The Effect of the Abolishment of Capital Punishment on Violent Crime Rates and Murder Rates in American States

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Abstract

This paper examines the effect of the abolishment of the death penalty on violent crime rates and murder rates in American States by utilizing a staggered fixed effects Difference-in-Differences empirical design. I found significant results showing a decrease in Violent Crime Rates in States that implemented the abolition of the Death Penalty.

Keywords: Crime, Justice, Legal Institutions

JEL Codes: D63, K30, K42,

1   Introduction

This paper intends to study the effect of capital punishment on the violent crime statistics in a state by state manner. Essentially, we want to figure out if the existence of the death penalty in a State acts as a deterrent to violent crimes.

We already know that on average, homicides decrease by 35.7% immediately following a publicized execution, and the more publicity devoted to the execution, the more the homicides decrease thereafter (Phillips, 1980). This, however, is just a short term effect, but in this paper we want to establish whether there is a continuous effect of capital punishment on violent crime.

The United States is one amongst the 56 countries in the world that still implement the practice of capital punishment. Among those who have abolished the practice are Great Britain, Australia, Canada, France, Germany, as well as a host of other developed countries that seem to have less of a violent crime problem than the United States does. There is, in the United States, an ongoing debate on whether the practice of capital punishment serves any purpose. The opponents of capital punishment rely partly on the recognition of the possibility of errors in the process of enforcing justice (such as when a judge incorrectly convicts a suspect). Another prong of their argument is that the death penalty wastes taxpayer funds – a Susquehanna University report found that, on average, across all 50 states, a death row inmate costs $1.12 million more than a general population inmate (McFarland, 2016). The proponents of capital punishment respond mainly with the arguments that i) the death penalty is an effective deterrent to homicide, ii) the death penalty is cheaper than "feeding an inmate for the rest of his life". We already know that studies have shown that the second argument is incorrect, so we must now look at the first argument to decide whether the existence of capital punishment is doing more harm than good.

2   Literature Review

What many would expect to see is a deterrence effect that is based majorly in psychological principles. Psychological experiments show that people often avoid aggression when they observe someone else being punished for it (Bandura, 1977). Furthermore, there is also evidence (albeit anecdotal) that there exist criminals who may have been deterred by the possibility of capital punishment (Great Britain Royal Commission on Capital Punishment, 1953).

The most significant piece of literature on this subject comes from a model designed by Isaac Ehrlich in the mid-1970s. Ehrlich considered U.S murder and execution statistics for the period 1933-69 along with measures of social factors such as unemployment and per capita income. His model showed a negative coefficient for the variable of executions when trying to predict homicide rates. This was the first time any study had produced such a result. He asserted that his result was statistically insignificant, and concluded that "in light of these observations, one cannot reject the hypothesis that punishment, in general, and execution, in particular, exert a unique deterrent effect on potential murderers" (Ehrlich, 1973). However, Ehrlich's data were soon studied by other investigators and his results reconsidered. Peter Passell and John Taylor focused on Ehrlich's observed negative relation between executions and homicide rates, and asked what happens when the time period chosen for the model is changed. They also experimented with varying his assumptions as to the model's functional form. In both cases they found that some broad aspects of the model were unchanged, but the indication of a special deterrent effect from executions disappeared completely. Passell and Taylor concluded that whatever the other virtues of Ehrlich's work, no valid inference about deterrence could be drawn from it (Bedau, Pierce, 1976).

Apart from this, another important consideration is one that we find not in an economics paper, but in a medical paper. In 1968, Dr. Louis West described what he called "attempting suicide by homicide". In these bizarre cases, a person actually kills in order to court death by execution (Hearings before the US House Judiciary Committee, 1968). This invites the

thought that capital punishment may even act as the very opposite of a deterrent to homicide.

This paper will seek to utilize a fixed effects difference-in-differences model to tug at the differences between abolitionist states and states that continue to practice and implement capital punishment. The treatment group will consist of States that used to implement capital punishment but have abolished it, whereas the control group will consist of States that have not abolished the death penalty since its inception in that particular State.

3 Data and Descriptive Statistics

3.1 Data Sources and Description

This paper utilizes three data sets. The final data set is in panel data form with 46 U.S States being observed over a time period of 34 years, from 1980 to 2014, inclusive. Variables of interest in this paper include: Violent Crime Rate, Murder Rate, Year_Abolished, Death Penalty Status, Population Density, Unemployment Rate, Per Capita Personal Income.

I obtained the Population and Violent Crime, Murder rates from the Federal Bureau of Investigation's Uniform Crime Reporting Tool. I obtained data on each State's Death Penalty Status and Year of Policy Abolishment from the Death Penalty Information Center. Additionally, I obtained each State's land area in kilometres from the CIA Factbook. I then simply merged these three datasets to get my final dataset and created a new variable for each state's Population Density in each year by dividing the population for each State in each year by that State's land area. I obtained each State's Personal Per Capita Income (scaled to 2014 US Dollars) from the Federal Reserve Economic Data (FRED).

Unfortunately, I am analyzing only 46 U.S States and Territories because I had to drop the States of California, Colorado, Oregon and Pennsylvania due to these States' Governor Imposed Moratoriums on Capital Punishment and missing data. I also had to drop the territory of Washington D.C due to the same reason.

After merging and modifying, I am left with panel data with 1,610 observations, sorted

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by State and Year.

3.2 Descriptive Statistics

Table 1, below, shows the mean values of Violent Crime Rates, Murder Rates from 1980 to 2014 in States with the Death Penalty and States that, at some point, abolished the death penalty. From these descriptive statistics, there seems to be a difference between the two groups of States. This can serve as motivation for our research question of whether the abolishment of capital punishment has a significant effect on States' crime statistics.

Table 1: States With versus States Without the Death Penalty

	Death Penalty		No Death Penalty	
	Mean	St. Dev.	Mean	St. Dev.
ViolentCrimeRate	475.075	227.824	386.063	211.647
MurderRate	6.361	3.453	4.896	3.134
Observations	980		630	

4 Empirical Methodology

For this paper I will be using a fixed effects difference-in-differences model to analyze how changes in a State's death penalty status affect changes in the amount of violent crime being committed in that State. For this purpose I have divided the sample of 46 States into two groups: Control and Treatment. The Control group consists of those States that still have the death penalty in effect, and the Treatment group consists of those States that abolished the death penalty at some point before 2014. Using a fixed effects difference-in-differences model, we can take our Treatment States and evaluate how the their crime statistics change after the point in time where they abolish the death penalty, and compare these changes to the changes we see at the same time in our Control group States.

The empirical model I am using is as follows:

$$Y_{i,t} = \beta_1(POST) + \beta_2(POST * TREAT) + \beta_3(TREATGAP) + \beta_4(TREATGAP * POST) +$$

$$\beta_5(TREATGAP * POST * TREAT) + \beta_6(X_{i,j}) + \alpha_i + \alpha_t$$

Where i indexes for State and t indexes for year. $Y_{i,t}$ represents our independent variable, so Violent Crime Rate, Murder Rate. PRE is a binary variable referring to whether the State is in pre-treatment stage (0) or post-treatment stage (1). TREAT is also a binary variable referring to whether the State is in our Control Group (0) or Treatment Group (1).

This brings us to the slightly more complex variable of TREATGAP, which I created myself. Essentially, TREATGAP is a countdown that measures how far the treatment stage is for all States. Suppose a State, say, Colorado, undergoes treatment in the year 1987, the following table shows you what TREATGAP would look like for that State:

Table 2: TREATGAP Variable Explanation

State	Year	TREATGAP
Colorado	1980	-7
Colorado	1981	-6
Colorado	1982	-5
Colorado	1983	-4
Colorado	1984	-3
Colorado	1985	-2
Colorado	1986	-1
Colorado	1987	0
Colorado	1988	1
Colorado	1989	2
...	...	...
Colorado	2013	26
Colorado	2014	27

For States in the Control Group, I take TREATGAP to be centered around the year 2004. Additionally, α_i refers to fixed effects for State and α_j refers to fixed effects for time (here, Year). Finally, $X_{i,j}$ refers to a vector of controls, including Unemployment Rate, Population

Density, and Per Capita Personal Income.

By using a staggered, fixed effects difference in differences model, I am able to produce causal estimates for how the treatment (abolishing the death penalty) affects violent crime rates, murder rates, and aggravated assault rates in a U.S. State.

Let us now discuss the assumptions for running a difference-in-differences model, and whether this paper stays within the boundaries set by the same. First off, we have the assumption of common trends for treatment and control States pre-treatment. Here we approximate treatment at the Year 2004, and the period 1980-2004 is pre-treatment and period 2004-2014 is post-treatment (for the purpose of analyzing common trends). Having a look below at the figures (1 and 2) for Violent Crime Rates and Murder Rates, we can analyze their common trends:
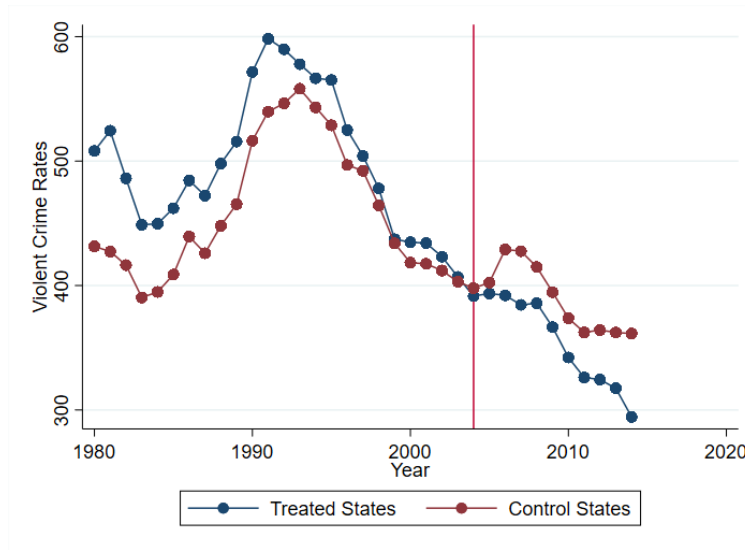

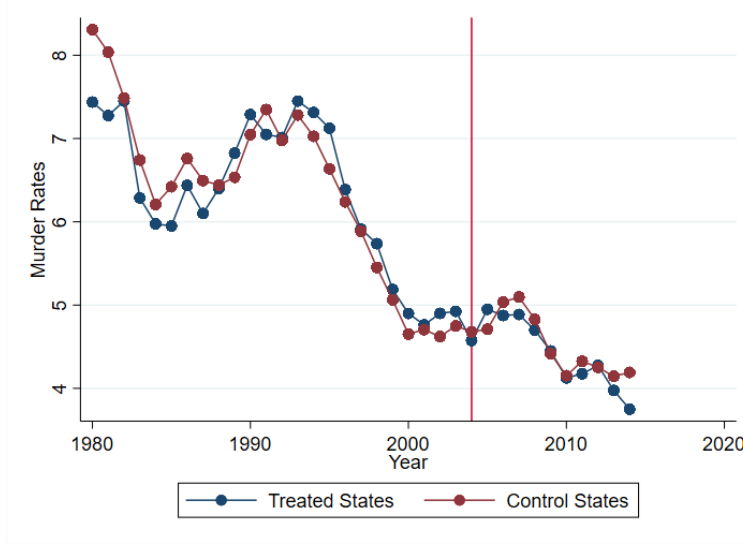Figure 1: Common Trends for Violent Crime Rates

Figure 2: Common Trends for Murder Rates

We see that in the case of both Violent Crime Rates and Murder Rates, we have common trends pre-treatment for the Treatment and Control Groups. As a result, I have satisfied the first assumption.

For my model to be well identified, the key assumption is that there is no other treatment being enacted at the exact same time as this policy change. I am confident this holds because there are so many States that are undergoing treatment at different times that it is highly unlikely that there is a confounding treatment happening at the same times in all our Treatment States. For example, Rhode Island undergoes treatment in 2004 and Virginia undergoes treatment in 1984. It is unlikely that there is a confounding treatment in Rhode Island in 2004 AND a confounding treatment in Virginia in 1984.

5   Results

In Table 3 below, we can see the results of the regression I ran twice: first with ViolentCrimeRate as my dependent variable, and then with MurderRate as my dependent variable.

Table 3: Differences-in-Difference Estimates (Binary Treatment)

	ViolentCrimeRate	MurderRate
POST	22.86	0.209
	(1.28)	(0.69)
POST*TREAT	-41.66*	-0.0630
	(-1.77)	(-0.16)
TREATGAP	75.33***	1.418***
	(16.10)	(18.03)
TREATGAP*POST	1.453	0.0302
	(0.52)	(0.65)
TREATGAP*POST*TREAT	3.125	-0.0207
	(1.16)	(-0.46)
PopulationDensity	-1.345***	-0.00709***
	(-10.31)	(-3.23)
UnemploymentRate	-7.216***	-0.118***
	(-3.62)	(-3.51)
PCPIncome	0.00127	0.000129***
	(1.19)	(7.13)
N	1610	1610

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5.1 Effect on Violent Crime Rate

It is clear from the regression results in Table 3 that for a State that undergoes treatment between 1980 and 2014, abolishing the Death Penalty has an immediate effect on the Violent Crime in that State - it reduces it by 41.66 violent crimes per 100,000 people per year. This effect is significant at the level of $\alpha = 10\%$. Furthermore, we see that there is a general trend in all States (Treatment and Control) of increasing violent crime rates, as TREATGAP gives a highly significant coefficient of 75.33. However, for States undergoing Treatment, after the immediate reduction in crime after abolishment of the death penalty, there begins an upward trend in the value of violent crimes committed per 100,000 people. Specifically, the coefficient of TREATGAP*POST*TREAT shows us that the Treated states see their violent crime rate trend upwards with a slope of 3.125 (violent crimes per 100,000 people per year). This is contrasted with the coefficient of TREATGAP*POST which shows us that Control States see their violent crime rate trend upwards with a slope of 1.453. This slope is relatively smaller than the one experienced by Treated States, however there is an unfortunate absence of high significance in these results.

If we simply take the average values of Violent Crimes committed in Treatment and Control States before and after the implementation of the treatment, the following figure is seen here:
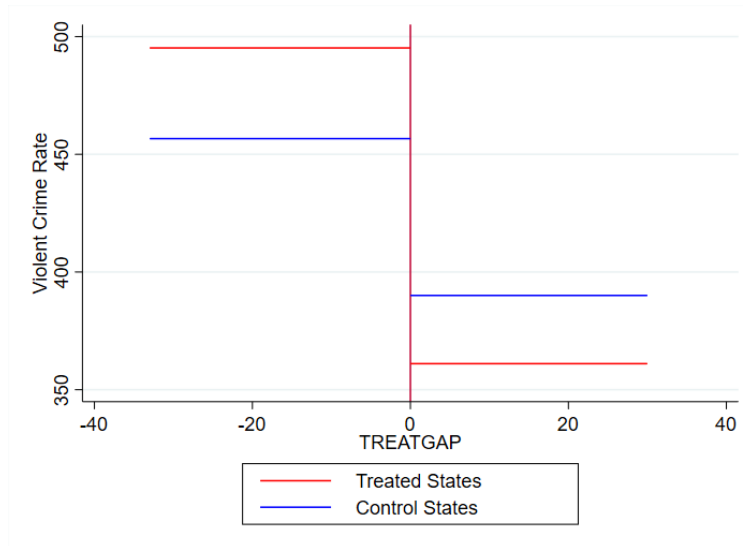
Figure 3: Mean Effect of Treatment on Violent Crime Rates

As for the control variables, we see that a one unit increase in Population Density (people per square kilometer) leads to a 1.345 unit fall in the Violent Crime Rate of the State (highly significant). We see that a one unit increase in the Unemployment Rate will cause a 7.216 unit decrease in the Violent Crime Rate (highly significant). Furthermore, it is observed that a one unit increase in the Personal Per Capita Income of the State will result in a 0.00127 unit increase in the Violent Crime Rate. These findings go against almost every piece of economic literature on the topic, as population density and unemployment rate have previously been shown to be positively correlated to crime, while income has been shown to be negatively correlated to the same. It is surprising to see the estimates we are seeing, then. Perhaps the explanation for the same could be bias from some omitted variables.

5.2 Effect on Murder Rate

It is clear from the regression results in Table 3 that for a State that undergoes treatment between 1980 and 2014, abolishing the Death Penalty has an immediate effect on the Murder Rate in that State - it reduces it by 0.063 murders per 100,000 people per year. This result, unfortunately, lacks statistical significance. We see that there is a general trend

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in all States (Treatment and Control) of increasing murder rates, as TREATGAP gives a highly significant coefficient of 1.418. However, for States undergoing Treatment, after the immediate reduction in murders after abolishment of the death penalty, there continues to be a downward trend in the murders committed per 100,000 people. Specifically, the coefficient of TREATGAP*POST*TREAT shows us that the Treated states see their murder rate trend downwards with a slope of -0.0207 (murders per 100,000 people per year). This is contrasted with the coefficient of TREATGAP*POST which shows us that Control States see their murder rate trend upward with a slope of 0.0302. Once again, there appears to be a disappointing absence of significance in the results.

If we simply take the average values of Violent Crimes committed in Treatment and Control States before and after the implementation of the treatment, the following figure is seen here:
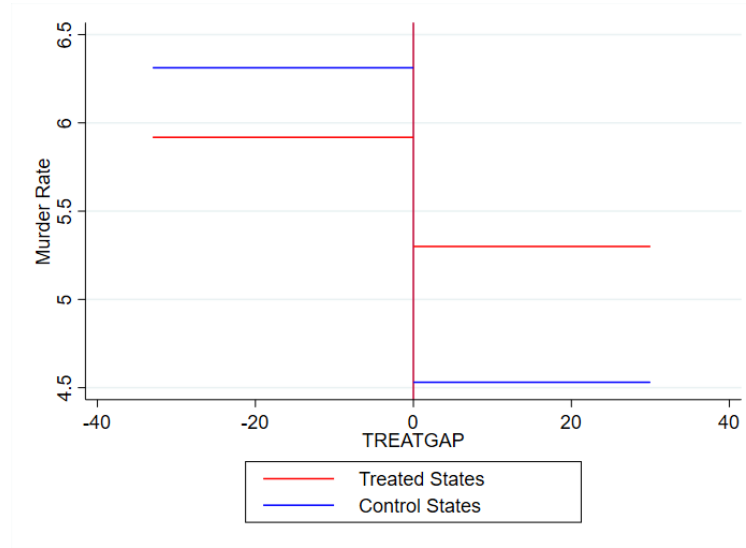

Figure 4: Mean Effect of Treatment on Murder Rates

As for the control variables, we see that the coefficients for all our control variables are highly significant. We see that a one unit increase in Population Density (people per square kilometer) leads to a 0.00709 unit fall in the Murder Rate of the State. We see that a one unit increase in the Unemployment Rate will cause a 0.118 unit decrease in the Murder Rate. Furthermore, it is observed that a one unit increase in the Personal Per Capita Income of

the State will result in a 0.000129 unit increase in the Murder Rate.

6   Conclusion

This paper exploits the exogenous shock of States abolishing the death penalty to measure the relationship between violent crime, murder rates and the practice of capital punishment. I estimate the relationship first with violent crime rates, and then with murder rates. My results show that the abolishment of the death penalty has an immediate, statistically significant effect on Violent Crime Rates in U.S States. It causes an immediate fall in the amount of Violent Crimes being committed per 100,000 people, and then possibly causes a consistent increase in the same after the abolishment. Unfortunately, the results when I run the model against Murder Rates was not nearly as significant or promising. Not much can be said about the murder rates of treated states with confidence, except that the abolishment seems to cause a continual downward trend in the murder rates.

The significant decrease then steady increase of Violent Crime Rates after the abolishment of the death penalty is an interesting result, and so is the continued fall in Murder Rates after abolishment. Possible reasons for these results hint at some of the pitfalls in my paper.

To answer this question we'd have to think about why States are abolishing the death penalty. Many states abolish it because they find it to be unconstitutional, but behind this is another reason and that is that they just don't feel it is doing a good enough job of deterring people. Another reason for abolishing the death penalty brings to our attention a potential endogeneity issue - maybe States are abolishing the Death Penalty because fewer people are committing crimes, and therefore the State no longer needs to execute people to deter people from committing crimes. This would mean that it might just be lower violent crime rates and lower murder rates that are causing States to abolish the death penalty. To conclude, in my endeavor to produce causal estimates of the abolishment of the death penalty on crime rates, I was limited by the nature of my data, which is why I had the

aforementioned concerns about this paper.

6.1   Future Research

I would hope to continue working on this question and eventually reach a statistically significant answer. I believe that with the right data set, I would have much greater likelihood of getting at a more accurate and significant estimate of the effect of the Death Penalty on crime rates in U.S States. One such possible modification to the data set could be having data for shorter time intervals, such as weeks. This would enable us to study short term deterrence. Another possible idea could be a data set that includes more relevant control variables so as to reduce unknown variation.

7 Bibliography

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