Determinants of Public Opinion on the Death Penalty

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Abstract

In this paper, I examine several factors that affect public sentiment on the death penalty, including individual characteristics as well as state-level measures of exonerations, executions, and botched executions. Using comprehensive data from the General Social Survey, the National Registry of Exonerations, and the Death Penalty Information Center, I find that exonerations significantly decrease the probability of supporting the death penalty by three to four percent from the average level. Nonetheless, neither executions nor botched executions seem to have an impact. I also investigate if there are significant changes in the criminal justice system associated with having more exonerations and find that they decrease the number of death sentences.

Keywords: Exoneration, Death Penalty, Criminal Justice
JEL Classification: D80, K14, K42

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1 Introduction

Public opinion regarding the death penalty has fluctuated significantly since the 1970s, peaking in its support during the mid-1990s and steadily declining ever since. A recent report by the Pew Research Center estimates that while 78% of all Americans were in favor of having the death penalty in 1995, the corresponding number in 2015 was about 56%.[1] A similar conclusion can be drawn from Figure 1, which plots the favorability of capital punishment using data from the General Social Survey: there are upward movements in favorability until the mid 1990s, followed by a period of steady decline. Nonetheless, there are recent indications that the public is changing its view again on capital punishment: voters in California, Nebraska, and Oklahoma all approved measures to bring back the death penalty during the 2016 election.[2]

This paper examines the role of individual characteristics as well as state-level measures of exonerations and executions (both successful and botched) in influencing the public's death penalty support. While previous research has shown that demographic factors are strong predictors of death penalty sentiment, the role of exonerations and executions has not been examined. Each of these factors could individually affect public view on capital punishment: being exposed to an exoneration or a botched execution could reduce capital punishment support, possibly due to a revision in beliefs about the validity of the original conviction or a shock from learning about the cruelty of a botched execution, while executions could raise support for capital punishment as they tend to buttress a "tough on crime" attitude in the criminal justice system. I analyze these factors jointly to account for possible correlations in their influence on death penalty sentiment.

This study contributes to several established areas of research. First, it adds to the literature on the determinants and consequences of death penalty sentiment. Past studies have identified elements such as race, gender, and the crime environment as important components

[1] Pew Research Center, "Less Support for Death Penalty, Especially Among Democrats"
[2] Additionally, California voters also approve a measure to speed up the process of execution.

in influencing sentiment regarding the death penalty.[3] In addition to these conventional demographic characteristics, I consider the role of exonerations and executions (successful or not) in affecting public sentiment. I also show that there is a relationship among exonerations, falling sentiment in favor of the death penalty, and a reduction in the number of death sentences, which adds to existing evidences on the legislative and judicial consequences of a changing public perception regarding the death penalty.[4]

Second, this paper contributes to the recent literature in economics examining the impact of being exposed to stigma-attaching events. Since exonerations and executions tend to attract widespread media attention, exposure to such an event could have comparable effects to other types of scandal. Studies suggest that stigma-attaching events can carry immediate and long-lasting consequences; for example, the Catholic Church's sex abuse scandal in the United States has been shown to lead to a significant fall in the Catholic population (Hungerman 2013) and a decrease in charitable contributions, both in the short and long run (Bottan and Perez-Truglia 2015). Studies in the political science literature similarly conclude that scandals can have a negative impact on the evaluation of a political candidate or the probability of being elected.[5]

If it is the case that individuals alter their sentiment about capital punishment after being exposed to an exoneration or execution, they must be updating their beliefs in the presence of new information. There is an extensive literature, in both theory and empirics, on belief-updating and its implications. The third contribution of my study is to the advancement of a recent literature measuring the impact of plausibly exogenous events on the process of learning and belief-updating. For instance, it has been shown that new information on health conditions in the form of tests or screenings lead to changes in belief and behavior among HIV patients (Godlonton and Thornton 2013, among others) and at-risk cancer patients

[3]Soss *et al* (2003) find that in addition to individual characteristics, racial tension, as measured by proximity between white and black populaces, is a significant predictor for death penalty support among whites.

[4]For instance, Brace and Boyea (2008) find that in states where Supreme Courts are elected instead of appointed, public support for capital punishment has a significant influence on the court's composition and its willingness to uphold convictions with a death penalty sentence.

[5]See, for example, Basinger (2012) or Vonnahme (2014).

(Lange 2011).

Using comprehensive data from the National Registry of Exonerations, the Death Penalty Information Center, and the General Social Survey from 1980 to 2014, I find that living in a state that has an exoneration significantly decreases the probability that an individual will support the death penalty by two to three percentage points, a 3% decrease from the average level of support during the time period in my data. Nonetheless, exposure to successful or botched executions does not seem to affect how people feel about capital punishment.

Next, I investigate whether the change in opinion on capital punishment leads to additional changes in the criminal justice system. While individuals could change their view on the death penalty, it is not clear that such a change in stated preference could lead to a significant response when examining revealed-preference based outcomes. Consistent with my previous findings, exonerations have a contemporaneous impact on reducing states' annual number of death sentences while executions, botched or successful, do not.

Flannagan (1996) synthesizes previous research in criminology and political science regarding the values of understanding public opinion on crime and justice and argues that it is important for three reasons: it presents a record of historical trends, it may foreshadow legislative shifts, and it reveals a social attitude regarding the acceptable range at which citizens are comfortable with government intervening programs. Indeed, the declining public sentiment in favor of the death penalty has been followed by its legislative abolition in a number of states (e.g. Illinois in 2011, Connecticut in 2012, and Maryland in 2013) while many more are considering either complete abolition or further restrictions on capital punishment as a criminal sentence.[6] Thus, in addition to uncovering the impact of events such as exonerations and executions on death penalty sentiment, this paper has important policy implications; specifically, the findings of this study could be of particular relevance in informing policy makers on the causes and consequences of legislation aiming to abolish the

[6]Oregon, for example, has been maintaining a moratorium on administering death penalties since 2011. For a detail list of state restrictions on capital punishment as a possible sentence, see National Conference of State Legislatures, "States and Capital Punishment" http://www.ncsl.org/research/civil-and-criminal-justice/death-penalty.aspx

death penalty. As more states have begun to reexamine the need for capital punishment, it is crucial that legislators be advised about the drivers behind the decline in death penalty support and any possible consequence from such decline, such as a decrease in the number of death sentences or a changing political landscape.

The rest of the paper proceeds as follows: Section 2 provides a modern background on the death penalty, exonerations, and executions in the United States and reviews the relevant literatures on the determinants and consequences of death penalty support, the impact of stigmatic events, and belief-updating behaviors. Section 3 describes the data set and the main regression specification. Estimation results are presented in Section 4, and Section 5 concludes.

2 Background

2.1 The Death Penalty, Executions, and Exonerations in the U.S.

The death penalty has been a controversial subject in America. Proponents of death penalty sentencing often argue that it is the only appropriate punishment for extraordinarily heinous crimes and that it serves to deter future criminals. Opponents counter that it is inhumane, expensive, and arbitrary. While the debate about capital punishment as an appropriate sentence is more philosophical in nature, ample empirical evidences have been provided on the deterrent effect of the death penalty, often with contradictory implications. For example, Dezhbakhsh *et al.* (2003) and Dezhbakhsh and Shepherd (2006) find evidence of a deterrence effect in the form of a reduction in murder rates while Katz *et al.* (2003) find little evidence that higher execution rates lower crime rates. Donohue and Wolfers (2009, 2010) reexamine previous studies on capital punishment and conclude that existing data does not offer clear evidence of either a deterrent or antideterrent effect and stress that they are "profoundly uncertain" of the impact of executions on homicides.

Mirroring the uncertainty in the effectiveness of death penalty sentencing, its constitu-

tional legality has been called into question numerous times. In *Furman v. Georgia* (1972), the Supreme Court ruled that the use of capital punishment on William Henry Furman, a home burglar who murdered a house owner and was convicted after a one-day trial, constituted "cruel and unusual punishment" and therefore was a violation of the Eighth Amendment. This effectively put a moratorium on all but a few death sentences in the U.S. and forced states to rewrite legislation to avoid problems with "arbitrary and capricious" death penalty sentencing.[7] 34 states subsequently passed new statues conforming to this requirement. In *Gregg v. Georgia* (1976), the Supreme Court ruled that new death penalty statues in California, Florida, and Texas were constitutional, thus leaving the choice to maintain capital punishment to state legislatures.[8] Currently, the use of death penalty is legal in 31 out of 51 states, and in all but a few states a death penalty sentence is reserved for only the most severe of offenses, namely, murder.[9]

As the nature of capital punishment legislation evolved, so did the methods of executing prisoners. Recent trends indicated that older, more cruel methods such as electrocution or gas chamber were being phased out in favor of lethal injection, which was perceived to be more humane.[10] To provide a snapshot of executions throughout the years, Figure 2a plots the national execution rate (per 100,000 residents) from 1980 to 2015 using data from the Death Penalty Information Center.[11] Executions steadily increased up until 2000, then fell back to early-1990s level. It is worth noting that the distribution of executions is uneven across states: since 1976, Texas has executed more prisoners (538 out of 1,438 total) than the next six highest states combined.

[7] "Arbitrary and capricious" was the original language used in determining the the death penalty was unconstitutional during *Furman v. Georgia*.

[8] While there is a federal death penalty, very few cases where federal prosecutors sought a death penalty sentence actually resulted in an execution. Most of these cases settled before an inmate was sent to death row in the form of an acquittal or a reduction of sentence to life in prison.

[9] "Murder" in this context includes, but not limited to, capital murder, first-degree murder, and aggregated murder.

[10] Nonetheless, recent shortages of lethal injections have forced states to consider bringing back previous execution methods.

[11] Sentiment on the death penalty (Figure 1) is superimposed on this graph, as well as subsequent graphs, to facilitate easy comparisons.

One of the many proposed explanations for the decline in death penalty support in recent years is the persistent problems in administering executions.[12] Sarat (2014) documents the many incidents of botched execution in the U.S. and estimates that 3% of all executions were botched. Among all methods of execution, lethal injection has the highest rate of failure (about 7%), followed by lethal gas (5.4%) and hanging (3.12%). Notable cases of botched execution can attract widespread media attention and serve as reminders about the potential cruelty of capital punishment. Indeed, in the wake of a gruesome botched execution in Oklahoma in 2014,[13] President Barack Obama called for a reexamination of the way executions were being carried out in the U.S.[14] Figure 2b plots the rate of botched execution per 100,000 residents using information from Sarat (2014): in spite of several notable spikes, there does not seem to be a discernible pattern in the time series.

Another hypothesis for the decrease in public sentiment in favor of capital punishment is the possibility of executing an innocent person. Using survival analysis, Gross *et al* (2014) estimate the probability of a wrongful death sentence to be about 4%, conservatively. Additionally, since 1973, 156 death row inmates were eventually exonerated.[15] Together, these statistics strongly suggest that there is a distinct possibility capital punishment can lead to the execution of an innocent person, a fact documented extensively with case studies of previous death sentences by Radelet and Bedau (1998). Huff (2002) surveys personnels in the criminal justice system and points out several possible causes for wrongful convictions: eyewitness errors, overzealous police and prosecutors, false and coerced confessions, and ineffective assistance of counsel. He makes several policy recommendations to reduce these instances; among them the abolition of the death penalty, enactment of measures to compensate those who are wrongfully convicted, and an increase in the use of DNA testing whenever possible.

[12]Time Magazine, "The Death of the Death Penalty"
[13]Clayton Lockett was believed to be in pain for more than 40 minutes before dying from a heart attack due to his body's reaction to a new mix of lethal injection that had not been used before.
[14]The Atlantic, "The Cruel and Unusual Execution of Clayton Lockett"
[15]Source: Death Penalty Information Center

There has been a steady increase in the number of exonerations,[16] with and without the help of DNA testing. For instance, only one fifth of all exonerations in 2015 relied on DNA evidence while the rest were due to non-DNA factors such as false confession, mistaken witness identification, or official misconduct. The National Registry of Exonerations (NRE) explains that this is due to two reasons: first, the share of DNA-related exonerations will go down as information about less well-known exonerations (those without DNA evidence) become more available. Second, it is increasingly more likely that DNA evidence is utilized before trial, not after, and thus the role of DNA in exonerating the wrongfully convicted post-trial has been diminished. Figure 2c plots the national rate of exoneration with data from NRE.

2.2 Determinants and Consequences of Death Penalty Support

Americans have consistently expressed support for the use of capital punishment. Historical data by Gallup indicates that except for the two decades between 1950 and 1970, where death penalty support hovered around 50%, the favorability of capital punishment as a possible sentence for persons convicted of murder has always been above 50% since the 1930s.[17] Consistent with Figure 1, the Gallup data shows a peak in support in the early 1990s at 80% and a decline back to low 60s ever since.

Previous studies have documented several determinants of this support. Traditionally, individual factors such as gender, race, place of residence, and political affiliation have been shown to significantly influence death penalty sentiment. For instance, Bohm (1991) and Longmire (1996) both attribute increasing support for capital punishment to being white, conservative, male, and living in a non-urban setting. Using data from the General Social Survey, Stack (1990) finds that increasing racial prejudice is associated with higher death

[16] There are various definitions of what exactly qualifies as an exoneration. The National Registry of Exoneration, for example, defines an exoneree as a person who "was convicted of a crime and later was either: (1) declared to be factually innocent by a government official or an agency with an ability to make the declaration or (2) relieved of all the consequences of the criminal conviction by a government official or body with the authority to take that action.

[17] Gallup, "Death Penalty Historical Trends." `http://www.gallup.com/poll/1606/death-penalty.aspx`

penalty support. Similarly, using Census data, Soss *et al.* (2003) discover that racial prejudice, as approximated by the black percentage of county residents, is a significant predictor for capital punishment favorability among whites. In my analysis of the determinants of public opinion on the death penalty, I include common demographic controls such as age, gender, race, marital status, education, party affiliation, as well as sentiment on the harshness of the criminal justice system. My findings are broadly in line with previous research regarding the impact of these factors on the favorability of the death penalty.

Crime, or the fear of crime, has often been examined as a predictor for death penalty support. While Warr (1995) and Gross (1998) find little correlation between public perception on crime rate and penalty support, other studies have offer contradicting evidences. For example, Sims and Johnston (2004) observe that fear of crime is associated with higher death penalty support, though this impact is less than the impact of demographic factors. Additionally, Keil and Vito (1991) find that the fear of crime in a neighborhood results in greater support for capital punishment, and that it plays a crucial role in mediating the impact of other demographic factors.

To facilitate a visual comparison between crime rate and death penalty support, Figure 2d plots the national violent crime rate, again, per 100,000 residents, from 1980 to 2014 using data from the Uniform Crime Report. We can observe some resemblances to Figure 1: crime rates increase up until the mid 1990s and decrease ever since, which lends credence to the theory that violent crime rate is an important factor to consider in explaining death penalty sentiment; indeed, my analysis points to a significant contemporaneous relationship between the two factors. In all but a few specifications, I control for the state-level violent crime rate to net out any confounding impact on death penalty sentiment due to changes in the crime environment.

One might wonder if changes in support to the death penalty, a stated-preference variable, could have consequences on revealed-preference based outcomes. Previous research has found a linkage between public opinion on capital punishment and policy and practice at the state

level (Norrander 2000, Fisher and Pratt 2006). More relevant to this study, Brace and Boyea (2008) show that public opinion can have a direct and indirect impact on the judicial system. In states where Supreme Court judges are elected instead of appointed, they find that judges are more likely to uphold capital punishment sentences when the state is more in favor of capital punishment. They take this as evidence of a direct impact of public sentiment on the death penalty. Furthermore, they show that public sentiment can also have an indirect effect by way of changing the composition of Supreme Courts; that is, elective states with higher pro-capital punishment sentiment tend to vote for more conservative judges, thus increasing the likelihood that capital punishment sentences will be upheld. These findings build upon work by Huber and Gordon (2004), who show that judges in elective states tend to become more punitive as elections approach, suggesting that public sentiment plays an important role in influencing the judicial process.

In this study, I consider the effect of individual demographic factors and state-level measures of exoneration, executions, and botched executions on influencing public opinion regarding the death penalty. To the best of my knowledge, the role of exonerations and executions in changing death penalty sentiment has not been previously considered. I analyze these factors jointly to account for any correlation among them in changing public perception. For example, a higher rate of exoneration could coincide with a higher crime rate, since there are presumably more arrests and more wrongful convictions, and so omitting either variable will bias the coefficient estimate for the other variable. Furthermore, one could imagine a scenario where execution and botched execution have opposite effects on death penalty sentiment, as the former could be considered an indicator of a "tough on crime" attitude and thus more likely to increase death penalty support while the latter would decrease support due to its gruesome and public nature. Additionally, my study also contributes to the research on the consequences of a changing public perception on the death penalty by documenting a reduction in the number of death sentences as a result of being exposed to more exonerations.

2.3 Stigma-Attaching Events and Belief-Updating Behaviors

An exoneration or an execution might be considered a stigma-attaching event given the associated publicity. There is an established literature measuring the impacts of such events on a number of wide-ranging outcomes. Studying the religious market after the Catholic church sex abuse scandal in the early 2000s, Hungerman (2003) finds that such scandals are responsible for a fall of two million members in the Catholic Church and a $3 billion decrease in donation to the Church that is offset by an increase in non-Catholic participation and donations. Similarly, Bottan and Perez-Truglia (2015) find that within a zip code that witnesses a clergy sex scandal there is a 3% decline in religious participation and 1.3% decline in charitable donations while Dills and Hernandez-Julian (2012) document a decrease in the availability of Catholic schooling steaming from the same scandals. Research in the political science literature also suggests that scandals involving politicians can affect a candidate's evaluation (Vonnahme 2014), political support (Maier 2010), and the probability of being reelected (Basinger 2012).

If individuals increase their opposition to the death penalty after witnessing an exoneration or an execution, they must be engaging in belief-updating behaviors in the presence of new information. This paper therefore contributes to the literature on belief-updating as a result of being exposed to plausibly exogenous events. In an experiment in Malawi, Godlonton and Thornton (2013) find that individuals' perceptions about HIV risks alter significantly after learning about the infection status of their friends and neighbors from the experiment. Along the same dimension, Lange (2011) shows that exposure to new medical evidence leads to an increase in cancer risk perception and a subsequent increase in willingness to undertake additional tests and screenings. Oster *et al.* (2013) study the relationship between behavior and belief in the opposite direction and find that testing rates are higher for individuals with higher ex ante risks of Huntington disease, suggesting that beliefs can also strongly influencing behaviors. Similarly, de Paula *et al.* (2014) find that downward revisions in the belief of being HIV positive can lead to an increase in risky behavior.

The findings in this paper adds to the literature on the impact of stigma-attaching events and belief-updating behaviors. A change in support for the death penalty as a result of being exposed to an exoneration or an execution (botched or not) would provide additional evidence on the impact of stigmatic events; moreover, such results also suggest that individuals choose to update their beliefs and behaviors in the presence of new information.

3 Data and Methodology

3.1 Data

My data on exonerations comes from the National Registry of Exoneration, a project of the University of Michigan Law School. This data set tracks instances of both DNA and non-DNA exonerations in the United States from 1989 to 2014 and classifies them according to a number of factors, such as location, type of crime, reason for conviction overturn, demographic characteristics of the wrongfully convicted, and sentence length.[18] My exoneration measure will be derived primarily from this data set. Data on all executions in the U.S. is obtained from the Death Penalty Information Center, while information on botched executions comes from Sarat (2014). Violent crime rate, to be used as a state-level control variable, is from the Uniform Crime Report, a data collection agency operated under the direction of the FBI. Collectively, my main independent variables of interest are balanced panels of exoneration, execution, and botched execution from 1980 to 2014.[19]

One of my dependent variables, sentiment on the death penalty, come from the General Social Survey (GSS), an extensive data set cultivated by the National Opinion Research Center at the University of Chicago. Every two years, one in roughly 50,000 households is

[18] To the best of my knowledge, this is the most extensive database on exonerations in the U.S., but due to nature of tracking exonerations this data set is continuously updated at different point in times. This should not have an effect on my results since most updates to the data address the most recent exonerations and few concern exonerations in the past. The data set used in this paper is current as of February 2016.

[19] Additional checks reveal that property crime rates, the other type of crime rate in the Uniform Crime Report, do not affect sentiment on the death penalty and thus they are not considered in my analysis.

selected to participate in the GSS, and one member in each household is selected to answer the questions in the survey. Questions on the GSS range from personal characteristics to attitude towards religion, culture, politics, law enforcement, and the criminal justice system, the last two of which are particular relevant to my research question. I use the confidential version of the GSS (which includes information on respondents' places of residency at the time of survey) to match survey participants to exonerations and executions happening within the same geographic boundaries within the same years. The analysis in the following sections classifies both exoneration and execution exposure at the state level, though one could imagine them being classified at the county level as well. The main concern with county-level classification is that there is a possibility that news about an exoneration or an execution travels across county lines more easily than state lines. My analysis essentially boils down to a comparison in sentiment between the treatment group, which is exposed to an exoneration or an execution, and a control group, which is not; thus, county-level classification could lead to the control group being partially treated and so the true impact will be underestimated.

During the early years of my sample (from 1980 to 1993), the GSS surveyed respondents almost every year. Beginning in 1994, it switched to a biennial model where surveys were conducted in even-numbered years only. While this is not a concern during the examination of the contemporaneous impact of exonerations and executions on death penalty sentiment, one could imagine that the effect can last several years due to the prolonged nature of such events and thus leads and lags of exoneration and execution should be included in the model. This creates a challenge in merging GSS and exoneration and execution data due to the unbalanced gap in GSS survey years.

To address this problem, I first create a balanced panel of exonerations and executions and generate (up to two) leads and lags for each variable. I then merge this data set to GSS data. This ensures that, despite the uneven gap in GSS survey years, the leads and lags of my explanatory variables always correspond to the years immediately before and after an event.

That is, each person in GSS surveys is associated with the executions and exonerations in the immediate two years preceding and following the year he or she is surveyed.

Lastly, to measure the impact of exonerations and executions on revealed-preference outcomes, I utilize data on death sentences from the Bureau of Justice Statistics' annual reports on capital punishment, curated by the Death Penalty Information Center.

3.2 Methodology

My baseline regression model is:

$$\begin{aligned} Support_{ist} = X_{ist}\beta + \delta_1 Exoneration_{st} + \delta_2 Execution_{st} \\ + \delta_3 Botched\_Execution_{st} + \alpha_s + \gamma_t + u_{ist} \end{aligned} \tag{1}$$

where $Support_{ist}$ is a binary indicator that equals 1 if an individual i living in state s in year t states that he or she supports the use of the death penalty as a possible sentence for murder convictions, X_{ist} is a vector of individual characteristics, and α_s and γ_t are state and year fixed-effects, respectively. $Exoneration_{st}$, $Execution_{st}$, $Botched\_Execution_{st}$ are some measures of exposure to those events at the state level. Consistent with previous research, the matrix of control variables includes age and binary indicators for gender, race, income, work status, education, political party affiliation, and general view on the criminal justice system. I use two classifications of exoneration and execution exposure: a binary indicator that equals 1 if there is an event in state s during year t and a count of exoneration, execution, and botched execution per 100,000 residents of state s in year t. While the interpretation of the coefficient estimates differs across the two classifications, statistical significance remains rather consistent. Lastly, since the variation of my independent variable is at the state level, standard errors are clustered at that level.

To investigate the impact on death sentence, I run the following regression model:

$$\Delta Death\_sentence_{st} = \Delta X_{st}\beta + \delta_1 \Delta Exoneration_{st} + \delta_2 \Delta Execution_{st} + \delta_3 \Delta Botched\_Execution_{st} + u_{st} \quad (2)$$

Since the death sentence data is at the state level, GSS individual data is also aggregated to the state level to be utilized as controls. In some specifications, I also include state fixed effects, which is equivalent to models in level with state-specific time trends. A first differencing model is chosen over an aggregated state-level fixed effects specification because of concerns regarding the impact of time-persistent factors that cannot be easily captured by year fixed effects as well as state-specific linear time trends. Indeed, since the time period in my data set spans over 30 years (1980 - 2014), there is a possibility that sentiment on the death penalty during this extended period evolved in a manner that is not adequately explained by common fixed effects and linear trends, and thus a first difference model is my preferred specification when analyzing state-level data.

Finally, to measure the prolonged impact of exoneration and execution, Equations (1) and (2) are augmented to include two lags and leads of each of those variables. I find some evidence of lag impact, and more importantly, little evidence of lead impact, which confirms that the results are not driven by trends that are unaccounted for in the models.

4 Results

Summary statistics are provided in Table 1. Examining Panel A, we can see that the average age at conviction for an exoneree is 28.45 and that about a quarter of exoneration is achieved with the help of DNA evidence. Looking across exoneration characteristics, murder conviction accounts for 41% of all exonerations, 25% of all exonerees originally receive life sentences (with and without the possibility of parole), 7% receive the highest possible sentence (death), and almost half of all wrongfully convicted individuals are African Americans

(47%). Panel B and C indicate that the average age of an executed prisoner is 41.32, and that most of executions and botched executions are via lethal injections.

Panel D presents summary statistics for GSS data. Survey respondents are 45 years old on average. Males account for less than half of all respondents (45%), while the proportion of Caucasians is 80%. A majority of the sample have at least a high school degree (81%), half are married, and less than half self-describe as Democrats (47%). 73% have favorable views of the death penalty, a high level of support relative to recent years.

4.1 Determinants of Death Penalty Sentiment

The main regression results are provided in Table 2. Here, exonerations and executions are classified as binary indicators: that is, the independent variables $Exoneration_{st}$, $Execution_t$, and $Botched\_Execution_{st}$ are 1 if there is an exoneration, execution, or botched execution occurring in state s in year t and 0 otherwise. The top panel of Table 2 displays the impact of state-level measures of exoneration and execution while the bottom panel shows the effect of demographic characteristics.

Results in column (1), which are from a regression that only includes individual characteristics, are broadly consistent with previous findings about determinants of death penalty sentiment. Being older or a member of the Democratic party significantly decreases support for capital punishment while being male, white, in the top income bracket,[20], a full time worker, married, having a high school degree and thinking the court system is too lenient on criminals (a proxy for attitude on the criminal justice system) are all predicted to increase death penalty support, and all but full time work status are significant that the 5% level. Column (2) adds to this specification exonerations, executions, and botched executions, while column (3) augments the model with violent crime rate as an additional control. We can observe that there are little changes to the coefficient estimates or statistical significances for variables in the bottom panel across the three columns; unsurprisingly, demographic

[20]GSS defines the top income bracket as $25,000 or above per year. This low threshold leads to about half of the sample being classified as being in the top income bracket.

characteristics are strong predictors of public opinion regarding capital punishment.

Looking at column (2), exposure to an exoneration is predicted to decrease support for the death penalty by about 2.7 percentage points, and this result is quite robust to the inclusion of violent crime rate in column (3), though the magnitude of the coefficient estimate decreases in the presence of this additional control. Given that the average level of capital punishment support is 73%, being exposed to an exoneration significantly decreases the probability of supporting the death penalty by about 3.2% relative to the mean in the most comprehensive specification (column 3). Neither execution nor botched execution exposure seems to have an impact on death penalty sentiment in either column.

Table 3 investigates the robustness of exoneration exposure to various model modifications. Column (1) reproduces the baseline result in column (3) of Table 2, while columns (2) to (5) examine results when a state-specific linear time trend is included, when the sample is restricted to only include years since 1990 (when the majority of exonerations took place), when region-by-year fixed effects are included, and when outliners such as Texas and New York, the two states with the highest number of exonerations, are excluded. We can see that the estimated effects of exonerations are quite stable across these specification changes, and that all are significant at the 1% level.

Table 4 replicates the specifications in Table 2 except that exonerations and executions are now defined as rates per 100,000 state residents instead of binary exposure indicators to capture the effect of having an additional exoneration instead of having any exoneration at all.[21] The main implications of Table 2 for state-level measures are retained: mainly, there is a significant impact of exonerations on death penalty sentiment while the effects of executions are indistinguishable from zero. For brevity, the coefficient estimates for demographic factors are not reported in this table but they are very similar to those found in the top panel of Table 2. To make sense of the coefficient estimates for exoneration, consider the increase

[21] While there are many ways to define per-capita rates, per 100,000 state residents is selected so there is a consistency in measurement with respect to the crime rate control. Data on state population comes from the Census.

in exoneration rate from 0.011 per 100,000 people in 1990 to 0.022 in 2010 (this increase roughly corresponds to exoneration rate doubling from its average level of 0.01). This rise in exoneration rate over 20 years is predicted to decrease support for the death penalty by about 0.4 to 0.6 percentage points given the coefficient estimates in Table 4.

An event study could be conducted to alleviate concerns about the endogeneity in the timing of exonerations and executions. For instance, exonerations could be the result of increasing public sentiment against the death penalty, or, in contrast, more death row prisoners could be executed as the public becomes more receptive to a "law-and-order" attitude regarding criminals and incidences of crime. Nonetheless, a conventional event study is difficult to implement due to the nature of these events. As most states experience periods of rapid succession in exoneration (and to a lesser extent, execution and botched execution), it is not clear how to define pre- and post- periods in accordance to standard event study practice. Instead, I augment Equation (1) with the inclusion of two lags and leads of each of the main independent variables to account for their impact contemporaneously and beyond. Since exonerations and executions can occur over an extended time period,[22] this approach is well-suited to capture the prolonged impact of these events. Coefficients on lagged variables would measure the impact of exonerations and executions after their occurrences and could potentially be significant, which we could take as evidence of a spillover effect beyond the contemporaneous exposure. More problematic is the case where there are significant effects for leading variables. One could take it as evidence of an anticipation effect, but it is rather unlikely that survey respondents would be able to predict when an exoneration or an execution takes place in the future and react appropriately. Most likely, this is evidence of trends that have not been adequately captured in previous estimation. Fortunately, while I find evidence of lagged impact, the coefficients on lead variables are never significant at the 5% level.

[22]The Innocence Project of Florida estimates that it takes, on average, 8 years for a successful exoneration to be carried out from beginning to end, while according to the Death Penalty Information Center it could take as much as 20 years (and possibly longer) from the time of sentencing and the execution of a death row inmate.

Figure 3 plots the coefficients and 95% confidence intervals for the first two lags and leads of exonerations, executions, and botched executions. In each of these figures, exonerations and executions are defined as exposure indicators, and all point estimates and confidence intervals come from the same regressions. Examining Figure 3, we can see that exoneration exposure has both a contemporaneous impact and a decreasing residual impact, though the residual effects are insignificant. Furthermore, the contemporaneous impact is quite similar in magnitude to that in Table 2, suggesting that exonerations have the biggest and most direct impact during the years they actually happen. Executions do not seem to have an impact, contemporaneous or otherwise, while botched executions have a residual impact the year after they happen. Caution should be exercised in interpreting the coefficients on botched executions, however, since there are very few instances of them and they could be correlated with executions.

Figures 4 presents results from the same analysis of lag and lead impact but with exonerations and executions being defined as rates instead of binary indicators. Again, the implications of previous findings remain: exonerations have a contemporaneous impact (though it is now only marginally significant) while the rest of the state-level independent variables do not. Additionally, exonerations now have a strong residual impact in the first year following their occurrences; nonetheless, such effect dissipates in the second year.

4.2 Heterogeneous Impact of Exonerations

Since exonerations are consistently identified as a significant predictor for death penalty sentiment, Table 5 and 6 presents heterogeneity analyses of this impact. Table 5 examines the effect of different types of exonerations while Table 6 analyzes the results when GSS survey respondents are split into different subgroups. In Table 5, only the exoneration variable in the baseline specification varies while the rest remains the same. Each cell is a separate regression, and all specifications utilize the binary classification of exonerations for ease of interpretation. For example, the coefficient estimate of -0.0119 in column (2) suggests that

being exposed to any exoneration with a black exoneree decreases death penalty sentiment by 1.19 points, though this effect is not significant. Columns (1) to (4) explore sensitivity of the results to different exoneration classifications: by original crime, race, DNA help, and sentence.

We can see that overturned convictions in murder and homicide appear to have a high impact in changing death penalty sentiment compared to sexual assault or drug-related exonerations, while the impact of black exonerees or exonerations with DNA evidence is indistinguishable from zero. Indeed, the impact of exoneration appears to be driven by non-DNA cases, possibly because the use of DNA evidence has become more prevalent in pre-trial analysis and is thus not effective in post-trial exoneration.[23] Finally, exonerations with either life in prison or death sentences have relatively high impact, though only the coefficient on life sentence is significant. It is interesting to note that the impact of exonerating a death row inmate with DNA evidence is larger in magnitude than the impact of a death row exoneration alone.

Table 6 presents results when Equation (1) is estimated across various subgroups in the GSS data. Compared to the baseline estimated impact in Table 2 (-0.0240), the effect of exoneration exposure is smaller in magnitude among whites, males, and high school graduates while it is roughly the same for those who are married, are self-identified Democrats, or those reporting a harsh attitude towards the criminal justice system (as exhibited by their agreement that the court system is too lenient on criminals). Older age appears to decrease sentiment in favor of capital punishment quite a bit: the estimated impact of an exoneration is almost twice the baseline effect among the population over the age of 40.

Table 7 explores the racial implication of exonerations. In this table, I split the GSS data into white and black respondents and estimate the effect of being exposed to an exoneration with white and black exonerees for both groups.[24] Even though all coefficients are impre-

[23]The coefficient estimate on a binary indicator for non-DNA exoneration exposure is -0.0241 and it is significant at the 1% level.

[24]Since the main classifications for race in GSS data are "white", "black", and "other", it is difficult to identify racial impact of exonerations among Asians or Latinos.

cisely estimated, the qualitative results are compelling: regardless of the exoneree's race, white respondents exhibit little adjustment in death penalty sentiment[25] while exonerations decrease black respondents' support for capital punishment, and this impact is particularly strong when the exoneree is also of the same race.

4.3 The Effect of Exonerations on Death Sentences

To determine if a decrease in public opinion in favor of the death penalty resulting from more exonerations brings about additional changes in the criminal justice system, Table 8 presents results when the dependent variables are death sentences while Figure 5 presents an analysis of lag and lead impact of exonerations on the same outcome. Since the outcome variable is a state-level measure, all regression specifications are from the first difference model. The sample size is significantly smaller due to the fact that the unit of observation is a state-year and only states with capital punishment are considered during this analysis.[26]

In Panel A of Table 8, results suggest that having an exoneration decreases the number of death sentence by about 1.1 to 1.2 incidents per year while executions and botched executions do not appear to be significant predictors of death sentences being issued by states. The decrease in death sentence as a result of having an exoneration corresponds to about a 20% decrease from the average level during the time period in the sample (about 5.4 per state per year). In Panel B, while the impact of exoneration on death sentences is statistically insignificant, the sign of the coefficient estimates conform to the findings in Panel A and they also have sensible interpretations. For example, column (1) in Panel B suggests that the rise in the exoneration rate of 0.011 from 1990 to 2010 is associated with a decrease of about 0.25 death sentences per year (0.011×22.0691), or a 5% decrease from the mean level. Finally, Figure 5 indicates that once lag and lead impact are accounted for, exonerations do not seem to significantly decrease death sentences. However, the it is not clear whether such

[25] This is consistent with the finding in column (2) of Table 5: exonerations have a smaller and less significant impact among white respondents.

[26] This number varies between 31 and 43 states during the years in my sample.

effect is diminished in the presence of lags and leads or that there is not enough power to identify the impact, as the coefficient estimates for the contemporaneously impact are rather similar to those found in Table 8.

5 Conclusion

This paper examines the impact of a number of factors on sentiment regarding the death penalty. I find that being exposed to an exoneration significantly decreases the likelihood of supporting capital punishment as a potential sentence for murder convictions. Exposure to incidents of executions and botched executions does not seem to change public opinion. Furthermore, exonerations also decrease the number of death sentences issued by states, and this effect is most significant during the years of their occurrences. My findings contribute to the literature on determinants and consequences of a changing public opinion on capital punishment; furthermore, the results are consistent with a narrative about individuals choosing to update their beliefs about the necessity of capital punishment in the presence of new information in the form of a stigmatic event.

To the best of my knowledge, this is the first study to examine the influence of exoneration (and, to a lesser extent, execution) on death penalty sentiment. As such, there are many potential additions to this nascent literature; for instance, future research could attempt to quantify the precise mechanism that links exoneration to a reduction in death penalty favorability and the role of such mechanism through time. It is possible that, as information begins to travel faster with the advent of the internet and mobile technology, the impact of exonerations on decreasing death penalty sentiment could become more pronounced in the coming years. Another possible research area is on the impact of exonerations on other outcomes: if it is indeed the case that judges in states where they are elected instead of appointed are more receptive to public sentiment on capital punishment, the effect of exonerations on the criminal justice system is more likely to be clear-cut and definite in these

states. Yet another study could examine the possibility that, if anything, DNA exonerations could increase death penalty support since there is more certainty that a guilty criminal is being convicted. Such an effect could be a potential explanation for why sentiment in favor of the death penalty is increasing again, judging by recent public measures to bring back capital punishment being approved in California, Nebraska, and Oklahoma.

Given that public debates regarding the use of capital punishment are currently ongoing across the U.S., the findings of this paper could be of relevance to legislators that are in the process of examining the need for the death penalty. The evaluation of a death penalty abolition should be processed in conjunction with an understanding of public opinion in favor of such legislative change and the determinants behind it. Furthermore, it is imperative that lawmakers be informed about potential shifts in the political landscape in response to a decline of public favorability in the death penalty. My paper provides empirical evidence in support of exonerations as a driver in affecting sentiment regarding the death penalty; furthermore, exonerations could also impact the criminal justice system by way of reducing the number of death sentences.

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Tables

Table 1: Summary Statistics

	Mean	Median	Std. Dev
Panel A: Exonerations, N = 1,797			
Age	28.62	26	10.16
DNA	0.23	0	0.42
Murder	0.41	0	0.49
Life	0.25	0	0.43
Death	0.07	0	0.25
Black	0.47	0	0.50
Panel B: Executions, N = 1,436			
Lethal Injection	0.88	1	0.33
Black	0.34	0	0.48
Panel C: Botched Executions, N = 102			
Lethal Injection	0.72	1	0.45
Electrocution	0.25	0	0.44
Panel D: GSS, N = 48,947			
Age	44.54	42	16.99
Male	0.45	0	0.50
White	0.80	1	0.40
High school	0.81	1	0.39
Married	0.59	1	0.49
Democrats	0.47	0	0.50
Support death penalty	0.73	1	0.44

Sources: National Registry of Exonerations (Panel A), Death Penalty Information Center (Panel B), *Gruesome Spectacles* by Austin Sarat (Panel C), and the General Social Survey (Panel D). Summary statistics in Panel D are weighted by the probability weights provided by GSS.

Table 2: Determinants of Death Penalty Sentiment

VARIABLES	(1)	(2)	(3)
1(Exoneration)		-0.0271***	-0.0240***
		(0.0062)	(0.0061)
1(Execution)		0.0095	0.0053
		(0.0140)	(0.0131)
1(Botched Execution)		0.0183	0.0201
		(0.0130)	(0.0129)
Age	-0.0006**	-0.0006**	-0.0006**
	(0.0002)	(0.0002)	(0.0002)
1(Male)	0.0776***	0.0775***	0.0776***
	(0.0063)	(0.0062)	(0.0062)
1(White)	0.1175***	0.1175***	0.1146***
	(0.0215)	(0.0216)	(0.0216)
1(Top Income Bracket)	0.0770***	0.0761***	0.0759***
	(0.0203)	(0.0202)	(0.0202)
1(Full Time Worker)	0.0155	0.0163	0.0175
	(0.0196)	(0.0194)	(0.0193)
1(Married)	0.0515***	0.0515***	0.0514***
	(0.0068)	(0.0068)	(0.0068)
1(High School Degree)	0.0592***	0.0589***	0.0586***
	(0.0131)	(0.0132)	(0.0129)
1(Democrats)	-0.0469***	-0.0469***	-0.0466***
	(0.0047)	(0.0047)	(0.0046)
Observations	35,133	35,133	35,133
State & Year FEs	Yes	Yes	Yes
Crime Rate	No	No	Yes

Notes: Dependent variable: binary indicator for supporting the death penalty as a sentence for persons convicted of murders. Indepent variable: 1 if there is an event in a given state and year, 0 otherwise. Standard errors in parentheses, allowing for clustering at the state level. *** significant at 1%; ** significant at 5%; * significant at 10%.

Table 3: Determinants of Death Penalty Sentiment, Robustness Checks

VARIABLES	(1)	(2)	(3)	(4)	(5)
1(Exoneration)	-0.0240***	-0.0221**	-0.0220***	-0.0269***	-0.0251***
	(0.0061)	(0.0062)	(0.0050)	(0.0066)	(0.0065)
Observations	35,133	35,133	22,927	35,133	30,752
Crime Rate	Yes	Yes	Yes	Yes	Yes
State-linear trends	No	Yes	No	No	No
Post 1990	No	No	Yes	No	No
Region-by-Year Fixed Effects	No	No	No	Yes	No
Excluding Texas & New York	No	No	No	No	Yes

Notes: Dependent variable: binary indicator for supporting the death penalty as a sentence for persons convicted of murders. Indepent variable: 1 if there is an event in a given state and year, 0 otherwise. Each cell is a separate regression. All regressions include state and year fixed effects as well as control variables in the bottom panel of Table 2. Standard errors in parentheses, allowing for clustering at the state level. *** significant at 1%; ** significant at 5%; * significant at 10%.

Table 4: Determinants of Death Penalty Sentiment
Event Count

VARIABLES	(1)	(2)	(3)
Exoneration	-0.5582***	-0.4577***	-0.3797**
	(0.1647)	(0.1375)	(0.1446)
Execution	0.0713	0.0784	0.0214
	(0.0821)	(0.0735)	(0.0704)
Botched Execution	1.0834	0.8830	0.8885
	(0.8600)	(0.6377)	(0.6575)
Observations	39,204	35,133	35,133
State & Year FEs	Yes	Yes	Yes
Controls	No	Yes	Yes
Crime rate	No	No	Yes

Notes: Dependent variable: binary indicator for supporting the death penalty as a sentence for persons convicted of murders. Independent variable: number of events in a given state and year per 100,000 residents. Standard errors in parentheses, allowing for clustering at the state level. Controls include variables in the bottom panel of Table 2. *** significant at 1%; ** significant at 5%; * significant at 10%.

Table 5: Heterogeneous Impact of Exonerations
by Exoneration Characteristics

VARIABLES	(1) Crime	(2) Race	(3) DNA	(4) Sentence
1(Murder & Homicide)	-0.0171**			
	(0.0084)			
1(Sexual Assault)	-0.0133*			
	(0.0077)			
1(Drug)	-0.0018			
	(0.0085)			
1(Black)		-0.0119		
		(0.0072)		
1(DNA)			-0.0038	
			(0.0067)	
1(Life)				-0.0147***
				(0.0052)
1(Death)				-0.0165
				(0.0102)
1(Death & DNA)				-0.0275
				(0.0267)
Observations	35,133	35,133	35,133	35,133

Notes: Dependent variable: binary indicator for supporting the death penalty as a sentence for persons convicted of murders. Each cell is a separate regression. All regressions include executions, botched executions, crime rates, controls, and state and year fixed effects. Controls include variables in the bottom panel of Table 2 . Standard errors in parentheses, allowing for clustering at the state level. *** significant at 1%; ** significant at 5%; * significant at 10%.

Table 6: Heterogeneous Impact of Exonerations
by GSS Respondents' Characteristics

VARIABLES	(1) Male	(2) White	(3) Married	(4) HS Degree	(5) Democrats	(6) Harsh Attitude	(7) Over 40
1(Exoneration)	-0.0177**	-0.0136*	-0.0246***	-0.0144	-0.0203**	-0.0237***	-0.0406***
	(0.0087)	(0.0073)	(0.0246)	(0.0089)	(0.0097)	(0.0078)	(0.0098)
Observations	15,916	28,438	18,165	18,402	16,257	26,297	18,811

Notes: Dependent variable: binary indicator for supporting the death penalty as a sentence for persons convicted of murders. Each cell is a separate regression. All regressions include executions, botched executions, crime rates, controls, and state and year fixed effects. Controls include variables in the top panel of Table 2 . Standard errors in parentheses, allowing for clustering at the state level. *** significant at 1%; ** significant at 5%; * significant at 10%.

Table 7: Racial Impact of Exonerations

VARIABLES	(1) White GSS Respondent	(2) Black GSS Respondent
1(White Exoneration)	0.0020	-0.0281
	(0.0065)	(0.0259)
1(Black Exoneration)	-0.0072	-0.0373
	(0.0056)	(0.0251)
Observations	28,438	4,784

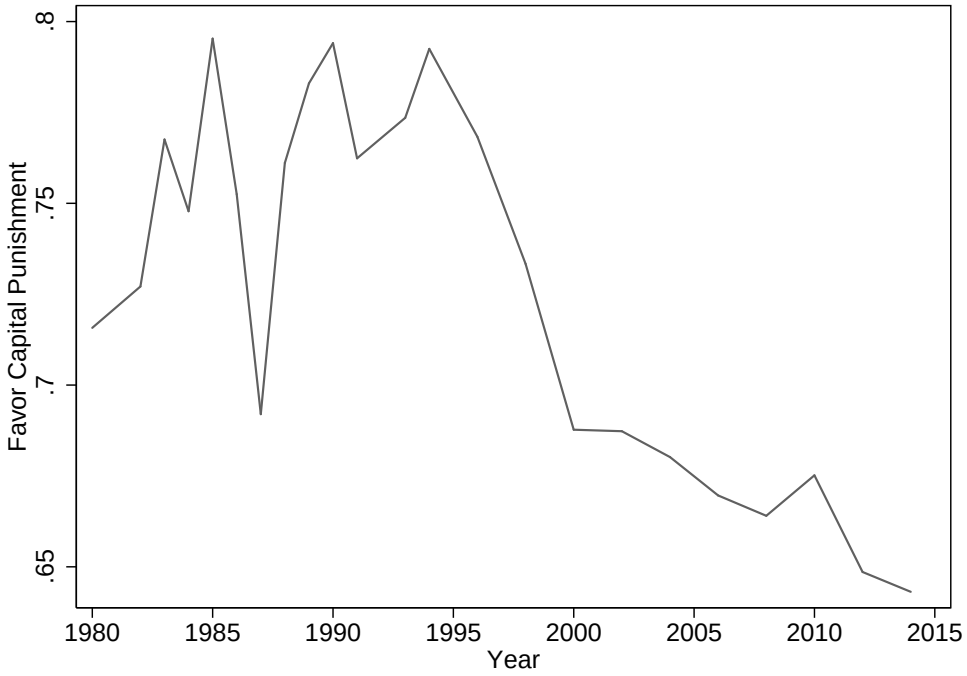
Notes: Dependent variable: binary indicator for supporting the death penalty as a sentence for persons convicted of murders. Each cell is a separate regression. All regressions include executions, botched executions, crime rates, controls, and state and year fixed effects. Controls include variables in the top panel of Table 2 . Standard errors in parentheses, allowing for clustering at the state level. *** significant at 1%; ** significant at 5%; * significant at 10%.

Table 8: Impact on Death Sentences Number

VARIABLES	(1)	(2)	(3)
Panel A: Event Exposure			
1(Exoneration)	-1.2205**	-1.1199**	-1.1274**
	(0.4652)	(0.4833)	(0.4992)
1(Execution)	1.2771	1.3299	1.3506
	(1.4910)	(1.4466)	(1.4901)
1(Botched Execution)	0.4198	0.3004	0.2864
	(0.9367)	(0.9934)	(1.0212)
Observations	620	620	620
Panel B: Event Count			
Exoneration	-22.0691	18.2954	-17.9398
	(13.0983)	(14.0164)	(14.4661)
Execution	10.4508	9.5209	9.6061
	(8.2634)	(9.2643)	(9.8193)
Botched Execution	51.9583	51.4434	51.3787
	(39.4268)	(36.7143)	(37.3851)
Observations	620	620	620
Year FEs	Yes	Yes	Yes
Controls	No	Yes	Yes
State FEs	No	No	Yes

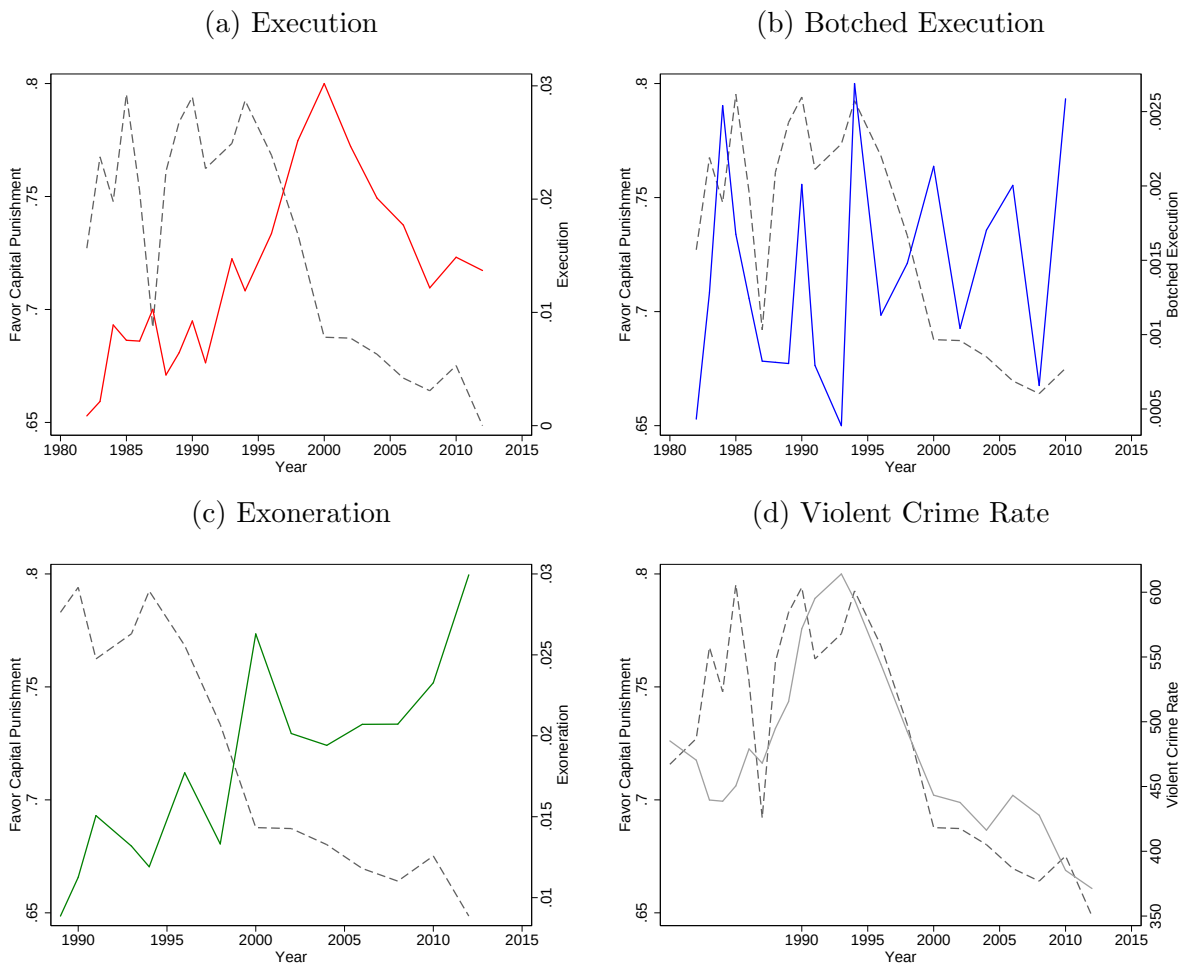
Notes: Dependent variable: Number of death sentences. Sample restricted to states where capital punishment is allowed. Standard errors in parentheses, allowing for clustering at the state level. Regressions are weighted with state populations. Controls include binary indicators for gender, age, race, marital status, education level, family income, political party affiliation, and opinion on the harshness of court sentences. *** significant at 1%; ** significant at 5%; * significant at 10%.

Figure 1: Death Penalty Favorability
Source: General Social Survey



Notes: recoded from the following GSS question: "Do you favor or oppose the death penalty for persons convicted of murder?" "Do Not Know" or "Not Available" responses are discarded.

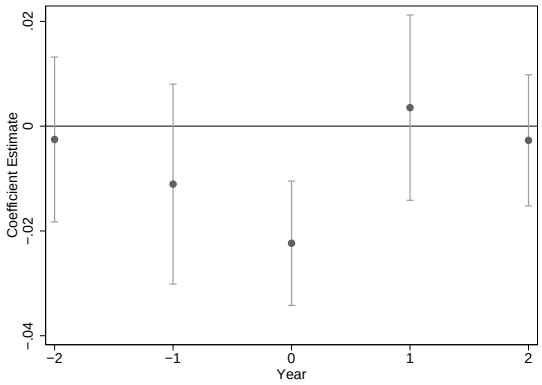
Figure 2: Trends in the Criminal Justice System



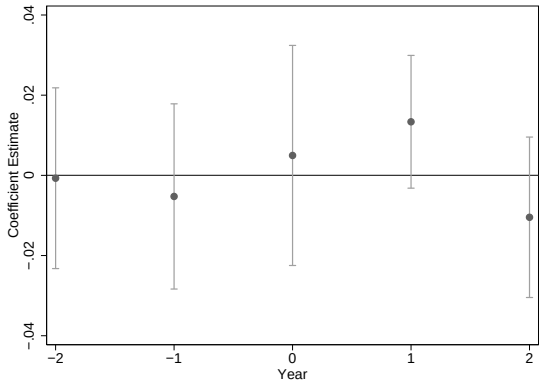
Notes: data from Death Penalty Information Center (Panel a), *Gruesome Spectacles* by Austin Sarat (Panel b), National Registry of Exonerations (Panel c), and Uniform Crime Report (Panel d). Sentiment regarding capital punishment (Figure 1) is in dashes.

Figure 3: Lag and Lead Impact, Event Exposure

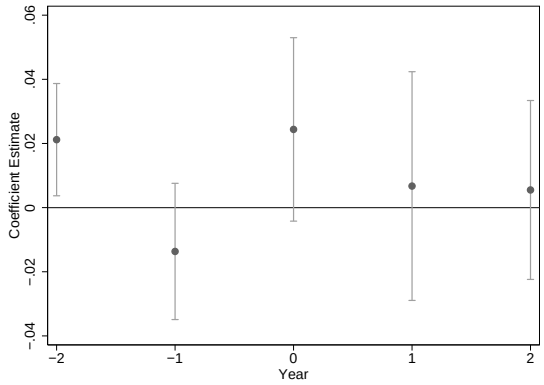
(a) Exonerations



(b) Executions



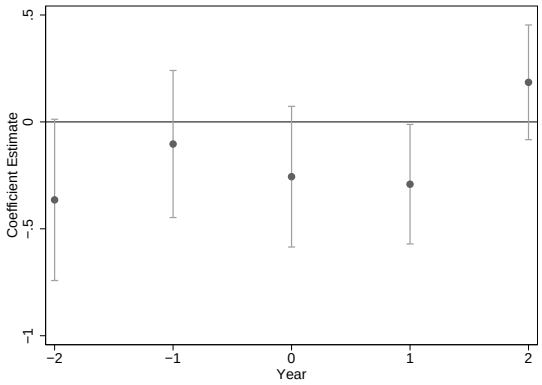
(c) Botched Executions



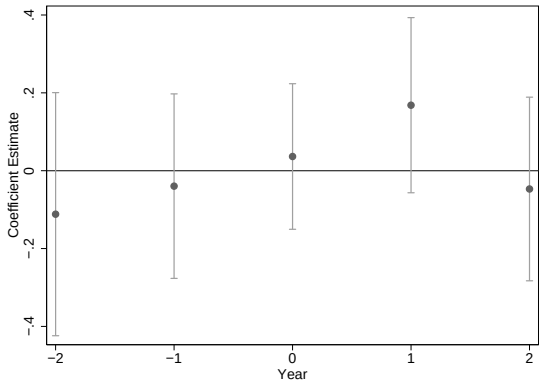
Notes: Dependent variable:binary indicator for supporting the death penalty as a sentence for persons convicted of murders. All coefficients are obtained from a regression with control variables and state and year fixed effects. All lags and leads of exonerations, executions, botched execution, and violent crime are included. The 95% confidence intervals for each coefficient are also displayed.

Figure 4: Lag and Lead Impact, Event Count

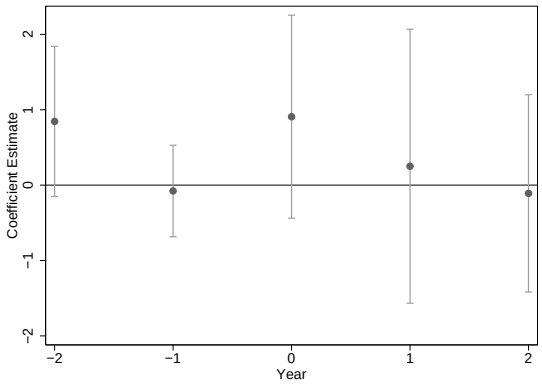
(a) Exonerations



(b) Executions



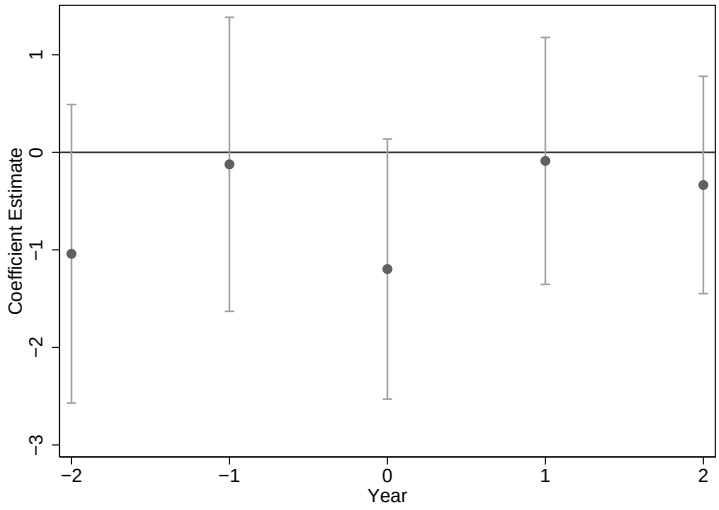
(c) Botched Executions



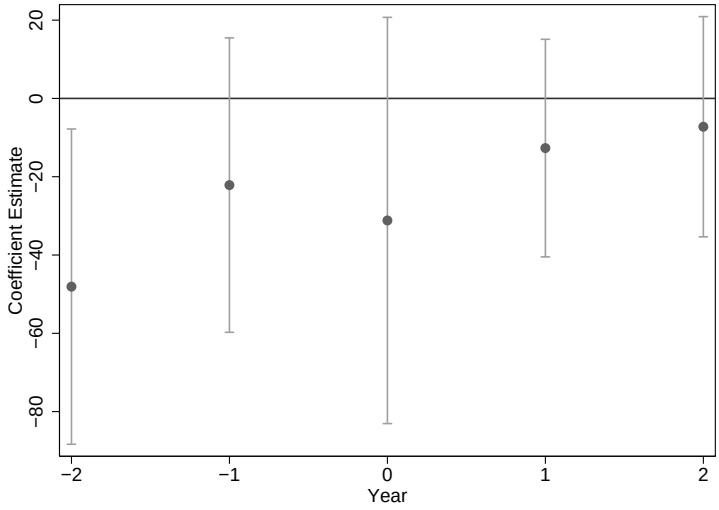
Notes: Dependent variable: binary indicator for supporting the death penalty as a sentence for persons convicted of murders. All coefficients are obtained from a regression with control variables and state and year fixed effects. All lags and leads of exonerations, executions, botched execution, and violent crime are included. The 95% confidence intervals for each coefficient are also displayed.

Figure 5: Lag and Lead Impact
Dependent Variable: Number of Death Sentences

(a) Event Exposure



(b) Event Count



Notes: Dependent variable: number of death sentences. All coefficients are obtained from a regression with control variables and state and year fixed effects. All lags and leads of exonerations, executions, botched execution, and violent crime are included. The 95% confidence intervals for each coefficient are also displayed.