Prison Mortality, Executions, and Crime Rates

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Abstract

Using panel data at the state level from approximately 1960 to 2000, I tested the relative efficacy of the death penalty and the prison mortality rate as crime deterrents in the United States. To do this, I performed regression analysis with crime rates as the dependent variables and the death penalty and prison mortality rates as the independent variables. In addition, I used state fixed effects and tried to control for other determinants of crime to help isolate these effects. Contrary to the findings of earlier work on this subject, I find that the execution rate persists as a statistically significant deterrent of crime even after controlling for prison mortality rates. In addition, I also found that prison mortality rates had little statistical impact as a crime deterrent. Finally, I found some interesting relationships between the various crime rates and some of my control variables.

1. *Introduction*

In recent years, the usage of the death penalty has become one of the most debated public policy issues. For a variety of reasons such as the increasing efficacy of forensic evidence, surveillance, and growing dissatisfaction with the criminal justice system, a growing number of people have joined in on the argument. On one hand, people have made the argument that the death penalty serves as a deterrent to some of the most severe crimes. In economic terms, using the death penalty serves as an extreme disincentive for committing the crimes that it punishes. With this framework, we would expect a decrease in the incidence of severe crimes if more court sentences involved the death penalty. However, people arguing against the death penalty duly note that at best, it may represent a marginal increase of severity over life sentences. In addition, some people have argued that the impact of the death penalty stems from other factors, such as the relative harshness of prison conditions in a given state. Furthermore, there have been an array of controversies in previous years that resulted from the lack of companies willing to manufacture the drugs used for the punishment. Even after considering all of this, we have not even touched the plethora of arguments that oppose the death penalty for purely ethical reasons.

Despite all of the noise, the argument concerning the death penalty gives us an exciting chance to try and objectively determine whether death penalty usage has any impact on crime rates after controlling for other determinants of the crime rate. By analyzing various crime statistics at the state level over a long period, we can try to determine whether the death penalty has any significant relationship, statistically or

economically, with crime levels. Regardless of the results, this study will be useful for forwarding the debate regarding the death penalty, as the death penalty should at least be able to provide statistically sound results if people wish to keep utilizing it. If it turns out that the death penalty does have a statistically significant deterrent effect on crime, then people can begin to consider some of its other criticisms. At the same time, I will also be attempting to determine whether the prison mortality rate, a proxy for harsh prison conditions, serves as an effective crime deterrent because it extends to all forms of criminals. From what I have read so far, I believe that the death penalty will have statistically significant effects on crime. However, it will be interesting to see how controlling for prison mortality affects the significance of the death penalty as a deterrent and whether prison mortality also serves as a deterrent.

2. Literature Review

As we might expect, researchers have already conducted a decent amount of studies to determine the efficacy of the death penalty, many of which asked unique questions and employed different statistical methods. Cuellar and Buehring of Sonoma State University conducted a model in which sought to test the efficacy of the death penalty by testing panel data from 1976 to 2006. Firstly, they corrected for endogeneity in the murder rate, execution rate, and police expenditures by predicting these variables in regressions using crime statistics, locations, and other demographic data. They then used these engogeneity corrected variables in a state fixed effect model where they found that a negative and statistically significant deterrent effect associated with the execution rate[i].

In 2009, Lee and McCrary also attempted to test the strength of the death penalty by exploiting the fact that only legal adults can receive the punishment. They performed an analysis of criminal tendencies for people slightly before and after their eighteenth birthday, theorizing that the abrupt increase in legal sentences would sharply decrease the likelihood of committing crime. The authors found statistically significant relationships, but their results did not have great economic significance. Their results suggested a relatively small decrease in the likelihood of committing crimes after one's eighteenth birthday, which suggests that more severe punishments may not have the greatest deterrent strength[ii].

In 2006, Wolfers and Donohue also attempted to tackle the question of whether criminal punishment serves as a crime deterrent. The authors analyzed a wide array of the previous empirical work in an attempt to answer this question. In their analysis, they found that making slight changes to the empirical methods used in previous papers had a catastrophic effect on the results of the studies[iii]. In particular, they argued that because executions happen at such a low rate and with little variance, empirical models will always struggle to precisely capture the deterrent effect of such punishments.

Finally, Katz, Levitt, and Shustorovich also attempted to answer the question of whether the death penalty serves as an effective crime deterrent in 2003. They did not succeed in finding any evidence that the death penalty serves as a crime deterrent; however, they found the prison mortality rates, which serve as a proxy for the harshness of prison conditions, could explain a good deal of variation in crime rates[iv]. After controlling for a group of other state level variables and analyzing their panel data, they found that

prison mortality rates had the strongest deterrent effect on crime rates out of all their variables. For this reason, I will be controlling for prison mortality in my empirical analysis.

3. Data

For my empirical analysis, I used the Katz-Levitt-Shustorovich dataset. This data set contains panel data from all fifty states and the District of Columbia from 1930 to 2004. However, because not all states began recording every variables in 1930, I could only utilize data mostly starting from the mid-1950s. A full list of the variables that I will use can be found in figure 2 of the appendix. Because I am testing the deterrent effect of the death penalty, I will be using an array of crime rates as my dependent variables. In particular, I will be using the murder rate, violent crime rate, assault rate, burglary rate, larceny rate, auto theft rate, and robbery rate[1]. All of these variables give a good sense for crime in the area, and the variety of crime levels will allow me to test whether the usage of the death penalty and prison mortality rates affect all crime rates similarly. The main explanatory variables that I will be using in my regression are the execution rate, prison mortality rate, insured unemployment rate, percentage black, percentage urban, infant mortality rate, and age demographics[2]. The execution rate variable will allow me to see how crime rates vary with respect to death penalty usage and whether there is a statistically significant association. The prison mortality rate, defined as non-natural prison deaths, will serve as a proxy for prison conditions and will allow me to test the question of whether the harshness of prisons serves as a crime deterrent of affects the deterrent effects of the death penalty.

[1] Larceny refers to simply taking property, robbery refers to taking property by force, and burglary refers to unlawfully entering property with the intention of committing some crime.

[2] The age demographics have density bins of 0 to 14, 15 to 24, 25 to 44, and 45 to 64.

The insured unemployment rate will serve as a proxy for economic conditions, which will allow me to control for the variations in crime rates that accompany changing socioeconomic conditions. Percentage urban and percentage black will hopefully allow me to control for some of the variation in crime rates that accompanies these two variables. Infant mortality rate, like insured unemployment rate, will also serve as a proxy for socioeconomic conditions and will hopefully help to control for more variation in crime. Finally, I am including a bunch of age demographics in my regression to cut down on any variation in crime that may accompany difference age densities.

4. Econometric Methods

For my empirical analysis, I relied almost exclusively on fixed effects regressions with state fixed effects. This econometric technique allows me to look at the fifty states and the District of Columbia and examine the variation of the crime rates with respect to the mean in the area. This allows us to gain better results in two distinct ways. Because the fixed effect regression effectively applies a dummy variable to each location through the demeaning process, it eliminates any individual heterogeneity that we may encounter at the state level. This means that the regression will control for effects, such as state-specific laws and regulations, that remain constant over the course of the regression and affect our variables of interest. This alone should allow the model to cut down on the variation in crime statistics that does not stem from our explanatory variables. To estimate these regressions, our equation will look like

$$y_{i,t} = \beta_0 + \beta_1 X_{1,t} + \cdots + \beta_n X_{n,t} + u_i + e_{i,t}$$

where $y_{i,t}$ refers to the dependent variable of state *i* at time *t*, $X_{1,t} \ldots X_{n,t}$ refer to state *i's n* independent variables at time *t*, u_i refers to the dummy variable for state *i* (also known as the idiosyncratic error), and $e_{i,t}$ refers to state *i's* residuals at time *t* (also known as the time error). Additionally, I will be using robust standard errors in all of my regressions as there is such high risk of having heteroscedasticity in fixed effects regression. This will ensure that we can accurately judge the statistical significance of explanatory variables, as regressions suffering from heteroscedasticity without corrected standard errors provide invalid t and F tests.

5. Regression Results

From the regression results, we see that the execution rate has a consistent impact on the various crime metrics. From figure 2 of the appendix, we see that the execution rate had a statistically significant relationship with the violent crime rate, assault rate, burglary rate, auto theft rate, and robbery rate. Furthermore, the coefficient for the execution rate was negative in all of these regressions, and you could obviously reject the null hypothesis that the coefficients equaled zero. This suggests that the execution rate effectively served as an effect deterrent for violent crime, assault, burglary, auto theft, and robbery.

On the other hand, the execution rate did not have a statistically significant relationship with the murder rate and the larceny rate. This is not particularly surprising, as murderers often do not rationally consider the consequences of their actions. Furthermore, the death penalty does not serve as a punishment for petty crimes like larceny. In addition, the prison mortality rate also did not have a statistically significant

relationship with any of the crime rates other than the robbery rate. This indicates that the prison mortality rate did not serve as a strong crime deterrent.

Outside of our main variables of interest, a few other interesting dynamics occurred in the regressions. For instance, we can see that the insured unemployment rate, a proxy for economic conditions, has a statistically significant relationship with burglary, larceny and auto theft. I cannot quite explain the negative impact of the insured unemployment rate on auto theft, but we would expect burglary and larceny to increase in harsher socioeconomic conditions, which serves as a nice sanity check for our model. Finally, the infant death rate had a negative relationship with all of the crime rates at a highly significant level. This runs contra logic because normally we would expect higher infant death rates to coincide with harsher socioeconomic conditions and higher levels of crime, but the opposite correlation appeared in the regression results. This could because I controlled for too few explanatory variables, but if this result stands, it may be an interesting area for further statistical analysis.

6. Caveats

Although I believe that my empirical analysis provides a good starting point for analyzing the relationship between the execution rate, prison mortality rate, and crime rates, this analysis likely suffers from some sort of omitted variable bias. Although the fixed effects model that I used successfully accounts for time invariant state characteristics that might affect the analysis, certain time variant factors could still have a large impact on the results of my study. In future iterations of this study, I believe that including a variable that captures a state's spending on public safety would help to improve my results. In

particular, I would theorize that states that enact the death penalty also take other large steps towards preventing crime. This means that my coefficients for the *execution rate* would also capture those time variant factors. It would also be nice to have variables like state police expenditure per capita and guns per capita to try and better isolate the effect of the execution rate. In addition to adding these variables, it could also be worthwhile to try to correct for endogeneity in the execution rate by using an instrumental variable regression to predict its values. Furthermore, I think that it would be better to have a wider range of crime in future analyses. I think that this would be particularly useful for types of crime with strike systems and high recidivism such as drug related offenses. Because people charged for this type of crime often return to jail, they would likely factor prison conditions into their decision making process more heavily. Finally, it may be interesting to observe the different impact that the execution and prison mortality rates have on crime in different states by including interaction terms in the analysis. In particular, many papers noted how the execution rate has a different effect on crime in Texas because of the higher historical level of executions.

7. Conclusion

In the regression analysis, we found statistically significant negative correlations between the execution rate and the violent crime rate, assault rate, burglary rate, auto theft rate, and robbery rate. This indicates that the execution has at least some deterrent effect for these types of crime. On the other hand, we did not find a statistically significant relationship between the execution rate and the murder and larceny rates. However, given the nature of these crimes, we would not necessarily expect to see such a relationship.

Furthermore, the analysis revealed that the prison mortality rate did not have consistently strong statistical relationships with the various crime rates, which indicates that the harshness of prison conditions did not serve as a strong crime deterrent. This contradicts the conclusion that Katz, Levitt, and Shustorovich reached in their paper. Because the statistical relationships between the execution rates and crime rates persisted after controlling for prison mortality, my regression analysis indicates the opposite of their result. My regression analysis also found some interesting dynamics the crime rates, the insured unemployment rates, and the infant mortality rates. Finally, while I believe that my empirical analysis serves as a good first step in uncovering the relationship between the execution rate, the prison mortality rate, and crime rates, my analysis likely yielded biased results. In particular, I believe that my model did not do enough to capture the effects of measures that states may take to prevent crime along with the enactment of the death penalty. Thus, my model shows some promise in terms of its implications, but it needs to be improved upon before any legitimate conclusions can be drawn from it.

8. Appendix

Figure 1

variable name	storage type	display format	value label	variable label
executionRate	float	%9.0g		Execution Rate per 1000 prisoners
prisonMortality	float	%9.0g		Prison Death Rate per 1000 prisoners
murderRate	float	%9.0g		Murder Rate
violentCrimeR~e	float	%9.0g		Violent Crime Rate
assaultRate	float	%9.0g		Assault Rate
burglaryRate	float	%9.0g		Burglary Rate
larcenyRate	float	%9.0g		Larceny Rate
autoTheftRate	float	%9.0g		Auto Theft Rate
robberyRate	float	%9.0g		Robbery Rate
unemploymentR~e	float	%9.0g		Insured Unemployment Rate
percentBlack	float	%9.0g		Fraction Black
percentUrban	float	%9.0g		Fraction Urban
infantDeathRate	float	%9.0g		Infant Mortality Rate
r_0_14	float	%9.0g		Fraction 0-14 year-olds
r_15_24	float	%9.0g		Fraction 15-24 year-olds
r_25_44	float	%9.0g		Fraction 25-44 year-olds
r_45_64	float	%9.0g		Fraction 45-64 year-olds

Figure 2

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	(1) murderRate	(2) violentCri~e	(3) assaultRate	(4) burglaryRate	(5) larcenyRate	(6) autoTheftR~e	(7) robberyRate
executionR~e	-0.216	-21.74*	-8.854*	-27.13*	17.01	-15.13*	-9.807*
	(0.147)	(8.827)	(4.216)	(12.99)	(34.32)	(6.013)	(4.755)
prisonMort~y	-0.0180	-2.665	-1.505	-5.004	1.222	0.265	-1.285*
	(0.0500)	(1.545)	(1.209)	(2.843)	(5.803)	(1.749)	(0.605)
unemployme~e	-0.0199	-1.834	-2.047	24.13***	63.04***	-12.13**	-0.0536
	(0.0464)	(2.729)	(1.685)	(3.854)	(9.111)	(3.480)	(1.400)
percentBlack	15.68	2577.8**	929.6	1123.7	7650.5*	1672.7*	1620.3**
	(14.16)	(910.0)	(525.9)	(1022.3)	(3115.5)	(665.5)	(506.6)
percentUrban	-10.34**	-36.19	85.00	-530.7	-1020.8	-874.1**	-122.1
	(3.860)	(340.4)	(214.2)	(586.1)	(1598.9)	(319.2)	(157.1)
infantDeat~e	-0.00130**	-0.110**	-0.0762**	-0.347***	-0.435*	-0.110***	-0.0360*
	(0.000401)	(0.0383)	(0.0250)	(0.0697)	(0.188)	(0.0299)	(0.0169)
r_0_14	-1.427	-1392.3	-755.1	-1567.8	-11680.5*	-939.4	-462.0
	(8.246)	(1085.3)	(684.6)	(2181.6)	(5736.1)	(780.4)	(446.1)
r_15_24	27.56*	150.9	-274.9	7714.1**	16902.7**	741.6	514.4
	(13.69)	(924.2)	(588.7)	(2499.3)	(6262.1)	(650.1)	(377.0)
r_25_44	-9.697	-508.6	-63.39	-1470.9	11497.9	-1761.5	-267.0
	(11.75)	(1042.2)	(619.7)	(2268.5)	(5973.1)	(909.0)	(468.7)
r_45_64	-30.18	-1067.9	-1005.2	-2888.0	-4787.8	-3723.8**	170.7
	(21.85)	(1530.5)	(1017.1)	(2741.2)	(7644.5)	(1381.6)	(678.4)
_cons	18.74	970.2	637.2	1851.5	504.0	2290.1**	180.2
	(11.02)	(936.4)	(556.4)	(1972.2)	(5225.1)	(828.4)	(420.4)
N	1924	1924	1935	1938	1932	1939	1938

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Works Cited

[i] Steven S. Cuellar, Kyle Buehring. *Does Capital Punishment Have a Deterrence Effect on the Murder Rate? Issues and Evidence.* Sonoma State University working paper.

[ii] David S. Lee, Justin McCrary. *Crime, Punishment, and Myopia*. Working paper.

[iii]John J. Donohue, Justin Wolfers. *The Death Penalty: No Evidence for Deterrence.* The Economist's Voice.

[iv] Lawrence Katz, Steven D. Levitt, Ellen Shustorovich. *Prison Conditions, Capital Punishment, and Deterrence*. American Law and Economics Review.