td>
<td><del>0.05(0.03)</del></td>
</tr>
</tbody>
</table>

Regression Coefficients for total executions in year (t-1) and law enforcement officer deaths in 2002.
<table>
<thead>
<tr>
<th>Model</th>
<th>R²</th>
<th>Population</th>
<th>Homocide Rate 2003</th>
<th>Executions in 2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.87e-08(2.13e-08)</td>
<td>0.11</td>
<td>0.11</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td>0.02(02)</td>
<td>0.46(02)</td>
<td>0.49(02)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Model 3</td>
<td>Model 2</td>
<td>Model 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: *p > 0.05, **p > 0.01, ***p > 0.001

Regression Coefficients for total executions in year (1-1) and law enforcement officer deaths in 2003

Table 13
Regression coefficients for total executions in year (1-1) and law enforcement officer deaths in 2004

<table>
<thead>
<tr>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>0.19</td>
<td>0.19</td>
<td>0.19</td>
</tr>
<tr>
<td>N=60</td>
<td>N=60</td>
<td>N=60</td>
</tr>
<tr>
<td>Population</td>
<td>Population</td>
<td>Population</td>
</tr>
<tr>
<td>Homicide Rate 2004</td>
<td>Homicide Rate 2004</td>
<td>Homicide Rate 2004</td>
</tr>
</tbody>
</table>

Note: *p<0.05, **p<0.01, ***p<0.001
<table>
<thead>
<tr>
<th>Model</th>
<th>N</th>
<th>R²</th>
<th>Population Executions in 2004 Homicide Rate 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td>50</td>
<td>0.03</td>
<td>-</td>
</tr>
<tr>
<td>Model 2</td>
<td>50</td>
<td>0.14</td>
<td>-</td>
</tr>
<tr>
<td>Model 3</td>
<td>50</td>
<td>0.22</td>
<td>.527 ± 0.08, 1.26 ± 0.08</td>
</tr>
</tbody>
</table>

Note: P < .10, * P < .05, ** P < .01, *** P < .001
<table>
<thead>
<tr>
<th>R²</th>
<th>N=50</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.90e-08(1.28e-08)*</td>
<td>-</td>
<td>Homicide Rate 2006</td>
</tr>
<tr>
<td>0.12</td>
<td>-</td>
<td>Executions in 2006</td>
</tr>
<tr>
<td>0.05</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>0.27</td>
<td>60</td>
<td>Model 3</td>
</tr>
<tr>
<td>60</td>
<td>60</td>
<td>Model 2</td>
</tr>
<tr>
<td>60</td>
<td>60</td>
<td>Model 1</td>
</tr>
</tbody>
</table>

Regressions Coefficients for total executions in year (1-1) and law enforcement officer deaths in 2006

Table 16
<table>
<thead>
<tr>
<th></th>
<th>O.35</th>
<th>O.26</th>
<th>O.16</th>
<th>Population</th>
<th>Homicide Rate 2007</th>
<th>Executions in 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 3</td>
<td>N=50</td>
<td>N=50</td>
<td>N=50</td>
<td>6.12e-08(1.35e-08)</td>
<td>2.04</td>
<td>19.04</td>
</tr>
<tr>
<td></td>
<td>6.0</td>
<td>60</td>
<td>60</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Regression Coefficients for total executions in year (1-1) and law enforcement officer deaths in 2007

Table 17
<table>
<thead>
<tr>
<th>Model 3</th>
<th>Model 2</th>
<th>Model 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.15</td>
<td>0.07</td>
<td>0.02</td>
</tr>
<tr>
<td>5.60e-08 (1.43e-08)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1.81 (0.06)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>0.007 (0.02)</td>
<td>0.04 (0.02)</td>
<td>0.4 (0.02)</td>
</tr>
</tbody>
</table>

Regression Coefficients for total executions in year (1-1) and law enforcement officer deaths in 2008

Note: \( p > 0.10 \), \( \ast \ast \ast \) \( p < 0.01 \), \( \ast \ast \ast \ast \) \( p < 0.001 \)

\( R^2 \)

Population

Homicide Rate 2008

Executions in 2007

Table 18