RESEARCH REPORT

The Cost of the Death Penalty in Maryland

John Roman
Aaron Chalfin
Aaron Sundquist
Carly Knight
Askar Darmenov

March 2008

research for safer communities

URBAN INSTITUTE
Justice Policy Center

This document was prepared under a grant from the Abell Foundation.

Points of view or opinions expressed in this document are those of the authors and do not necessarily represent the official position or policies of the Abell Foundation, the Urban Institute, its board, or sponsors.

URBAN INSTITUTE
Justice Policy Center
2100 M STREET, NW
WASHINGTON, DC 20037
www.urban.org

The views expressed are those of the authors, and should not be attributed to The Urban Institute, its trustees, or its funders.

ACKNOWLEDGEMENTS

We would like to thank the Abell Foundation for funding this research, and Amanda Owens for her patience and guidance during this project.

The authors would like to thank the many individuals who assisted our efforts in collecting, preparing and analyzing the data used in this study. We were fortunate to speak with public defenders, state's attorneys and judges throughout the state who had experience with capital cases. Many of these individuals spent significant time discussing their role in death penalty cases, and their assistance was invaluable.

Dr. Raymond Paternoster at the University of Maryland was kind enough to share the data he collected for his study of racial disparities in death sentencing in Maryland. Margaret Donkerbrook, and John DiCamillo at Grubb & Ellis and the Human Resources Department at Maryland Judiciary provided important cost data.

Students at the University of Baltimore Law School provided research assistance. We would like to thank Alicia Donohue, Alana Henninger, Danielle Jordan, Ashley Leebow, Matthew Lewis, Adam Maarec, Daniel Rubenstein, Robert Shuman-Powell, John Tramazzo and Jana White for their assistance.

At the Urban Institute, Terence Dunworth and Christy Visher provided thoughtful guidance throughout the project. Avinash Bhati provided guidance on econometric issues.

ABSTRACT

Maryland reinstated the death penalty in 1978 as a sentencing option for individuals convicted of felony homicide. Since then, five inmates have been executed and five others are on death row awaiting execution. Much has been written about the morality of the death penalty, and many empirical studies have investigated whether the presence of such a statute deters homicides. However there is limited rigorous empirical research on whether the death penalty increases or decreases the cost of prosecution and incarceration. To address this issue, we initiated a study to assess the death penalty's costs to Maryland taxpayers. We study the lifetime costs of all homicides eligible to receive the death penalty where the homicide occurred between 1978 and 1999.

We found that an average capital-eligible case in which prosecutors did not seek the death penalty will cost Maryland taxpayers more than $1.1 million, including $870,000 in prison costs and $250,000 in costs of adjudication.

A capital-eligible case in which prosecutors unsuccessfully sought the death penalty will cost $1.8 million, $700,000 more than a comparable case in which the death penalty was not sought. Prison costs are about $950,000, and the cost of adjudication is $850,000, more than three times higher than in cases which were not capitally prosecuted.

An average capital-eligible case resulting in a death sentence will cost approximately $3 million, $1.9 million more than a case where the death penalty was not sought. In these cases, prison costs total about $1.3 million while the remaining $1.7 million are associated with adjudication.

Between 1978 and 1999 there were 56 cases resulting in a death sentence, and these cases will cost Maryland citizens $107.3 million over the lifetime of these cases. In addition, the 106 that did not result in a death sentence are projected to cost Maryland taxpayers an additional $71 million. In addition, the Maryland Capital Defender's Division cost $7.2 million. Thus, we forecast that the lifetime costs of capitally-prosecuted cases will cost Maryland taxpayers $186 million.

This study evaluates 1,136 cases were a murder was committed between 1978 and 1999 and the defendant was eligible for the death sentence. Estimates of attorney time spent processing these cases were developed from semi-structured interviews with prosecutors, defense counsel and judges with capital experience. Case events were calculated from data in the Maryland Judiciary Case Search database and the federal PACER database. Costs borne by Maryland taxpayers were estimated for each stage of case processing.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS ..... **II**

ABSTRACT ..... **III**

EXECUTIVE SUMMARY **1**
- Research Background 1
- Key findings 2
- Total Costs Per Case 2
- Summary of Total Costs to the State 3

THE COST OF THE DEATH PENALTY IN MARYLAND **4**
- Study Overview 4
- Prior Research 5
- Deterrence 8
- Processing of Capital Cases in Maryland 9
- Pre-trial 10
- Voir Dire 11
- Guilt/Innocence Trial 11
- Penalty Trial and Sentencing 11
- State Post -Conviction Review in Trial Court 13
- Direct Review in Maryland Court of Appeals 13
- Federal Habeas Corpus Review in US District Court 14
- Federal Habeas Corpus Review in US Court of Appeals 14
- Other Petitions for Relief 15
- Data Collection 15
- The Maryland Judiciary Case Search (MDJCS) Database 16
- Survey Data Collection 16
- Federal Data 17
- Removing Not Guilty and Nolle Prose Cases 17
- Constructing an Estimate of the Cost of Case Processing 18
- Methods 19

RESULTS **20**
- Descriptive Statistics 20
- Sample Size By Phase 23
- Event Data By Phase 23
- Bivariate Estimates of the Cost of the Death Penalty 24
- Costs of the Office of the Public Defender, Capital Defense Division 28
- Summary 28
- Sensitivity Analysis 29
- Discussion 29
- Limitations 31

REFERENCES **32**

APPENDIX A – DATA COLLECTION **35**

APPENDIX B – CONSTRUCTION OF CASE-LEVEL COST ESTIMATES **40**

APPENDIX C – ECONOMETRIC MODELS **60**

EXECUTIVE SUMMARY

In 1978, the death penalty was reinstated in Maryland as a sentencing option for a defendant convicted of felony homicide. Between 1978 and September 1999, there were 1,227 homicides where the death penalty was a sentencing option. Of those, 1,136 cases resulted in a guilty verdict in the initial trial or through a plea agreement. In 162 cases, prosecutors filed a "death notice" seeking the death penalty. Fifty-six resulted in a death sentence, although the vast majority of those sentences were ultimately overturned. Since 1978, five people in Maryland have been executed. Five others remain on death row and are awaiting execution. In this study, we estimate the lifetime costs of processing these death eligible cases.

RESEARCH BACKGROUND

Prior research on the costs of capital punishment in other states unambiguously finds that capital cases are more expensive to prosecute than non-capital cases. However, much of the past research relied on limited data and generally studied only a small number of cases. This study tests whether the death penalty resulted in additional costs to Maryland taxpayers and fills a gap in the extant literature by accounting for potentially confounding factors not addressed in prior studies.

A retrospective observational design was used to evaluate this question. Data used in this analysis were developed from several sources. The foundation for the analysis is case data collected by University of Maryland researchers for a 2004 study of disparities in the application of the death penalty in Maryland (Paternoster, Brame, Bacon and Ditchfield 2004). Paternoster and colleagues identified homicides that were eligible to be prosecuted as capital cases in Maryland. His sample includes all cases where the murder occurred between August 1978 and September 1999. From these data, we identified a census of death-eligible, guilty-verdict cases with 1,136 observations, including 162 cases in which a death notice was filed, and 56 death sentences. We estimate the total cost of processing these cases.

In order to estimate the costs of each stage of case processing, we turned to two additional sources. First, we searched administrative databases containing official records on individual case processing, using the Maryland Judiciary Case Search (MDJCS) database and the federal PACER database. All records that matched our sample were coded into our research database. Second, estimates of the time attorneys, judges and support staff spent processing these cases were developed from semi-structured interviews and survey data.

Complete administrative data on case processing were available for 509 of the 1,136 cases. This sample of 509 cases was weighted to resemble the population of 1,136. In addition, a propensity score analysis was conducted to adjust estimates to account for the possibility that capitally

prosecuted cases may have been more egregious, on average, than the typical case that did not receive a death notice. If true, these cases would have been more expensive to prosecute even if no death statute had been in place. Finally, we estimate the cost to Maryland taxpayers associated with each stage of case processing.

We estimated two key costs: 1) those associated with the filing of a death notice; and, 2) those associated with the imposition of a death sentence. We compared the costs for these cases with the cost of processing a capital-eligible case in which no death notice was filed. In this study, the no-death-notice cases represent the cost of processing a felony homicide case in Maryland as if there was no death penalty.

KEY FINDINGS

We find that both the filing of a death notice and the imposition of a death sentence added significantly to the cost of a case. For the average case, a death notice adds $670,000 in costs over the duration of a case. A death sentence adds an additional $1.2 million in processing costs. Thus the average total cost for a single death sentence is about $1.9 million over and above the cost of a similar case with no death penalty sought.

About 70% of the added cost of a death notice case occurs during the trial phase. These additional costs are due to a longer pre-trial period, a longer and more intensive voir dire process, longer trials, more time spent by more attorneys preparing cases, and an expensive penalty phase trial that does not occur at all in non-death penalty cases. In addition, death notice cases are more likely to incur costs during the appellate phase even if there is no death sentence.

TOTAL COSTS PER CASE

- An average capital-eligible case in which the death sentence was not sought costs Maryland taxpayers more than $1.1 million over the life of the case - $870,000 in prison costs and $250,000 in adjudication costs.
- An average capital-eligible case with a death notice costs the taxpayers of Maryland about $1.8 million. In other words, each case with a death notice filing costs $670,000 more than a no-death-notice case. Current and forecasted prison costs are about the same ($950,000 per case), but adjudication costs are more than three times greater ($850,000 per case) than in no-death-notice cases.
- A capital-eligible case that results in a death sentence adds another $1.2 million in costs. The total cost to the taxpayers of Maryland approximately $3 million, more than $1.9 million more per case than a no-death-notice case. Current and forecasted prison costs are higher for death sentence cases ($1.3 million) than no-death-notice cases, and adjudication costs total $1.7 million.

SUMMARY OF TOTAL COSTS TO THE STATE

We find there are substantial costs to the citizens of Maryland associated with the death penalty.

- 56 individuals received a death sentence – at an additional cost to Maryland citizens of $108 million.
- There were an additional 106 cases where a death sentence was sought but not handed down – at an additional cost of $71 million.
- The availability of the death penalty has required the state to operate the Capital Defense Division, with costs more than $7 million for activities not included elsewhere in this study during the period 1978 to 2008.

In sum, we estimate the total cost of the death penalty to Maryland taxpayers for cases that began between 1978 and 1999 to be at least $186 million.

A conservative approach was used to develop these estimates. Thus, this estimate does not include some costs of the death penalty that could not be empirically tested. These include additional pre-trial costs of cases in which a death notice is filed but subsequently waived, the costs of cases tried under a death notice that resulted in a not guilty verdict, and costs of appeals to the United States Supreme Court. If these expenditures could be estimated, they would likely increase the total cost to Maryland taxpayers.

THE COST OF THE DEATH PENALTY IN MARYLAND

STUDY OVERVIEW

This research utilized a retrospective quasi-experimental design to measure the average cost of the death penalty in Maryland. The study makes two comparisons:

(1) the average difference in cost of a capital eligible case in which a *death sentence was sought* by a Maryland state's attorney as compared to the cost of a capital eligible case in which the state's attorney did *not* seek a death sentence; and

(2) the average difference in cost between cases in which *a death sentence was returned* compared to capital eligible cases in which a death sentence was not sought.

The first comparison yields the differential cost of a death notice; the second comparison yields the differential cost of a death sentence. Conceptually, both outcomes are relevant to assessing the costs of capital punishment in Maryland. The presence of a death statute in Maryland means that differential processing of cases begins at the time a decision is made whether or not to pursue a death sentence. Once that decision is made, the processing of cases with a death notice fundamentally changes, and any difference in costs between the two types of cases is a cost associated with the Maryland's capital punishment statute. Once a death sentence is handed down by a Maryland judge or jury, case processing fundamentally changes once again, and cases receiving a death sentence are processed differently than cases not receiving a death sentence. The goal of the study is to determine whether this difference in case processing yields additional costs.

Data were gathered on the 1,227 capital-eligible cases that where a crime that was eligible to receive the death penalty occurred between 1978 and September 1999. We study the lifetime costs associated with these cases, including all costs that had occurred before 2008, and a forecast for all future costs of these cases. Of these cases, an additional 91 cases that resulted in not guilty verdicts were removed, yielding a sample of 1,136 cases[1]. Of these cases, complete administrative data on case processing were available for 509 cases, approximately 45% of all capital-eligible cases yielding guilty verdicts from 1978-1999 and three quarters of all cases with a court event after 1989. All subsequent analyses were conducted on this sub-sample of 509 cases and statistical methods were utilized to ensure that this sub-sample was broadly representative of the original sample of 1,136 cases. Next, costs borne by Maryland taxpayers were estimated for each stage of case processing. Estimates of the time attorneys, judges and support staff spent adjudicating these cases were

[1] A discussion of the decision to delete nolle prosse and not guilty (in the initial trial) cases can be found in the Data section. In sum, we delete those because it would not be appropriate to compare death sentence cases which can not include not guilty or nolle prose to a set of cases that do.

developed from semi-structured interviews and wage data were gathered from administrative data. The cost of prison was estimated by generating a counterfactual year of exit from prison for each offender in our sample from offender and case attributes and adding forecasted prison costs over the remainder of their expected lives to costs already incurred. Finally, all elements of case processing were aggregated, yielding a total lifetime cost for each case.

Multivariate models were utilized to estimate the differential cost of a capital case after holding constant a host of other factors theoretically related to costs. By artificially holding other things equal, this research is able to isolate the impact of a death sentence sought or returned on cost, and rule out the possibility that differences in characteristics of the victim, the defendant and the case and the year and county in which the case was prosecuted contribute to observed cost differentials. Finally, observed cost differentials were multiplied by the number of cases in each condition from 1978-1999 to estimate past, current and future costs to Maryland taxpayers resulting from cases with a crime occurring during this time period. This aggregate total does not include any cases in which the offense occurred after 1999.

PRIOR RESEARCH

There have been at least thirteen prior studies that estimate the costs associated with the death penalty: one federal study, eleven state-level studies and a study of capital punishment in Los Angeles County (Table 1). The studies vary widely in their scope. None of the studies estimate costs for 1) all stages of case processing, 2) the additional costs of a death notice, *and* 3) the additional costs of the death sentence. Despite these limitations, there is a consensus that the presence of capital punishment results in additional costs. Each of the ten studies finds additional costs associated with capital punishment. However, there is substantial variation in these estimates. For instance, five studies estimate the cost of a death sentence compared to a capital eligible case where no death notice is filed. The average additional cost per case among these prior studies is $650,000, but the estimates range from about $100,000 to more than $1.7 million.

Only three studies apply the most rigorous cost estimation approach, 'bottom-up' accounting, which estimates costs at the case level, allowing for the observation of variation in costs within and across cases. That variation can be accounted for in generating average cost estimates. The remaining studies employ an alternative approach, 'top-down' accounting, where all cases are assumed to have identical costs. In addition, many of the studies do not employ a formal sampling strategy where a random (or approximately random) sample of cases is studied and variation across cases is observed. Instead, these studies analyze the costs to justice agencies involved in the death penalty, and divide by the number of death cases processed. Thus they create a 'typical' case and assume that all capital cases are similar. A brief review of these studies follows.[2]

[2] All dollar amounts have been converted into 2007 dollars.

Table 1.

Results of published studies reporting the costs associated with processing capital cases.

	Study Attributes		Cost of Capital-Eligible Cases			Added Cost - Capital Case	
	Type of Study	Stages	Annual	Capital Case	Death Sentence	Death Notice	Death Sentence
New Jersey (2007)	Cost to State	OPD DOC	$1.59 M	--	--	--	--
Washington (2006)	Mixed	T, A, FH	--	--	$198,263 (A, FH)	$480,204 (T)	$103,679
Forsberg, New Jersey (2005)	Top Down	T,PC,A DOC	--	--	$4,460,000	--	--
Tennessee (2004)	Mixed	T, PC, A	--	$74,072 (T, A)	$25,857 (PC only)	--	--
Baicker, 2004 (NH)	Econometric	--			$2,200,000		
Connecticut (2003)	Top Down	T, P	--	--	$428,206	--	$200,170
Kansas (2003)	Bottom Up	T, A	--	--	$1,352,230	--	$946,561
Federal (1998)	Top Down	T	--	$277,446	--	$206,502	--
Erickson, Los Angeles County (1993)	Bottom Up	T	--	--	--	--	$1,721,871
Cook, North Carolina (1993)	Bottom Up	T, PC, A, DOC	$5.74M	--	--	--	$309,937
Maryland (1985)	Top Down	T, P	--	$96,187	--	$67,650*	--
Garey, California, (1985)	Bottom Up, Single Case	T, P, A, PC, SC	--	--	$1,156,182	--	$388,286
NY State Defender's Association (1985)	Mixed	T, P, A, CPR	--	$3,927,895	--	$2.6 M**	--

Source: Urban Institute review of extant studies of the costs of the death penalty. All costs are in 2007 dollars. T= Trial. P=Penalty phase. A= Appellate. PC=Post-Conviction. FH=Federal Habeus. CP= Certiorari Petition Review SC=Supreme Court. OPD=Office of the Public Defender. DOC=Department of Correction. * As compared with guilty pleas. ** Only compared trial cost of capital case to DOC cost for life-sentenced inmate for 40 years.

The first state-level report of the costs of the death penalty was published by the New York State Defenders Association (Capital Losses 1982). Using survey data to estimate costs across the various stages of case processing – the guilt trial, penalty trial, appeals, and Supreme Court review stages – a typical capital case was estimated to cost approximately $3.9 million in 2007 constant dollars. By comparison, NYSDA estimated that the expected alternative - the incarceration of an inmate for forty years – would cost $1.5 million.

Two studies were completed shortly thereafter that estimated the difference in trial costs between a capital and non-capital case. Garey (1985) estimated that a capital trial in California that proceeds through execution cost $1.15 million, almost $400,000 more than a non-capital trial. That same year, the Maryland House Appropriations Committee commissioned a paper that analyzed 32 capitally prosecuted cases. Capital trials were compared with the cost of a guilty plea, and the study reported almost $100,000 in costs of a capital trial, $67,650 more than a guilty pleas. Notably, this was the first study that measured cost for each case in a sample.

Two of the most rigorous studies were published in 1993. Erickson (1993) studied 16 death-eligible cases in Los Angeles County, seven of which had a death notice and nine which did not. The study compared the number of motions filed, court time, and attorney fees. A death sentence was estimated to accrue $1.7 million in additional costs when compared to a homicide case in which no death notice was filed. Duke University economist Philip Cook (Cook et al. 1993) estimated direct costs of the death penalty from cases in six prosecutorial districts in North Carolina. Cook estimated the additional cost of a death sentence at over $300,000, with the annual cost of capital punishment to the state of $5.74 million. Trial costs were highly variable, with the least expensive capital trial costing less than the median non-capital trial. Cook estimated costs of retrials indirectly (from the probability of retrials) and costs associated with the post conviction stage were limited from a sample of two cases alone. However, unlike previous studies, the Cook study accounts for the confounding effects of two key case characteristics, controlling for the defendant's number of prior felonies as well as the indigence of the defendant.

The Judicial Conference of the United States (1998) conducted a budget analysis which was able to identify hours billed into hearing time, trial time, client time, and research time for both the defense and prosecution. They found capital cases billed more than ten times the hours of non-capital cases and that, contrary to other widely cited studies, prosecution costs (including law enforcement) were greater than defense costs. For the trial phase alone, they estimated costs of $277,000 for a death notice, $71,000 for no death notice cases, and $185,460 for cases in which the death notice was filed and then retracted.

A number of studies have estimated the costs of the death penalty by analyzing the costs to justice agencies involved in death penalty cases and then dividing by the number of death cases processed. The State of Connecticut Commission on the Death Penalty (2003) estimated the excess cost of a death sentence versus life in prison at about $430,000 or $200,000 more than life imprisonment. Similarly, New Jersey Policy Perspective (2005) estimated a total cost per death

sentence at $4.46 million (not including execution costs) by aggregating the annual costs of relevant justice system departments. A more recent New Jersey study from the New Jersey Death Penalty Study Commission (2007) estimated that eliminating the death penalty would save the office of the public defender alone $1.59 million. In a similar study, the Washington State Bar Association (2007) analyzed the differential cost of capital and non-capital cases, relying on prosecutors and public defenders' estimates on the extra cost to their organizations of trying a capital case. They estimate an additional cost of $480,300 per trial, and there is substantial variation, with prosecutor estimates ranging from $25,000-$1,000,000.

In 2003 a Kansas report by the Legislative Division of Post Audit estimated costs for a sample of 22 cases and estimated a median cost of a death sentence of $1.32 million, 70% higher than the $750,000 estimated costs for a non-death penalty case. Costs were obtained based on time estimates from judges and attorneys who had participated in each individual case. The study estimated the cost of appeals from prior studies. Unique features of the Kansas death penalty regime affect the generalizability of these estimates, since Kansas does not have a death row, did not give an option of life without possibility of parole at the time of the study, and does not conduct proportionality reviews.

In one of the few studies to sample a large number of cases, the State of Tennessee (2004) sampled 240 capital eligible cases and surveyed attorneys and judges to estimate the differential cost of a capital trial. The study estimated $16,000 in additional costs in the trial phase. The sample was large (53 capital cases, 39 LWOP cases, and 159 life cases), but significant portions of case processing were not included, such as defense attorney costs for life without parole cases, voir dire, and some appellate processing.

Finally, Baicker (2004) conducted an econometric study of the cost of capital cases by examining changes in county budgeting across time and place. Baicker estimated that each death penalty conviction is associated with an increase in county-level judicial and corrections expenditures of more than $2.2 million, and may lead to a shifting of resources away from policing.

Given the limitations of prior research and the substantial state variation in capital case processing, it is difficult to draw firm conclusions about the exact costs of the death penalty from the extant literature. That said, the extant literature consistently finds that capital punishment adds costs to case processing when compared to capital eligible cases where the death penalty is not sought.

Deterrence

None of the studies discussed above directly examined the effect of the death penalty on deterrence, that is, the extent to which the presence of the death penalty causes potential murderers to choose not to kill. Several studies have examined the issue of deterrence with differing results. Perhaps the most conclusive study on the deterrent effect of the death penalty is a recent review of the literature by University of Pennsylvania economists Donohue and Wolfers (2006). They conclude that

variation in homicide rates and small sample sizes make it impossible to detect a deterrent effect, much less to estimate the magnitude of the effect.

Early empirical research on deterrence began with economist Isaac Ehrlich (1975, 414), who concluded that each execution that took place between 1933 and 1969 "may have resulted, on the average, in seven or eight fewer murders." This conclusion has been the subject of intense debate. Passell (1976) conducted a cross-sectional analysis of 40 states for the same time period as Ehrlich, using similar source data (FBI records) and methods (unweighted regressions and cross-sections of similar samples of states for the same time period) and found no evidence of the deterrence effect (Forst 1983).

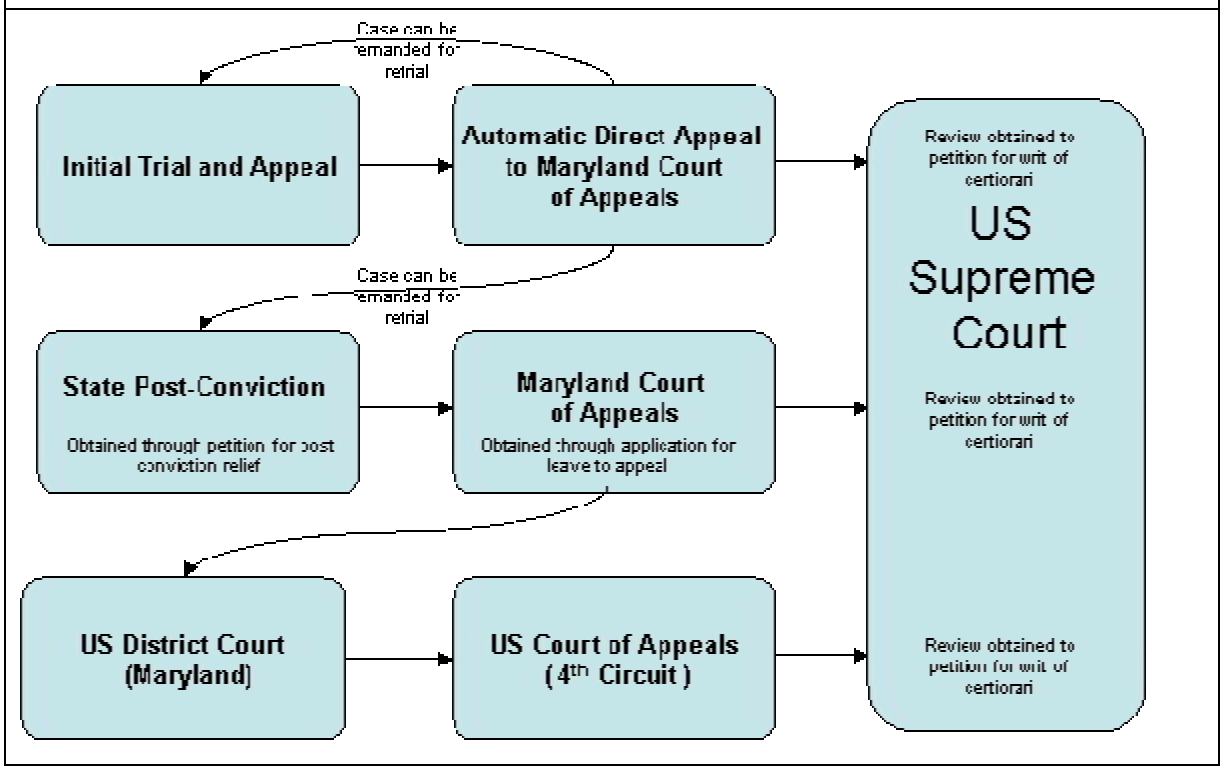
More recently, a number of deterrence studies have employed econometric models to test for a deterrent effects (Mocan and Gittings, 2003; Dezhbakhsh and Shepherd, 2006). Shepherd, an author of many death penalty studies, testified before the United States Congress that "all modern economic studies" had found an effect (Donohue and Wolfers 2006). Recently, Mocan and Gittings (2003) estimated five murders were deterred a year due to the death penalty, but also estimated that each commuted death sentence caused five additional homicides. And Dezhbakhsh and Shepherd (2006) used the Supreme Court's moratorium on executions to test for changes in the homicide rate before and after the moratorium. They found a 16% increase in homicide the year after the moratorium was imposed and an eight percent decrease two years later. A study in the same period by noted economists Katz, Levitt, and Shustorovich found no evidence of a deterrent effect (2003).

Thus, the literature gives no consensus on the effect of the death penalty on deterrence. Given the Donohue and Wolfers finding that research studies are unlikely to correctly estimate a deterrent effect of the death penalty, we do not estimate the effects of deterrence in this study.

PROCESSING OF CAPITAL CASES IN MARYLAND

The adjudication of both death notice and no death notice cases is a complex process. The State's decision to seek a penalty of death introduces additional requirements intended to provide 'super-due process' to a defendant facing a possible death sentence. In general, case processing can be divided into six phases: 1) pre-trial, 2) trial, 3) sentencing, 4) post-conviction, 5) state appeals and 6) federal appeals. The process is shown in **Figure 1**.

Figure 1. Death Penalty Case Processing in Maryland.



Pre-trial

The pre-trial phase includes several initial steps which occur regardless of whether or not a notice of intent to seek a penalty of death is eventually filed. These include arrest, arraignment, preliminary hearing, and selection of a trial date (Bair et al. 1993). The trial date is set within 180 days of the first appearance of the defendant before the circuit court and can be changed only by the county administrative judge with good cause. The notice of intent to seek the death penalty (the death notice) and voir dire (the selection of jurors) also occur during this phase.

Filing a Death Notice

During the pre-trial phase, the State's Attorney in the charging county has full discretion to file a notice of intention to seek a penalty of death as long as the following four conditions are met.

- The State's Attorney must file the notice and all aggravating circumstances on which the State intends to rely at least thirty days prior to the trial;
- The defendant must have been at least 18 years old at the time of the offense;
- The defendant cannot be mentally retarded; and,
- The defendant must be accused of principalship (e.g. the actually killer) in the first degree or of principalship in the second degree. For murder in the second degree, the defendant must also meet the conditions that he or she: 1) intended the premeditated murder of a law enforcement officer, 2)

was a major participant in the murder and 3) was actually present at the time and place of the murder.

Although a case may meet the above conditions, the decision to file a death notice is ultimately at the discretion of the State's Attorney. Furthermore, the State's Attorney has the discretion to unilaterally withdraw the death notice at any point during the trial. The notice to seek a sentence of life without parole (LWOP) must also be filed at least 30 days prior to trial.

Voir Dire

Unless the defendant waives the right to trial by jury, the trial judge decides the size of the initial pool of prospective jurors (the array) and the required number of sworn jurors, including any alternates. Prior to jury selection, each party is provided with biographical briefs of each juror from the initial pool. Jury selection then commences through a process of questioning of prospective jurors by the defense and prosecution known as voir dire. In cases where the prosecution has filed a death notice, or where life without parole is a sentencing option, the defense is permitted twenty strikes against prospective jurors and the prosecution is permitted ten. The judge may also dismiss an unlimited number of jurors. In death noticed cases, voir dire includes a process of "death qualification" – no juror may serve on a death penalty trial unless he or she is willing to impose the death penalty. [3] Through the process of voir dire, a twelve-person jury is impaneled in capital cases with at least two alternate jurors (Bair et al. 1993).

Guilt/Innocence Trial

The guilt/innocence phase is identical in structure for both death notice and no death notice cases (although the resources dedicated to the process may differ). Extant research suggests that death notice cases are more complex. Hypotheses about the extra processing of death notice cases include longer trials, more expert witnesses, more motions, hearings and deliberations. In short, they consume greater resources (Bair et al. 1993). American Bar Association (ABA) guidelines require the use of greater resources in several ways, including representation of indigent defendants by two attorneys in capital trials, as compared to a single defense attorney in no death notice trials (American Bar Association 2003, 28).

Penalty Trial and Sentencing

If a guilty verdict is issued for a death notice case, a second trial commences to determine whether or not a death sentence will be handed down. Typically, the same judge and jury adjudicate both trials in capital cases. In the bifurcated model of capital cases, this second trial is termed the penalty phase – there is no analogous phase of processing in no death notice cases. Instead, the presiding judge sentences the defendant during a separate sentencing hearing following a verdict.

---

[3] Thus, those who would always vote for a death sentence and those who would never vote for a death sentence are not eligible for a capital jury. This extra step in determining eligibility adds additional time and complexity to voir dire in death penalty cases.

During the penalty trial for a capital case, in order to impose a death sentence, the judge or jury must unanimously determine whether the case's aggravating circumstances outweigh the mitigating circumstances by a preponderance of the evidence. Maryland law provides for the following ten aggravating circumstances:

1) one or more persons committed the murder of a law enforcement officer while the officer was performing the officer's duties;
2) the defendant committed the murder while confined in a correctional facility;
3) the defendant committed the murder in furtherance of an escape from, an attempt to escape from, or an attempt to evade lawful arrest, custody or detention by:
   a. a guard or office of a correctional facility; or
   b. a law enforcement officer
4) the victim was taken or attempted to be taken in the course of an abduction, kidnapping, or an attempt to abduct or kidnap;
5) the victim was a child abducted in violation of § 3-503(a)(1);
6) the defendant committed the murder under an agreement or contract for remuneration or promise of remuneration to commit the murder;
7) the defendant employed or engaged another to commit the murder and the murder was committed under an agreement or contract for remuneration or promise of remuneration;
8) the defendant committed murder while under a sentence of death or imprisonment for life;
9) the defendant committed more than one murder in the first degree arising out of the same incident; or
10) the defendant committed the murder while committing, or attempting to commit:
    a. arson in the first degree;
    b. carjacking or armed carjacking;
    c. rape in the first degree;
    d. robbery; or
    e. sexual offense in the first degree.

Similarly, the Maryland law provides for the following eight mitigating circumstances:

1) the defendant previously has not:
   a. been found guilty of a crime of violence;
   b. entered a guilty plea or a plea of *nolo contendere* to a charge of a crime of violence; or
   c. received probation before judgment
2) the victim was a participant in the conduct of the defendant or consented to the act that caused the victim's death;
3) the defendant acted under substantial duress, domination, or provocation of another, but not so substantial as to constitute a complete defense to the prosecution;
4) the murder was committed while the capacity of the defendant to appreciate the criminality of the defendant's conduct or to conform that conduct to the requirements of law was substantially impaired due to emotional disturbance, mental disorder, or mental incapacity;
5) the defendant was of a youthful age at the time of the murder;
6) the act of the defendant was not the sole proximate cause of the victim's death;

7) it is unlikely that the defendant will engage in further criminal activity that would be a continuing threat to society; or

8) any other fact that the court or jury specifically sets forth in writing as a mitigating circumstance in the case.

The decision as to whether the aggravators outweigh the mitigators belongs to the jury. The jury may, for example, find that a single aggravating circumstance—the allegation that the murder took place while the defendant was attempting to commit another crime— outweighs the mitigating circumstances—youthful age at the time of the murder and an absence of violent criminal history—and, accordingly, impose the death penalty.

State Post-Conviction Review in Trial Court

The post-conviction review procedure allows a defendant to raise specific challenges in court that may not have been heard on appeal.[4] Most often, those challenges involve issues which fall outside the trial record, including the ineffectiveness of counsel or withholding of evidence by the state. The defendant may also raise claims based on new case law or on claims that the defendant unknowingly waived fundamental rights. Because the nature of these claims often involves re-opening parts of the case, the defendant may seek to prove prior counsel failed to present exculpatory evidence. Thus, preparation for post-conviction review may result in significant costs, particularly to the new defense.

All defendants have a statutory right to counsel on their first petition.[5] In subsequent post-conviction reviews for death sentence cases counsel is also provided. Counsel is rarely provided for additional post-conviction reviews for cases with other sentences. In Maryland, a capital defendant is typically represented by a private attorney who is reimbursed by the state. The prosecuting attorney and the attorney general represent the State at this stage. Prior to 1994, the deadline for filing a petition for post-conviction relief was 340 days prior to 1994 and the deadline was reduced to 210 days thereafter. Once a decision is rendered, a defendant seeking to appeal must file for a leave to appeal with the Court of Appeals.

Before 1995, a capital or non-capital defendant had the right to file a second post conviction petition. Under current law, however, a second post conviction petition can be only be filed if reopening the case is in the 'interest of justice.' The right to a hearing is only guaranteed for the first post-conviction review. In practice, defendants in death sentence cases often proceed through multiple post-sentencing reviews.

Direct Review in Maryland Court of Appeals

After a guilty verdict and sentencing, the defendant progresses through multiple stages of post-sentencing case review. Defendants in cases with a sentence other than death first appeal to the

[4] Maryland Uniform Post Conviction Procedure Act.

[5] Section 645A (A) of Article 27.

Maryland Court of Special Appeals. If the conviction is upheld by the Court of Special Appeals, the defendant may then appeal to the Maryland Court of Appeals. Cases with a death sentence are appealed directly to the Court of Appeals[6]. Thus, non-death cases may proceed through an additional stage of processing and occur additional costs. In addition to appeals by a defendant, the State may appeal court rulings, for instance, to contest a ruling over-turning the defendant's death sentence.

In Maryland, a defendant sentenced to death is granted an automatic appeal regardless of whether a notice of appeal is filed. This notice is typically filed within ten days of sentencing. Once the transcript of the trial is received by the Court, the defendant must file a brief within 40 days and the state must do so within 30 days. The hearing must be scheduled within 150 days of the transmittal of the transcript[7], though either side may request a continuance. Oral arguments typically take 30 minutes per side, and the decision is handed down via a written opinion.

On first review, the Court of Appeals will only rule upon issues that have been raised in or decided by the trial court. However, the Court has the discretion to expand its jurisdiction of review if the Court believes doing so will avoid additional appeals. In subsequent appeals, the Court reviews prior appellate decisions and considers only issues that have been raised in the petition for certiorari. If an issue of error in the trial court is raised, the court will consider whether or not the error was harmless (even if this issue was not previously raised). Rulings may be challenged through a motion for reconsideration within thirty days of the decision's filing.[8] It should be noted that after 1995, a defendant has the right to waive the automatic stay of a warrant of execution that occurs in the process of direct review following *Thanos v Maryland*.

Federal Habeas Corpus Review in US District Court

Once an appeal for post conviction relief is denied, the defendant is allowed to file for a writ of habeas corpus in the United States District Court for the District of Maryland. The review is available only after it is shown that the defendant has exhausted all possible processes of appeal within the State Court. However, the scope of habeas review is limited: habeas may only be raised on claims that are federal or constitutional in nature. Thus, Federal Habeas Corpus Review rarely addresses the state's factual determinations and as such, evidentiary hearings rarely occur. Defendants who have received a death sentence have a right to counsel. The US District Court has the authority to stay death sentences.

Federal Habeas Corpus Review in US Court of Appeals

If a defendant is denied relief in the United States District Court, he or she may appeal to the United States Court of Appeals for the Fourth Circuit. In order to appeal, the defendant must have

[6] Maryland Rules 8-301.

[7] Maryland Rules 8-306 (f)

[8] Maryland Rules 8-605(a).

a certificate of probable cause, the issuing of which occurs routinely in capital habeas corpus cases.[9] The case is argued as a regular appeal. If relief is denied in the U.S. Court of Appeals, the defendant has ninety days to seek review in the Supreme Court on a writ of certiorari. Since these costs are not borne directly by Maryland taxpayers, data were not collected from our sample on this stage.

Other Petitions for Relief

Once these stages of review have been exhausted, the defendant may also challenge their competency to be executed or seek commutation of the death sentence from the governor. Our sample does not contain any cost data associated with this process.

Within our sample, we observed case processing through federal appeals. Most cases in the sample do not proceed through all levels of the review process. For many cases, the process through review was not a linear one—we observed many instances in which petitions for post-conviction relief or appeals for leave to appeal were denied multiple times for the same defendant.

DATA COLLECTION

Data used in this analysis are developed from several sources. The foundation for the analysis is the data collected by University of Maryland researchers for their study of disparities in the application of the death penalty (Paternoster, Brame, Bacon and Ditchfield 2004). Paternoster identified 6,000 first and second degree murders committed in the state of Maryland from August 1978 until September 1999. From this sample, 1,311 cases were identified that were eligible to be prosecuted as capital cases. In these cases, either the state's attorney filed a notice of intention to seek the death penalty or the facts of the case clearly met death penalty eligibility criteria. The data include substantial information about cases attributes for each of the 1,311 cases. Eighty-four observations were multiple records of the same event (usually retrials for the same homicide). These trials were re-coded into a single defendant-level file, yielding a final sample of 1,227 observations. Of these 1,227 cases there were 173 cases with a death notice filed, and 56 death sentences.

While the Paternoster data provided a wealth of data about case attributes, data collected for that study do not record case events in each stage of case processing. Thus, while the Paternoster data were used to identify the samples in our study, and to observe case characteristics, they could not be used to estimate the costs of the case. In order to estimate the costs of each stage of case processing, we turned to two additional sources of data, an official records administrative database -- the Maryland Judiciary Case Search (MDJCS) Database -- containing data on individual case processing, and semi-structured interviews with prosecutors, defense counsel and judges to estimate the time spent in each phase of case processing. A brief description of each data source follows—a complete description of the data collection process can be found in **Appendix A**.

[9] Report of the Governor's Commission on the Death Penalty.

The Maryland Judiciary Case Search (MDJCS) Database

Traditionally, Maryland counties maintained hard copy records of each criminal case file either on location with the criminal clerk's office or at the Maryland Hall of Records in Annapolis, Maryland. Though some counties automated recordkeeping in the 1990s, recordkeeping in Maryland remains decentralized and at the county's discretion. In early 2006, the Maryland Judiciary initiated an online database, the Maryland Judiciary Case Search (MDJCS), in an effort to provide public access to a centralized source of electronic case records from all counties. The database is limited to cases that had some activity after the year (usually in the early 1990s) when the county where that case was adjudicated implemented its automated case management system.[10]

From the Paternoster dataset of 1,227 observations, key identifiers—case number, name, date of birth, year of case and trying county—were used as search criteria to locate electronic case dockets in the MDJCS database. We observed additional variables in MDJCS that were not available in Paternoster including key dates such as arraignment, trial days, hearings, motions, petitions and appeals. For each observation in Paternoster, we searched for an electronic record in MDJCS. To verify the accuracy of the MDJCS database, we conducted site visits to courthouses in Baltimore County, Baltimore City, Prince George's County and Anne Arundel County and compared data from MDJCS to data observed in the in-house databases. In all instances, the availability and the scope of records from both sources were found to be identical. Thus, we searched MDJCS for all 1,227 records in the Paternoster data. Many records, especially for cases with no activity after 1990, were missing in the MDJCS database. We could identify no other means of efficiently collecting these records.

Of the 1,227 observations in the analytic dataset, 538 dockets were classified as complete, 93 as incomplete and 596 as missing.[11] A case record was judged to be complete if it contained observable events appropriate to the full length of a case from arraignment to conclusion (typically marked by sentencing or an affirmed appeal). A docket was deemed incomplete if any phases or crucial events, such as a sentencing date, were unobservable. Dockets were labeled as missing if no data were available in the MDJCS database.

Each docket was coded into the Urban Institute database. The data that were coded described each stage of case processing, including dates of key events and durations (in days) of arraignments, hearings, trials, sentencing, appeals and petitions. These data on event-based case information were matched with the relevant observation in the Paternoster dataset.

Survey Data Collection

Not all required data were contained in either the Paternoster data or in the official records. Most importantly, neither data source contained any information about the amount of time

[10] According to the MDJCS website and numerous discussions with staff in several counties at the Criminal Division of the Clerk of the Circuit Court.

[11] These statistics refer to the sample of dockets that we searched for, and, subsequently we drop additional cases that had a not guilty verdict or a nolle prosse, to arrive at the final sample of 1,136 cases and the 509 cases that were fully coded and analyzed.

attorneys spent out of court working on these cases. To estimate these costs, we collaborated with a panel of defense and prosecution counsel who had experience trying capital cases to develop initial estimates of preparation time for a 'typical' no death notice case and a 'typical' death notice case at each stage of processing.

Following an initial introduction by telephone, the prosecution and defense estimates were faxed to one or more counsel in the State's Attorney's Offices and the Offices of the Public Defender, respectively, across Maryland's 24 counties. Counsel were then asked to review the initial time-based estimates and provide feedback and comments as to the accuracy of the estimates. In all, 16 defense estimates were sent to 15 counties and 37 prosecution estimates were sent to 23 counties. In addition, we employed a snowball sampling technique, and solicited names of additional respondents, who we also contacted. [12] Across all survey respondents, the only significant departure from the initial estimates was in regards to the estimated number of days of voir dire. We had initially used an estimate drawn from the Indiana death penalty study, which proved to be too high for the Maryland population. The final estimates cover the stages of pre-trial, guilt/innocence, penalty, appellate, post-conviction and other post-sentencing.

Federal Data

The automated Maryland data did not include any information about case processing at the federal level. To collect these data, we accessed federal data through the Public Access to Court Electronic Records (PACER) database. PACER contained information about case processing during federal habeas corpus review in US District Court and federal habeas corpus review in the US Court of Appeals. We collected data on the dates of habeas corpus petitions, the dates of court decisions, and the length of the phase overall. We again matched records and coded the data in the UI research database.

Removing Not Guilty and Nolle Prose Cases

In order to ensure a valid comparison between cases resulting in a death sentence and no death notice cases, all cases in which the prosecutor declined to prosecute or which resulted in an initial not guilty verdict were dropped from the initial sample of 1,227. These cases represent just 7% of our sample and yield a final analytical sample of 1,136. Cases resulting in a death sentence cannot, by definition, have resulted in a verdict other than guilty. A comparison of death sentence cases to a cohort of cases that resulted in some disposition other than "guilty" (and therefore cannot, by definition, have gone through the appellate process), risks overestimating the death sentence parameter by making a biased comparison.

However, we will fail to capture the impact of a death notice filed on the probability of innocence, which, in turn, could influence the differential costs associated with a the filing of a death

[12] Respondents generally requested anonymity. We received responses from attorneys who have participated in a substantial number of death penalty cases in Maryland. Given how few attorneys in absolute numbers have been involved in death penalty cases, especially among prosecutors, we can not also report response rates without violating that anonymity.

notice. However, given that a death notice and innocence are theoretically unrelated and empirically uncorrelated, we believe that the cost of removing cases not resulting in a guilty verdict are outweighed by the much more potent risk that our estimate of the cost of the death sentence will be biased upward (perhaps significantly so).

Constructing an Estimate of the Cost of Case Processing

Once all of the data were collected, they were combined to estimate the costs for each stage of case processing for each case in the sample. In this study, we count the opportunity cost of the death penalty, which is the value of resources in their next best use. Resources take the form of capital (such as the value of court space) and labor costs (salary and wages). We estimate the value of each resource (the price) in terms of the price per unit (such as one hour of attorney time). We estimate the value of all resources paid for by Maryland taxpayers in the processing of a death eligible case. We estimate costs for each defendant, and for each stage of case processing.[13]

Costs are calculated as the product of a price of a unit of input (such as hours) and the quantity of inputs used. Thus, our basic cost equation is:

$$\text{Cost}_i = \text{Price of unit of input}_i \text{ X Quantity of inputs}_i \qquad (1)$$

Following (1), we estimated the two components of cost, price and quantity, separately. For instance, we observed the price of an hour of an attorney's time, then multiplied that by the number of hours spent by each attorney in each stage of case processing. As is described in substantial detail in **Appendix C**, in general we estimate the price of each input from published sources, such as budgets. We estimate the quantity of each input consumed either from survey data or from the electronic dockets that report case processing details.

Thus, the quantity of inputs is a function of two separate quantities. Quantity data derived from the electronic court dockets on the number of each type of adjudication event vary by defendant. Quantity data derived from the attorney surveys is assumed to be the same for each case. For instance, when we calculate the costs of appeals for a defendant, we observe the number of appeals in that defendant's case from court dockets. We then assume a fixed quantity of hours to process that case for each of the attorneys involved, using the results of the survey to calculate those fixed quantities. In the analysis, a single record was created for each individual in the dataset. If a defendant had a retrial, as was the case for 64 defendants in our sample, all of those retrials were aggregated into a single event record.

All of the cost estimates in this section describe retrospective costs. That is, they describe events that have already transpired. However, some costs of the death penalty in Maryland for our

[13] Because we are comparing trial costs of capital cases and non-capital cases, we dropped from our comparison group cases which were acquitted. Given that these cases could not possibly receive the same cost inputs as the treatment group, including them would have deflated the cost of the comparison group and artificially raised the differential cost of death penalty as compared to cases which did not receive the death penalty.

sample are predictable, but have not yet occurred. These costs are costs associated with incarceration, and are described in the next section.

Cost of Prison

Many individuals in the sample were in prison at the time data were collected for this study. Thus, individual prison costs include a retrospective component – how much time has already been spent in prison (and how much of that time has been spent on death row) – and a forecasted component – an estimate of how much time any individual will spend in prison until they either complete their sentence or die. Because we cannot observe when inmates died, when they will die, or when they will be released from prison, we estimate an expected date of exit from prison for each inmate predicted by individual attributes (including sentence length). Past prison costs were estimated in constant 2007 dollars. Future costs were estimated using forecasted rates of increases in spending and were discounted at a rate of 5% per year. The prison cost estimates are based on observed costs of prison in Maryland for both general prison populations and death row inmates. Prison cost estimates are adjusted to account for prison and health care inflation. Methods used to estimate lifetime prison costs for each individual in our sample can be found in **Appendix A.**

METHODS

Multivariate models were used to estimate the lifetime costs of cases as a function of capital punishment as well as case characteristics. The analysis proceeded in three stages.

- In the first stage, we account for the fact that we were unable to observe data in our sample for every case in our population of interest. In order for the cases with data to be comparable to the cases where data are missing, we generated weights so the sample data resemble the population of all death penalty cases between 1978 and 1999. A logistic regression was specified in order to generate sampling weights. These weights are used in all analyses. The explanatory power of the model ($R^2 = 0.44$) was high, indicating that the econometric model is able to accurately predict whether or not cases were complete. We found no difference in the probability that cases with a death notice had complete data. These weights were used in all subsequent analyses.

- In the second stage, we accounted for potential differences between cases where a death notice was filed and cases where no death notice was filed. By modeling the prosecutor's decision to file a death notice, we account for the possibility that cases that received a death notice might have been more costly even if there had been no death statute. A second logistic regression model was utilized to model the prosecutor's decision to file a death notice. These models yielded a propensity score – the probability that a case received a death notice conditional on that case's attributes – for each case in our sample. The propensity scores were then used in outcome models to reduce any potential bias resulting from differences in death notice and no death notice cases. Variables included in the

models to generate the propensity scores were chosen using standard theoretical and econometric reasoning and include: age of defendant; race of victim; whether the victim was executed, killed in their own home, was elderly or frail and/or was unable to defend themselves; whether the evidence against the defendant was circumstantial; whether the same incident produced multiple murder victims; the county where the trial took place; and the year.

- The final stage of the analysis uses sampling weights generated in the first stage of the analysis and propensity scores generated in the second stage of the analysis to model the cost of capital eligible cases in Maryland using ordinary least squares (OLS) regression. These models regress total costs of each capital eligible case in Maryland on whether a death notice was filed, whether there was a death sentence and other variables that might explain the costs of the case including the attributes of the defendant, victim and offender; the nature of the homicide; and the strength of the prosecution's case.

A detailed description of the methods used in this study can be found in **Appendix B**.

RESULTS

Descriptive Statistics

Table 3 presents descriptive statistics for all variables used in the analysis. The table describes the attributes of victims and defendants, and the facts of the homicide. These descriptive statistics serve two purposes – they describe the attributes of the cases included in the study and provide context to the analysis, and they are a diagnostic to identify differences between the samples. Overall, the average age of offenders in the sample is 26 and more than three quarters of defendants were black. Almost all (93%) of defendants had a prior felony charge. Sixty percent of defendants report prior alcohol abuse and 40% report job problems. There are few differences in defendant attributes across the groups. Those who receive a death sentence are older than average (29 years) although the cohort of all defendants in a death case are younger (23.7 years) than the full sample.

The majority of victims across the sample (60%) were non-white. Only a few, 3%, were identified as either elderly or frail and 12% were identified by investigators as unable to defend themselves. Twenty-one percent involved homicides with multiple victims and 41% of cases involved a defendant who was unknown to at least one of the victims. Victims were sexually assaulted in 9% of cases, murdered 'execution-style' in 12% of cases and, in 26% of cases, victims were murdered in their own homes.

Just 3% of cases were identified by a detective as being based primarily on circumstantial evidence and the defendant confessed to the homicide in 16% of cases. Overall, the average case met the criteria for 1.3 statutory aggravators with 5% of cases containing no aggravating factors and

23% of cases containing more than one factor. Nearly 80% of capital eligible cases stemmed from offenses taking place in three Maryland counties – Baltimore City, Baltimore County and Prince Georges County. The median case was filed in 1992, with case filings ranging from 1979 to 1999.

Differences between groups are tested through two comparisons. Cases with a death notice are compared to cases with no death notice, and cases with a death sentence are compared to cases with no death notice. Significance levels, indicated by asterisks in the table, were calculated using mean comparison t-tests. A few differences between the samples emerge from this analysis. Cases in which the defendant was under the age of 18 were less likely to receive a death notice or a death sentence (such defendants were excluded from death eligibility under Maryland law beginning in 1987). Death notices and death sentences were more likely to be filed in cases where at least one of the victims was white and where at least one of the victims was unable to defend himself. Cases in which the defendant was a stranger to at least one of the victims and where the murder was committed during the commission of another felony were more likely to receive a death notice and a death sentence.

Table 3. Descriptive Statistics

	Death notice not filed (n = 425)		Death notice filed (n = 55)		Death sentence returned (n = 29)		Entire Sample (n = 509)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Defendant Characteristics								
Age	26.42	15.71	23.72	11.95	29.08	15.96	26.28	15.37
D race is white	0.20	0.50	0.30	0.50	0.23	0.39	0.22	0.50
D has a prior felony charge	0.93	0.55	0.83*	0.44	1.02	0.48	0.93	0.54
D has a history of alcohol abuse	0.58	0.66	0.63	0.53	0.76	0.68	0.60	0.65
D has a troubled job history	0.38	0.55	0.46	0.56	0.65*	0.70	0.40	0.56
Victim characteristics								
V race is white	0.36	0.62	0.56**	0.59	0.71**	0.68	0.40	0.63
V is unable to defend oneself	0.10	0.34	0.20**	0.36	0.26*	0.46	0.12	0.35
V is elderly or frail	0.03	0.2	0.05	0.18	0.12	0.30	0.03	0.21
Offense characteristics								
Multiple victims	0.20	0.47	0.13	0.32	0.53***	0.65	0.21	0.48
D was a stranger to any V	0.39	0.58	0.52	0.59	0.60*	0.66	0.41	0.58
V was sex assaulted	0.08	0.33	0.16*	0.34	0.20	0.50	0.09	0.34
V was executed	0.1	0.33	0.10	0.28	0.27*	0.44	0.11	0.33
V made made to beg for life	0.07	0.31	0.12	0.32	0.11	0.31	0.08	0.31
V took a long time to die	0.08	0.34	0.12	0.30	0.05	0.19	0.09	0.33
V was killed in own home	0.24	0.50	0.23	0.38	0.61***	0.63	0.26	0.51
D persisted even when V's death was certain	0.14	0.41	0.19	0.35	0.25	0.62	0.15	0.42
D attempted to evade capture	0.11	0.34	0.14	0.30	0.22	0.43	0.12	0.34
D confessed to the crime	0.15	0.40	0.19	0.38	0.19	0.39	0.16	0.40
Evdience against D was circumstantial	0.02	0.12	0.02	0.13	0.08	0.25	0.03	0.13
Statutory Aggravators								
A1 - V was a law enforecement officer	0.00	0.06	0.04	0.17	0.10*	0.30	0.01	0.11
A2 - D committed murder in a correctional institution	0.03	0.19	0.00***	0.00	0.00***	0.00	0.03	0.17
A3 - D committed murder trying to escape custody	0.01	0.14	0.03	0.15	0.06	0.21	0.02	0.14
A4 - V was murdered in the course of an abduction	0.10	0.33	0.20*	0.38	0.08	0.23	0.11	0.34
A5 - V was a child abductee	0.04	0.22	0.05	0.20	0.00***	0.00	0.04	0.21
A6 - D murdered in money for hire case	0.04	0.26	0.05	0.17	0.04	0.17	0.04	0.24
A7 - D employed another who killed for renumeration	0.03	0.24	0.03	0.15	0.06	0.23	0.04	0.23
A8 - D committed murder while under life sentence	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.04
A9 - Same incident produced multiple murder victims	0.18	0.44	0.13	0.32	0.53***	0.65	0.19	0.45
A10 - D committed murder during another offense	0.69	0.65	0.76	0.50	0.90*	0.59	0.71	0.64
County Dummies								
County = Anne Arundel	0.08	0.36	0.07	0.29	0.03	0.17	0.08	0.34
County = Baltimore City	0.44	0.66	0.07***	0.37	0.13***	0.43	0.38	0.64
County = Baltimore County	0.09	0.29	0.34***	0.43	0.55***	0.68	0.14	0.36
County = Harford	0.01	0.15	0.04	0.2	0.00*	0.00	0.01	0.15
County = Montgomery	0.07	0.26	0.05	0.2	0.05	0.21	0.07	0.25
County = Prince Georges	0.28	0.42	0.24	0.35	0.15**	0.32	0.27	0.41
County = Other	0.06	0.38	0.07	0.37	0.09	0.35	0.06	0.37
Year of Case	1992	5.14	1989***	5.71	1988***	5.34	1991	5.32

Significance-levels are based on group mean comparison tests detailing two comparisons: (1) cases in which a death notice was filed versus cases in wich a death notice was not filed and (2) cases in which a death sentence is returned versus cases in which a death notice is not filed. All analyses are conducted using sampling weights.
Significance testing: * p < 0.10, ** p < 0.05, *** p < 0.01.

Overall, cases in Baltimore City were substantially underrepresented in the death notice and death sentence groups (suggesting that death notices and death sentences were less common in that jurisdiction) whereas cases in Baltimore County were substantially overrepresented among death notice filings and death sentences returned. Finally, death notices and death sentences were more likely to occur in older cases.

Within our data, we observed events up until the level of federal appeals. However, a majority of cases did not go through all levels of the review process, and we observed many instances in which petitions for post-conviction relief or appeals for leave to appeal were denied multiple times for the same defendant.

Sample Size By Phase

For our sample of 509 cases, we observed 336 cases that made it to a trial (the remainder were pleas), 84 cases that had a penalty phase, and 283 cases that filed at least one appeal.

At the post-conviction stage, the majority of cases (326) did not receive a hearing. Of the rest, 149 had an initial post-conviction review (15 of which had received a death sentence), and 34 had multiple post conviction reviews (three of which had received a death sentence). Past this stage, only one non-capital case was assumed to have had a Federal Habeas review while 14 death sentence cases filed a petition of habeas corpus. At the federal appellate level, we observed 10 defendants who appealed their death sentence.

Table 4. Sample of Cases at Each Stage of Processing

Stage	Total Cases	Death Notice*	Death Sentence
Plea	173	4	1
Trial	336	84	29
Penalty phase	84	84	29
Appeals (state)	309	70	27
- Multiple appeals	70	22	15
Post-Conviction Hearing	160	32	15
- Multiple post-conviction hearings	34	4	3
US District Court	15**	14	14
- Multiple petitions of habeas corpus	2	2	2
Federal Court of Appeals	10	10	10
- Multiple appeals	1	1	1

Source: Urban Institute
Notes: * These numbers include death sentence; * *This cost was distributed amongst non-death sentence cases

Event Data By Phase

Table 5 presents event data for each state-level stage of a capital eligible case, on an individual defendant level. Days refer to working days (Mon-Fri) and the length of phase does not include trial days. Death sentence cases have a higher average number of trial days, hearing days, and overall

length of phase at every stage of the trial except for post-conviction. The length of phase for the penalty trial includes retrials of the penalty phase, which can be longer than a year from when the retrial is remanded until the actual onset of the trial.

Table 5. Time Elapsed for Key Events in Working Days

Variable	No Death (n=425)	Death Notice (n=55)	Death Sentence (n=29)
Guilt Phase			
Length of Phase	237.2	262.0	312.7
Hearing Days	1.6	3.8	4.3
Trial Days	3.1	7.0	7.4
Penalty Phase			
Length of Phase	--	100.2	152.4
Number of trial days	--	3.2	5.8
Number of hearing days	--	0.8	1.5
Post Conviction Phase			
Length of Phase	382.6	333.9	302.9
Number of hearing days	1.4	1.9	2.9
Appellate Phase			
Number of Appeals	0.7	1.3	1.9

Source: Urban Institute.

Bivariate Estimates of the Cost of the Death Penalty

Table 6 presents bivariate cost estimates for each of the stages of a capital eligible case. Death notice cases are significantly more expensive than cases in which a death notice was not filed in three stages of case processing: (1) the guilt trial ($601,000), (2) the penalty trial ($71,000) and (3) the state-level appellate phase ($134,000). No statistically significant differences in cost were observed during the post-conviction, federal appellate or federal habeus phases. Though prison sentences were, on average, slightly longer among individuals against whom a death notice was sought, there were no significant differences in lifetime prison costs between the two groups.

Table 6.

Bivariate Outcomes

	Death notice not filed (n = 425)		Death notice filed (n = 55)		Death sentence returned (n = 29)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Phase						
Guilt trial	$158	$94	$601***	$289	$775***	$381
Penalty trial	$0	$0	$71***	$74	$263***	$289
Post-conviction	$40	$73	$39	$64	$82**	$101
Appellate	$42	$45	$134***	$96	$474***	$300
Other (state-level)	$1	$3	$2*	$40	$9***	$11
Federal habeas	$0	$0	$0	$0	$82***	$137
Federal appellate	$0	$0	$0	$0	$14	$78
Prison	$862	$549	$946	$540	$1,318***	$704

Significance-levels are based on group mean comparison tests detailing two comparisons: (1) cases in which a death notice was filed versus cases in which a death notice was not filed and (2) cases in which a death sentence s returned versus cases in which a death notice is not filed. All analyses are conducted using sampling weights.
Significance testing: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Cases resulting in a death sentence were significantly more expensive than cases in which a death notice was not filed in all but one phase of case processing. Four phases – the guilt trial ($775,000), the penalty trial ($263,000), the appellate process at the state level ($483,000), and the lifetime cost of prison ($1.3 million) – explain the majority of the differences in cost.

The results in **Table 6** do not account for potentially confounding explanations of the differences in cost. That is, it is possible that some of the differences between groups described in Table 3 are responsible for the differences. For example, it is possible that cases in Baltimore County (where there are significantly more death notices filed than average) are routinely more expensive to process than are cases in other counties, and thus the differences in Table 4 are due to differences in county costs and not the costs of the death penalty. Or, it might be that particularly horrifying or complicated cases may have cost more to prosecute regardless of whether they were processed under a death statute. To account for these possibilities we specify eight regression models that control for competing explanations of the differences in cost.

Table 7 displays regression coefficients from eight OLS models in which the dependent variable is the total cost of case processing. In each of the models, we report two coefficients: the additional cost associated with the filing of a death notice, and the additional cost associated with the receipt of a death sentence. We first specify a model (1) that contains only the two main effects – dummy variables for the filing of a death notice and the returning of a death sentence. In model (2)

we add the propensity score estimates generated in Stage 2 of the analysis. In effect, these propensity scores account for the underlying differences in the propensity of cases to have a death notice. Models (3)-(8) progressively add selected sets of covariates to prior models. We first add in the year of case, and then sequentially add a set of county dummy variables, dummy variables describing attributes of the defendant, attributes of the victims, case characteristics and the presence of statutory aggravators. Model (8) includes all covariates. All parameter estimates in Table 5 are reported in thousands of dollars.

Table 7.

Total Cost of Case Processing

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Death notice filed = 1	$699***	$621***	$624***	$649***	$630***	$627***	$669***	$659***
	($110)	($121)	($121)	($112)	($105)	($105)	($104)	($106)
Death sentence returned = 1	$1,318***	$1,222***	$1,217***	$1,155***	$1,256***	$1,267***	$1,248***	$1,252***
	($387)	($382)	($389)	($403)	($362)	($363)	($351)	($365)
Propensity Score Included?	NO	YES	YES	YES	YES	YES	YES	YES
Year of Case Included?	NO	NO	YES	YES	YES	YES	YES	YES
County Dummies?	NO	NO	NO	YES	YES	YES	YES	YES
Defendant Characteristics?	NO	NO	NO	NO	YES	YES	YES	YES
Victim Characteristics?	NO	NO	NO	NO	NO	YES	YES	YES
Case Characteristics?	NO	NO	NO	NO	NO	NO	YES	YES
Statutory Aggravators?	NO	NO	NO	NO	NO	NO	NO	YES
R^2	0.357	0.365	0.366	0.397	0.457	0.458	0.486	0.489
N	509	509	509	509	509	509	509	509

Each column reports selected coefficients from an OLS regression of the total cost of case processing. The coefficient on a death notice filed is the cost associated with a death notice cases, above the cost of a capital-eligible case in which a death notice is not filed. The coefficient on a death sentence returned is the cost associated with a death sentence, above the cost of a case in which a death notice is filed. The intercept parameter is the cost of a capital-eligible case in which a death notice is not filed. Coefficients are reported in thousands of dollars. All models are run using sampling weights winsorized at a value of four and, in all models, robust standard errors are reported.
Significance testing: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

In Model (1), the coefficient on the intercept parameter is $1.1 million (not reported in the table). This coefficient can be interpreted as the cost of an average case which did not receive a death notice. Thus, the average death eligible case in Maryland has total costs (including prison) of $1.1 million. The death notice parameter is $699,000 indicating that a death notice case is approximately $700,000 more expensive than a case in which a death notice is not filed. The death sentence parameter of $1.3 million is the additional cost of a case in which a death sentence is returned relative to a case in which a death notice is filed but where a death sentence is not returned. All parameter estimates were statistically significant at $p < 0.01$ and the base model explained approximately 36% of the variation in the cost. Overall, without controlling for other factors theoretically related to the cost of case processing, an average death notice case costs approximately $1.8 million and an average death sentence case costs approximately $3.1 million.

Model (2) adds the propensity score to Model (1). The propensity score parameter is significant at $p<0.05$ and since the propensity score captures each case's probability of receiving a death notice

conditional upon the fifteen predictors in Table 2, the effect of adding the propensity score to the outcome model is to reduce the estimated treatment effects by 9% and 5%, respectively. As each successive set of covariates is added to the model, though the predictive power of the models rise, the estimated treatment effects remain remarkably stable, with the death notice parameter falling between $638,000 and $698,000 and the death sentence parameter falling between $1.13 million and $1.26 million in Models (2)-(8).[14]

We report the costs of the death penalty from the results of Model (7). This model achieves the optimal balance between explanatory power and parsimony.[15] Thus, the costs of the death penalty to the taxpayers of Maryland are as follows. A capital eligible case in Maryland costs about $1.1 million to process including all judicial and correctional expenses. If a case has a death notice, $669,000 in additional costs are added, for a total cost of about $1.8 million. If a case results in a death sentence, $1.25 million in additional costs are added, for a total of $1.9 million in additional costs, and a total cost of processing of about $3 million per case.

The costs describe above can be parsed to show the additional cost at each stage of case processing. **Table 8** divides the costs into stages, and reports the results of regression models on each of the eight stages of case processing. The set of controls included in Model (7) in **Table 7** are included in all models.[16]

Table 8.

Cost of Case Processing by Stage

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Guilt Trial	Penalty Trial	Post-Conviction	Appellate	Other (State-Level)	Federal Habeas	Federal Appellate	Prisons
Death notice filed = 1	$474***	$64***	-$9	$86***	$1	-$1	-$1	$55
	($48)	($16)	($11)	($19)	($1)	($4)	($1)	($92)
Death sentence returned = 1	$142*	$262**	$42**	$381***	$6***	$88***	$11	$316*
	($84)	($103)	($18)	($84)	($2)	($28)	($11)	($165)
R^2	0.636	0.441	0.122	0.572	0.252	0.342	0.077	0.223
N	509	509	509	509	509	509	509	509

Each column reports selected coefficients from an OLS regression of the total cost of case processing. All models contain the same control variables as model (7) in Table 3. The coefficient on a death notice filed is the cost associated with a death notice cases, above the cost of a capital-eligible case in which a death notice is not filed. The coefficient on a death sentence returned is the cost associated with a death sentence, above the cost of a case in which a death notice is filed. The intercept parameter is the cost of a capital-eligible case in which a death notice is not filed. Coefficients are reported in thousands of dollars. In all models, robust standard errors are reported.
Significance testing: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[14] Notably, costs associated with the death notice and the death sentence increase as additional covariates are added to the model. Thus, we can conclude that, if anything, variables that are positively related to the cost of case processing tend to be negatively related to the presence of a death notice or a death sentence, having controlled for the probability that a case receives a death notice.

[15] Technically, Model (7) had the lowest value of the Akaike Information Criterion (AIC) indicating that the model has the maximum explanatory power conditional on the number of predictors entered into the model.

[16] The coefficients in **Table 6** sum to the values of the parameters in **Table 5** on death notice and death sentence respectively..

Cases receiving a death notices are approximately $470,000 more costly during the trial phase, $64,000 more costly during the penalty phase and $86,000 more costly during the appellate phase than a capital eligible case where no death notice was filed.[17] These differences are significant at $p<0.05$. Cases resulting in a death sentence were significantly more costly during every stage of case processing ($p<0.1$) with the exception of the federal appeals stage.

Costs of the Office of the Public Defender, Capital Defense Division

A statewide office established in 1988, the Capital Defense Division coordinates the delivery of legal defense services, arranges for experts and advises counsel in capital cases. In addition, the Division focuses on "convincing the State pretrial that a notice to seek a sentence of death should not be filed because it did not satisfy legal criteria or because it was not warranted despite technical eligibility" (Office of the Public Defender 2006, 124). As a result, the total number of death notice cases "does not appear to accurately represent the potential workload involved in handling these complex matters" (Ostrom, Kleiman and Ryan 2005:112). Since the Division "is generally administrative in nature and rarely litigates death penalty cases" (Department of Legislative Services 2004:4), the office's costs are not included within expenditures captured elsewhere in the study.

Accordingly, we consider the cost of the Division as an additional cost of capital punishment above the per case costs, that is applied to all capital eligible cases whether or not the prosecution eventually files a death notice. Employing State of Maryland Operating Budget Details, we record total expenditures (in 2007 dollars) over a period of five years and subtract out technical and special fees to avoid double-counting the cost of specialists and expert witnesses. We take the inflation-adjusted, five-year annual average of Division expenditures, $563,575.46, and apply it to the years in the sample for which the Division operated (1988-1999). This estimate adds an additional $6.2 million to cases in our sample occurring 1988-1999. However, due to the protracted nature of capital litigation, cases in our sample will have activity beyond 1999. We calculate these costs as follows. In 2000 and 2001 the average caseload of transferred (old) cases is 41%, and all of these cases are in our sample. We calculate additional costs from cases in our sample as $(0.41)^n$ where n is the number of years beyond 1999. We then sum each year. We estimate another $0.95 million in Capital Defense Division costs accruing to the cases in our sample beyond 1999. The total estimated cost of the Capital Defense Division accrued to cases in our sample is $7.2 million.

Summary

The results can be summed across all cases. That is, because cases in the sample were weighted in these analyses to reflect the full sample of 1,136. In total, the 162 cases with a death notice cost Maryland taxpayers an additional $1 86 million or more than $1 million per death notice over and above the costs where there was no death notice. Of this total, cases were the death penalty was sought, but that did not result in a death sentence cost Maryland taxpayers an additional $70.9

[17] The estimates are for all death notice cases and includes cases that did not progress to that stage of case processing. Thus, the average cost of only those cases that made it to the penalty phase and the appellate would be higher.

million dollars. Cases resulting in a death sentence cost Maryland taxpayers an additional $107.4 million. Additionally, the Capital Defense Division cost $7.2 million.

Sensitivity Analysis

Some assumptions were built into the analysis. For the most part, where an assumption had to be made, we took a conservative approach. That is, we made an assumption that would make it more difficult to find an additional cost of the death penalty. An example of this is the most important assumption in the analysis which centers on the issue of a death notice 'sticking'. In more than 100 cases, a death notice was filed but by the time the case reached trial the death penalty was no longer being sought. Unfortunately, no data were available to determine when the decision not to proceed with the death notice occurred. If these cases followed the usual pattern of death notice cases, then substantial additional resources were applied to these resources, perhaps hundreds of thousands of dollars given that the average death notice cases cost $474,000 more than no death notice cases just through the trial stage. However, since we could not empirically observe those additional expenses, we assumed the additional costs were zero, which almost certainly leads to an underestimate of the costs of the death penalty.

An additional assumption that is often contentious in any study that seeks to predict future spending is the choice of a discount rate. Research estimating future costs generally controls for the time value of money - the concept that an expenditure in the future is less costly than an expenditure of the same magnitude today. In general, higher discount rates produce smaller estimates of future costs. In this case, we were able to test our use of a 5% discount rate. The models in Table 5 and 6 were re-run twice, once using a discount rate equal to the rate of prison inflation (2.1%), and a second time with a discount rate set to zero. In each case, the parameter estimate on death notice decreased by approximately 3% and the parameter estimate on death sentence increased by approximately 3% indicating that results are highly robust to the choice of discount rate.

DISCUSSION

Extant literature on the costs of capital punishment unambiguously finds that capital cases are more expensive to prosecute from beginning to end than non-capital cases. However, past research has generally only studied a subset of cases in a given jurisdiction. Moreover, to date, no study has accounted for the possibility that many other variables related to the cost of case processing or the process of selecting cases for death penalty prosecution explain the cost differential. This research examines 509 capital-eligible cases that resulted in a guilty verdict in Maryland between 1978-1999, nearly half of the cases prosecuted during this time period, and more than 75% of cases prosecuted after 1989. Costs are modeled using multivariate models controlling for more than twenty covariates theoretically related to seeking the death penalty and/or the expected costs of the case.

We find a strong, positive association between both the filing of a death notice and a death sentence and the cost of processing the case. On average, a death notice adds about $670,000 in

costs over the duration of a case. A death sentence adds an additional $1.2 million in processing costs, for a total additional cost of about $1.9 million over and above the costs of a case where no death notice is filed. All models have a high degree of explanatory power and results are robust to specification and to changes in the discount rate applied to costs incurred in the future. These results are generally consistent with the extant literature documenting the costs of capital punishment in other states. In addition, Maryland spent more than $7 million on the Capital Defense Division above the per case costs calculated above for cases in this study.

Selection into capital prosecution – that is, the choice by the prosecutor to seek the death penalty -- is found to have a statistically significant and empirically relevant impact on findings. Put another way, we find that the cases for which the prosecutor seeks a death sentence have characteristics that would have made it more expensive to prosecute even had there been no death statute. Including a selection variable in the model reduces the estimate of the differential cost of a death notice and a death sentence by 11% and 7% respectively. However, when other variables theoretically related to costs are added to the model with the selection variable, the reduction in costs associated with selection is about 5%.

The majority (70%) of the cost differential between a death notice and a non-death notice case occurs during the trial phase. This difference is due to a greater number of pre-trial motions, longer and more intensive voir dire, longer trials and a greater amount of general preparation time. In addition, a typical capital case involves two attorneys on each side of the aisle while a case in which a death notice is not filed usually involves a single attorney. Another systematic cost difference between capital and non-capital cases is the penalty trial. For cases in which a death notice is not filed, sentencing will be held before a judge and there is no penalty trial. In cases in which a death notice is filed and the defendant does not subsequently enter into a plea agreement, the defendant is entitled to a penalty trial in which witnesses and experts testify and a sentence is determined by a jury. For an average case in which a death notice is filed (some of which reach a plea agreement prior to the penalty trial) the costs of the penalty phase are about $64,000.

Death notice cases are also more likely to incur costs during the appellate phase even where a death sentence is not handed down. Though some of these additional costs are likely due to the egregious nature of the offense, even after accounting for characteristics of the victim, the defendant and the case, these differences persist indicating that these cases are nevertheless prosecuted more intensively at the appellate level. Prison costs between death notice and non-death notice cases and sentence lengths do not systematically vary between the two groups.

When considering the costs of death sentence cases versus cases in which a death notice was not sought, differences occur at nearly every phase of the case. Trial costs are higher by $616,000 and cases in the penalty phase (which always occurs in cases that eventually reached a death sentence) were $326,000. The post-conviction stage in which additional motions are filed are higher by approximately $50,000 and the appellate phase which contains a greater number of appeals and hearings results in an additional $467,000 in cost. An additional $88,000 in costs are borne during

the federal habeas stage in which motions are heard by a federal appeals court. Finally, defendants sentenced to death actually have significantly more prison costs ($316,000). This is partly because the type of confinement for death sentenced inmates is more expensive, but also due to the reality that few of those sentenced to death are actually executed.

Limitations

The current study is not without limitations. First, the study relies heavily on the accuracy of information on the amount of time spent on an average case reported to us by prosecutors, judges, and public defenders. Data were collected post-hoc and respondents were asked to provide information on an "average" or "typical" case potentially introducing recall bias.

Second, although multivariate models explained a high proportion of variation in the cost of case processing, we cannot rule out the possibility that the coefficients on treatment dummies are biased due to the presence of one or more omitted variables. Of particular concern is the fact that due to both information and statistical constraints, we were unable to account for case clustering among prosecutors, defense attorneys and judges, all of which might reasonably be related to the cost of a case. However, it should be noted that the explained variance in this study was exceptionally high for a social science study of this type.

Third, prison costs estimated for each individual in the study sample rely on estimated counterfactual ages of death that are not sensitive to whether or not a defendant was under sentence of death. If living under sentence of death itself impacts life expectancy then prison costs may be subject to either upward or downward bias, depending on whether those on death row live longer or shorter lives.

Finally, though this study captures the costs associated with a large number of case events, there are additional costs associated with capital cases that can not be estimated. As inclusion of any omitted costs would likely increase the estimated cost of capital punishment to an even greater degree, the estimated costs found in this study are perhaps best interpreted as a conservative estimate of the differential cost of capital punishment. As noted, we do not include the costs of cases where the death notice did not 'stick' and was not prosecuted as a death notice case at trial. We exclude cases with a not guilty verdict or a nolle prose. In 7% of death noticed cases, or 11 cases total, the final result was not guilty. Because this study sought to compare the costs of death penalty and non-death penalty cases, those cases were excluded to ensure that only similar cases were compared. Any stage of processing beyond federal appeals, such as costs associated with the commutation process or litigation around competency to be executed could not be observed and were not included here. Finally, it is possible that there were additional costs associated with no death notice cases where defense counsel fought a death notice filing and the prosecution did not prepare a death notice filing.

REFERENCES

American Bar Association. (2003). "Guidelines for the Appointment and Performance of Defense Counsel in Death Penalty Cases.

Arias, Elizabeth. "United States Life Tables, 2003". National Vital Statistical Report 54/14. April 19, 2006. Retrieved 20 Dec., 2007. Website: http://www.cdc.gov/nchs/data/nvsr/nvsr54/nvsr54_14.pdf

Baicker, Katherine. (2004). "The Budgetary Repercussions of Capital Convictions". Advances in Economic Analysis & Policy 4.

Berk, Richard A. (1983). "An Introduction to Sample Selection Bias in Sociological Data". American Sociological Review, Vol. 48, No.3: 386-398

Caliendo, Marco and Sabine Kopeinig. (2005). "Some Practical Guidance for the Implementation of Propensity Score Matching". IZA Discussion Paper No.1588.

Cook, Philip, D.B. Slawson and L.A. Gries. (1993). The Costs of Processing Murder Cases in North Carolina. Terry Sandford Institute of Public policy, Duke University.

Dehejia, Rajeev and Sadek Wahba. (1998)."Propensity score matching methods for non-experimental casual studies". National Bureau of Economic Research.

Department of Legislative Services, Maryland General Assembly. (2004). Fiscal and Policy Note, House Bill 521. http://house.state.md.us/2004rs/fnotes/bil_0001/hb0521.doc

Dezhbakhsh and Shepherd (2006). "The Deterrent Effect of Capital Punishment From a Judicial Experiment". Economic Inquiry.

Donohue, John J. and Justin Wolfers. (2006) "Uses and Abuses of Empirical Evidence in the Death Penalty Debate." National Bureau of Economic Research Working Paper 11982.

Ehrlich, Issac. (1975). "The Deterrent Effect of Capital Punishment: A Question of Life and Death." American Economic Review, 65: 397-417.

Forsberg, Mary. (2005). "Money For Nothing? The Financial Costs of New Jersey's Death Penalty." New Jersey Policy Perspective.

Forst, Brian E. (1983). "Capital punishment and deterrence: Conflicting evidence?" Journal of Criminal Law and Criminology 74:927-42.

Garey, Margot. (1985). "The Cost of Taking a Life: Dollars and Sense of the Death Penalty." UC Davis Law Review.

Goodpaster, Mark. (2002). "Cost Comparison between a Death Penalty Case and a Case Where the Charge and Conviction is Life without Parole. In the Application of Indiana's Capital Sentencing Law: Findings of the Indiana Criminal Law Study Commission." Retrieved 20 Dec. 2007. Website: http://www.in.gov/cji/special-initiatives/law_book.pdf

Governor's Commission on the Death Penalty. (1993). An Analysis of Capital Punishment in Maryland: 1978-1993.

Greene, William H. (1981). "Sample Selection Bias as a Specification Error: A Comment". Econometrica, Vol. 49, No.3: 795-798

Heckman, James J.(1977). "Sample selection bias as a specification error". March 1977. National Bureau of Economic Research.

Heckman, James and Edward J. Vytlacil.(2000). "Instrumental variables, selection models and tight bound on the average treatment effect". National Bureau of Economic Research.

Heckman, James, Hidehiko Ichimura and Petra Todd. (1998). "Matching as an Econometric Evaluation Estimator". The Review of Economic Studies, Vol. 65, No.2: 261-294

Katz, Lawrence, Steven D. Levitt and Ellen Shustorovich. (2003). "Prison Conditions, Capital Punishment, and Deterrence," American Law and Economics Review V5: 318-343.

Maryland Access Rule. http://mdcourts.gov/access/ro-accesstoctrecords.pdf

Maryland House Appropriations Committee. (1985). "Committee to Study the Death Penalty in Maryland Final Report: The Cost and Hours Associated with Processing a Sample of First Degree Murder Cases For Which the Death Penalty was Sought in Maryland Between July 1979 and March 1984." Maryland House Appropriations Committee.

Maryland Judiciary Case Search. http://casesearch.courts.state.md.us/inquiry/inquiry-index.jsp

Maryland Judiciary Offers Internet Case Search of Court Records. (2006). Court Information Office. Website: http://www.courts.state.md.us/press/2006/pr03-07-06.html

Mocan, H. and R. Kaj Gittings. (2003). Getting off Death Row: Commutted Sentences and the Deterrent Effect of Capital Punishment. The Journal of Law and Economics 46: 453-478.

Mumola, Christopher J.(2007). "Medical Causes of Death in State Prison, 2001-2004". Bureau of Justice Statistics.

New Jersey Death Penalty Study Commission. (2007). "New Jersey Death Penalty Study Commission Report."

New York State Defenders Association. (1982). "Capital Losses: The Price of the Death Penalty in New York State." Albany, NY: New York State Defenders Association.

Office of the Public Defender, State of Maryland. (2006). *Fiscal Year 2006 Annual Report.* http://www.opd.state.md.us/Index%20Assets/Annual%20Report%202006.pdf

Orszag, Peter. (2008). "CBO Testimony before the committee on the Budget of the United States Senate: Growth in Health Care Costs." Congressional Budget Office.

Ostrom, Brian J., Matthew Kleiman and Christopher Ryan. (2005). National Center for State Courts. *Maryland Attorney and Staff Workload Assessment, 2005.* http://www.ncsconline.org/WC/Publications/Res_WorkLd_MDAtty&StaffWkLdAs05Pub.pdf

Paternoster, Raymond et al. (2003). An Empirical Analysis of Maryland's Death Sentencing System with Respect to the Influence of Race and Legal Jurisdiction.

Paternoster, Raymond, Robert Brame, Sarah Bacon and Andrew Ditchfield. (2004). Justice by Geography and Race: The Administration of the Death Penalty in Maryland, 1978-1999. University of Maryland Law Journal of Race, Religion, Gender and Class.

Radelet, ML and RL Akers. (1996). "Deterrence and the Death Penalty: The Views of the Experts." Journal of Criminal Law and Criminology.

Rosenbaum, Paul and Donald B. Rubin.(1983) "The Central Role of the Propensity Score in Observational Studies for Causal Effects". Biometrika, Vol. 70, No.1: 41-55

Scalia, John. (1997). "Prisoner Petitions in the Federal Courts, 1980-1996." Bureau of Justice Statistics NCJ-164615.

State of Connecticut Commission on the Death Penalty.(2003)."Study Pursuant to the Public Act No. 01-151 of the Imposition of the Death Penalty in Connecticut."

State of Tennessee Comptroller of the Treasury.(2004). "Tennessee's Death Penalty: Costs and Consequences."

Stephan, James. (2007). "State Prison Expenditures, 2001" Special report. 2004. Bureau of Justice Statistics.

Washington State Bar Association. (2007). "Final Report of the Death Penalty Subcommittee of the Committee on Public Defense."

APPENDIX A – DATA COLLECTION

The initial data about the cases included for this study are drawn from a University of Maryland study on death penalty disparities in Maryland (Paternoster, Brame, Bacon & Ditchfield 2004). The study examined about 6,000 first and second degree murders committed in the state of Maryland from August 1978 until September 1999. The initial pool of 6,000 homicides produced a universe of 1,311 death sentence eligible cases. These 1,311 cases met two criteria: 1) the state's attorney filed a notice of intention to seek the death penalty and 2) the facts of the case clearly complied with the death penalty eligible criteria. Ambiguous cases were reviewed and the recommendations of by a panel of attorneys. The initial list of homicides and the corresponding case records were collected from the Maryland Division of Corrections. Additional data on case files were provided by the Clerk of the Maryland Court of Appeals, State's Attorney offices and the Maryland Office of Public Health. However, since the study was focused on the effect of race and jurisdiction on the imposition of the death penalty, time- and cost-related variables that were crucial to our study were not included in the Paternoster data.

We identified 84 observations in the data which were retrials of the same homicide. Each initial trial and its subsequent retrial(s) were later condensed into a single observation, yielding an analytical database of 1,227 observations. After removing cases which did not result in a guilty verdict, this adapted dataset of 1,136 death eligible cases formed the initial dataset used by the UI research team.

COLLECTING DATA FROM THE MARYLAND JUDICIARY CASE SEARCH (MDJCS) DATABASE

Traditionally, Maryland counties maintained hard copy records of each criminal case file either on location with the criminal clerk's office or at the Maryland Hall of Records in Annapolis, Maryland. In the 1990s, counties began deploying automated case management systems to electronically manage newly active cases in their counties. Maintained on private computer networks, the public could access these local databases only by visiting the county clerk's office. Each of the 24 counties developed their database autonomously and the databases evolved differentially with differences in operating systems, data availability and data format. In short, case records—hardcopy and electronic—were decentralized by county and data vary across counties.

In March 2006, the Maryland Judiciary initiated an online database, the Maryland Judiciary Case Search (MDJCS), in an effort to provide public access to a centralized source of electronic case records. However, the constraints of the centralized database are identical to those of the decentralized, county-level databases. Primarily, the MDJCS is limited to cases that had some activity after the year when the county where that case was adjudicated implemented its' automated

case management system. In many cases records for cases where all activity was prior to the development of the database were either maintained in hard copy or have since been destroyed.

From the Paternoster dataset, key identifiers—case number, name, date of birth, year of case and trying county—were used as search criteria to locate electronic case dockets in the Maryland Judiciary Case Search (MDJCS) database. We observed additional variables in MDJCS that were not available in Paternoster including key dates such as arraignment, trial days, hearings, motions, petitions and requests. For each observation in Paternoster, we searched for an electronic record in MDJCS.

There was no way to determine *ex ante* whether the data contained in the MDJCS database were complete. To verify the data's accuracy, we conducted site visits to Baltimore County, Baltimore City, Prince George's County and Anne Arundel County. We compared data we had printed from the MDJCS data to data we observed in the in-house databases maintained by each county's Clerk's Office in all four of these jurisdictions. In all instances, the availability and the scope of records from both sources were found to be identical.

Many records were missing in the MDJCS database. We determined there were four explanations for the missing data: 1) only the Hall of Record in Annapolis maintained a hardcopy case file, 2) the Circuit Court Clerk's Office maintained a hardcopy file, 3) the Circuit Court Clerk's Office maintained only a docket brief of the case file, and 4) the hardcopy record had been destroyed. In the first two instances, budgetary and time constraints prevented the acquisition and inclusion of records. In the third instance, the docket brief included no usable data and, in the fourth instance, records were unattainable.

Of the 1,227 observations in the analytic dataset, 538 dockets were classified as complete, 93 as incomplete and 596 as missing. A docket was judged to be complete if it contained observable events appropriate to the full length of a case from arraignment to conclusion (typically marked by sentencing or an affirmed appeal). A docket was deemed incomplete if any phases or crucial events, such as a sentencing date, were unobservable. Dockets were concluded to be missing if the identifiers in Paternoster dataset did not produce search results or if the docket was unavailable due to the limited historical scope of the MDJCS database.

Coding Dockets

Each docket was assigned a unique identifier. Multiple dockets for the same defendant for the same case were assigned a lettered sub-identifier, e.g. 445A and 445B. In the event of overlap among dockets for the same individual – e.g. multiple dockets reporting on the same case events – the most complete docket was used or, alternatively, fragments of dockets were used to form a complete docket. Consequently, we minimized double-counting. The data coded from the dockets into the data collection instrument fell into two general categories: 1) judicial phases and 2) case identifiers. As will be further discussed in later sections, data coded into the judicial phases encompassed various binary variables and the dates and durations (in days) of arraignments,

hearings, trials, sentencing hearings, appeals and petitions further broken down into the following phases:

- Trial (guilt/innocence phase);
- Trial (penalty phase);
- Other (hearings occurring between the penalty phase and the appeals phase);
- Appeals phase;
- Post-conviction phase;

These data on event-based case information were matched, where possible, with the relevant observation in the Paternoster dataset. Differences between the two data were minimal. In cases where differences were observed, we chose the official record if it was available, and the Paternoster data if official data were not available.

PACER

Data on costs associated with the federal stages were obtained from electronic dockets located on PACER, the federal judiciary's central location for court records for the US. District Court and US Court of Appeals. Docket information was only obtained for cases which had received a death sentence. At the US District Court level, we observed the date of filing for petitions for habeas corpus, hearings, and the date decisions were handed down. At the Federal Appellate level, we observed the number of appeals filed and decided upon. Appeals which were withdrawn or dismissed did not factor into our cost analysis.

DEVELOPING TIME-BASED ESTIMATES FROM DEFENSE AND PROSECUTION SURVEY RESPONDENTS

Not all required data were contained in either the Paternoster data or in the official records. Most importantly, we sought to estimate of the differential use of resources in processing capital versus non-capital (but capital eligible) cases by including out-of-court preparation time. We collaborated with a panel of defense and prosecution counsel with experience trying capital cases to develop initial estimates of preparation time for a 'typical' no death notice case and a 'typical' death notice case at each stage of processing.

Following an initial introduction by telephone, the prosecution and defense estimates were faxed to one or more counsel in the State's Attorney's Offices and the Offices of the Public Defender, respectively, across Maryland's 24 counties. Counsel were asked to review the initial time-based estimates and provide feedback and comments as to the accuracy of the estimates. In all, 16 defense estimates were sent to 15 counties and 37 prosecution estimates were sent to 23 counties. In addition, we employed a snowball sampling technique, and solicited names of additional

respondents, who we also contacted.[18] Across all survey respondents, the only significant change from the initial estimates was the estimated number of days of voir dire, as an initial estimate drawn from the Indiana death penalty study proved to be too high for a Maryland population.

Table A1.1

Prosecution and Defense Time-based Estimates for Processing Cases

Item	Death Notice	No Death Notice
Pretrial Phase		
% of time on a case (before death notice is filed)	50%	15%
% of time on a case (after death-notice is filed)	30%	15%
% of time on a case (90 days prior to trial)	50%	25%
% of time on a case (45 days prior to trial)	75%	50%
% of time on a case (30 days prior to trial)	100%	100%
Number of attorneys assigned	2	1
Attorney time to prepare for each hearing day (hours)	12	6
Paralegal time to prepare for each hearing day (hours)	2	1
Guilt/Innocence Phase		
Attorney time to prepare for each day of voir dire (days)	3	3
Average number of days of voir dire in a "typical" case	5	2
Attorney time to prepare for each trial day (hours)	60	60
Paralegal time to prepare for each trial day (hours)	5	5
Attorney time to prepare for each hearing day (hours)	12	6
Paralegal time to prepare for each hearing day (hours)	2	1
Penalty Phase		
Attorney time to prepare for each trial day (hours)	60	
Paralegal time to prepare for each trial day (hours)	5	
Attorney time to prepare for each hearing day (hours)	12	
Paralegal time to prepare for each hearing day (hours)	2	
% of time on a case (during phase)	100%	
Post-conviction Phase		
Hours/week	40	40
% of time on a case	15%	10%
% of time on a case (two weeks prior)	40%	40%
% of time on a case (during the hearing)	100%	100%
Attorney time to prepare for each hearing day (hours)	8	8
Paralegal time to prepare for each hearing day (hours)	1	1
Appellate Phase		
Attorney time to prepare an appeal (hours)	600 (200)*	300 (100)*

Source: Staff Attorneys from the Office of the Public Defender and the State's Attorney's Office. The only difference between prosecution and defense estimates is that the defense spends about three times as much time preparing an appeal then does the prosecution. This is justified as the defense must develop grounds for an appeal, and the prosecution only has to respond to the issues in the appeal.

[18] Respondents generally requested anonymity. We received responses from attorneys who have participated in a substantial number of death penalty cases in Maryland. Given how few attorneys in absolute numbers have been involved in death penalty cases, especially among prosecutors, we can not also report response rates without violating that anonymity.

These estimates include pre-trial, guilt/innocence, penalty, appellate, post-conviction and other post-sentencing phases. During the pre-trial and trial phases, attorney preparation time for capital and non-capital cases outside the courtroom increases as the trial date approaches. We estimate preparation for an appeal in a non-capital case consumes about one-half the time of a capital appeal. In terms of post-conviction, we again estimate out-of-court preparation time increases as the post-conviction hearing date approaches. Time consumption for other post-sentencing proceedings is assumed equivalent to preparation for hearings in the pre-trial phase.

Estimates for the prosecution are identical to that of the defense except for appeals. The justification is that the prosecution spends less time responding to an appeal than the defense does because the defense must identify grounds for the appeal, while the prosecution need only respond to the particular issues raised by the defense. Days in which there was a hearing or a trial day were assumed to have taken 100% of an attorney's time. Thus, we account for, on the average, the amount of time an attorney spends each day working on a case as well as the extra time associated with observed trial events.

APPENDIX B – CONSTRUCTION OF CASE-LEVEL COST ESTIMATES

This Appendix describes how case-level estimates were constructed. A description of how Maryland cases proceed through a capital eligible case can be found in the main body of the report.

OVERVIEW

In this study, we count the opportunity cost of the death penalty, which is defined as the value of resources in their next best use. Resources take the form of capital (such as the value of court space) and labor costs (salary and wages). We estimate the value of each resource (the price) in terms of the price per unit (such as one hour of attorney time). We estimate the value of all resources paid for by Maryland taxpayers in the processing of a death eligible case. We estimate costs for each defendant, and for each stage of case processing.[19]

Costs are calculated as the product of a price of a unit of input (such as hours) and the quantity of inputs used. Thus, our basic cost equation is:

$$\text{Cost} = \text{Price of unit of input X Quantity of inputs} \qquad \text{(A2.1)}$$

Following (A2.1), we estimate the two components of cost, price and quantity, separately. For instance, we observe the price of an hour of an attorney's time, then multiply that by the number of hours spent by that attorney in each stage of case processing. The remainder of this Appendix describes the sources of the price and quantity estimates.

Each of the sections in this Appendix follows the same order of presentation.

PRE-TRIAL/ TRIAL/ PENALTY PHASE

Defense Cost

The Office of the Public Defender's (OPD) primary mission is to provide legal representation to indigent defendants in the State of Maryland. The responsibility of establishing and funding county-level Offices of the Public Defender rests, not on the individual counties, but under the Executive branch of the Government of the State of Maryland.

[19] Because we are comparing trial costs of capital cases and non-capital cases, we dropped from our comparison group cases which were acquitted. Given that these cases could not possibly receive the same cost inputs as the treatment group, including them would have deflated the cost of the comparison group and artificially raised the differential cost of death penalty as compared to cases which did not receive the death penalty.

Wages

Position salaries are determined at the state level. In assigning value to time, we estimate the hourly wage of OPD staff, taking into account salaries, fringe benefits and days of leave. Staff salaries for county-level OPD offices were determined from the Maryland Department of Budget and Management's (DBM) State Salary Plan. The State Salary Plan lists title, class code and salary information in 2007 dollars for all state job classes. The annual salary for OPD staff was computed as the mean of the minimum and maximum salary for each position. These computed salaries correspond almost identically to salaries at the midpoint of the corresponding pay grades for each position listed in the State of Maryland Standard Salary Structure. The District Public Defender's salary is approximately $93,672.00, $72,157.50 for the Assistant Public Defender and $40,516.00 for the Paralegal.

Table A2.1

Estimated Salaries of Office of the Public Defender Staff

Position	Estimated Annual Salary
Dist. Public Defender	$93,672
Asst. Public Defender II	$72,157
Paralegal II	$40,516

Source: Maryland Department of Budget and Management (DBM) State Salary Plan

Following convention, fringe benefits are assumed equivalent to 30% of annual salary for all positions.[20] Fringe benefits represent a direct cost to the employer (in this case the State of Maryland) and include Social Security, Health Insurance, Pension Retirement, Deferred Compensation Match, Workers Compensation and Unemployment Insurance. Total estimates are $121,773.60 for the District Public Defender, $93,804.75 for the Assistant Public Defender and $52,670.80 for the Paralegal.

Table A2.2

Total Estimated Salaries and Fringe Benefits of Office of the Public Defender Staff

Position	Estimated Annual Salary and Benefits
Dist. Public Defender	$121,774
Asst. Public Defender II	$93,805
Paralegal II	$52,671

Source: Maryland Department of Budget and Management (DBM) State Salary Plan

[20] This estimate of 30% is close to the Department of Budget and Management's (DBM) FY 2007 estimate of a fringe rate of 33% for the typical state employee in the state personnel management system.

To estimate the hourly wage rate to be used in the final analysis, an estimate of the average number of workdays in a given year must be generated. Estimates of additional annual days of leave were developed from the annual leave policies outlined by the Maryland DBM. Leave time for state employees is comprised of annual leave, personal leave, holiday leave and sick leave. Annual leave can be used for any purpose and up to 50 days of annual leave can be carried over from one year to the next. Since annual leave varies directly with seniority, we used the mean allotment, 17.5 days. Personal leave cannot be carried over into a new calendar year and was excluded from out estimate. There is no limit to the number of sick days an employee can carry over into a new calendar year, so we included the full allowance of 15 days per year. A minimum of 11 days of holiday leave also figure into the total estimate. Our estimate of total leave, then, is 43.5 days. Given the seniority of staff in the study, this estimate of 43.5 days comports reasonably well with the DBM's estimate of 38 days of total leave for the typical state employee.

Table A2.3

Estimated Annually Allotted Days of Leave for Maryland State Employees

Leave Type	Allotted Days
Annual	17.5
Holiday	11
Sick	15
Personal	-

Source: Maryland Department of Budget and Management (DBM) Annual Leave Policy

Even if OPD staff do not take their full allotment of leave days, these days remain an indirect cost to the employer ($6,716 for the typical Maryland state employee in 2007), as outlined in the DBM 2007 Annual Personnel Report. Cook justifies an identical approach on the basis that employees will eventually use their leave at retirement if not sooner (1993: 41).

Accounting for 43.5 days of leave and 104 weekend days, we estimate 217.5 work days in an average year. Put differently, this estimate is equivalent to a 43.5-week year or a 1,740-hour year, assuming an eight-hour work day.

Table A2.4

Estimated Annual Work Time for Maryland State Employees

Unit	Amount
Days	217.5
Weeks	43.5
Hours	1,740

Source: Maryland Department of Budget and Management (DBM) Annual Leave Policy

Though interviews with attorneys involved in death cases suggest that their work often spans more than 40 hours per week especially around trials, attorneys are not eligible for overtime pay and, as such, a 40-hour work week is assumed in all cost analyses. Attorneys note that even in weeks where they are working 40 hours or more on death case, they still attend to other cases. Thus, when we interview attorney and ask them to assign percentages of time worked to cases, we ask them what proportion of 40 hours per week is spent on death cases at each stage of processing. Calculation of the hourly rate is straightforward:

Hourly wage rate = (annual salary + benefits) / 1740 hours

For staff in the county-level Offices of the Public Defender we estimate hourly wage rates at $69.98 for a Public Defender, $53.91 for an Assistant Public Defender and $30.27 for a Paralegal.

Table A2.5

Estimated Hourly Wage Rates for Office of the Public Defender Staff

Position	Hourly Wage Rate
Dist. Public Defender	$70
Asst. Public Defender II	$54
Paralegal II	$30

Source: Maryland Department of Budget and Management (DBM) State Salary Plan

Estimating Defense Quantities (Time Spent on Capital Eligible Cases)

Attorney time associated with an individual case proved the most difficult item to quantify. There are no time logs for either the prosecution or defense that are publicly available. Other studies have dealt with this problem by using survey data or interviews with attorneys to estimate, on average, the amount of time dedicated to a case (Cook 1993; Washington 2007). We developed a survey for attorneys to estimate time spent on these cases that could be linked to observable administrative data. In the electronic dockets, we observe both event data (number of hearings, number of trial days) and duration data (length of a phase). The survey queried attorneys with death penalty case experience about time spent on a case in each of these stages of processing. These estimates account for, on average, the amount of time an attorney spends each day working on a capital eligible case, as well as additional time associated with observable court events. A complete description of the survey can be found in **Appendix A**.

We estimate that attorneys involved in death penalty cases spend more time on those cases in all phases of pre-trial and the trial phase than would have been the case for a no death notice case. Importantly, survey respondents estimated that the number of attorneys dedicated to cases where a death sentence is being sought is twice (two) the number assigned to a no death notice case (one). For many court events, about twice as much time is spent in preparation. Respondents, however,

report that the amount of time preparing for voir dire preparation and a day of trial is identical in death notice and no death notice cases.

Table A2.6

Prosecution and Defense Time-based Estimates for Processing Cases in the Pre-trial and Trial Phases

Item	Death Notice	No Death Notice
Pretrial Phase		
% of time on a case (before death notice is filed)	50%	15%
% of time on a case (after death-notice is filed)	30%	15%
% of time on a case (90 days prior to trial)	50%	25%
% of time on a case (45 days prior to trial)	75%	50%
% of time on a case (30 days prior to trial)	100%	100%
Number of attorneys assigned	2	1
Attorney time to prepare for each hearing day (hours)	12	6
Paralegal time to prepare for each hearing day (hours)	2	1
Guilt/Innocence Phase		
Attorney time to prepare for each day of voir dire (days)	3	3
Average number of days of voir dire in a "typical" case	20	2
Attorney time to prepare for each trial day (hours)	60	60
Paralegal time to prepare for each trial day (hours)	5	5
Attorney time to prepare for each hearing day (hours)	12	6
Paralegal time to prepare for each hearing day (hours)	2	1

Source: Staff Attorneys from the Office of the Public Defender and the State's Attorney's Office

One critical difference between cases that receive a death notice and cases that do not receive a death notice occurs in the period before a death notice is filed[21]. Survey respondents report that the prosecution must spend additional time with these cases to determine whether a death sentence will be sought, and the defense works intensely to prevent the death notice filing. In death eligible cases where the death notice is not sought, we are unable to observe the amount of additional time spent by defense counsel to fight a death notice filing and the prosecution to prepare a death notice filing . Thus, in this area we likely underestimate the costs of the death penalty.

Prosecution Cost

The State's Attorney's Office (SAO) is responsible for prosecuting violations of Maryland State law within the geographical boundaries of its respective county. Unlike the Office of the Public Defender, policies dictating SAO salaries differ slightly for each county. County Councils define and approve SAO salaries, setting them directly as a specified amount or indirectly as a percentage of a District Court judge's salary.

We estimate the hourly wage of SAO staff by taking into account salaries, fringe benefits and days of leave using a process that is identical to the estimation strategy for OPD staff. However, because these salaries do not fall under the State Salary Plan, SAO wages were estimated from the Anne Arundel County Class and Compensation Plan. Again, we compute salaries as the mean of the minimum and maximum salary for each position and assume fringe benefits equivalent to 30% of annual salary. Total estimates designate $177,620.30 for a State's Attorney, $101,348.00 for an Assistant State's Attorney and $54,400.45 for a Paralegal.

Table A2.7

Total Estimated Annual Salaries and Fringe Benefits of State's Attorney's Office Staff

Position	Estimated Annual Salary and Benefits
State's Attorney	$177,620
Asst. State's Attorney	$101,348
S/A Paralegal	$54,400

Source: Anne Arundel County Class and Compensation Plan

Using the same estimates of 43.5 days of leave and 1,740 work hours per year, we estimate SAO hourly wage rates at $102.08 for a State's Attorney, $58.25 for an Assistant State's Attorney and $31.26 for a Paralegal.

[21] It should be noted that we were unable to observe the date of a death notice filling in all of our sample. In the event that we were able to observe a capital trial and the data in Paternoster dataset indicated a death notice, we used the average length of time from arraignment to the filing of a death notice to estimate the approximate date of a death notice filing. These estimates were made in 37 cases.

Table A2.8

Estimated Hourly Wage Rates of State's Attorney's Office Staff

Position	Hourly Wage Rate
State's Attorney	$102
Asst. State's Attorney	$58
S/A Paralegal	$31

Source: Anne Arundel County Class and Compensation Plan

As noted above, with the exception of differences in the appeals process, survey respondents report, on average, that there were no substantial differences between the defense and prosecution in the amount of time dedicated to a death notice case in the pre-trial and trial phases. Thus, the same estimates are used for prosecutors as for the defense. Within each type of case – death notice and no death notice -- differences in cost between the prosecution and defense are due to differences in wage rather than intensity of preparation.

One omission from our hourly estimates is the time contribution of investigators and local law enforcement. A federal study suggests that a large amount of time is spent by law enforcement investigators aiding the prosecution in developing capital cases. This cost may be the main driver for their findings that prosecution costs drive attorney costs in the trial phase of death penalty cases (Subcommittee on Federal Death Penalty Cases 1998). We were unable to directly observe these costs.

Expert Witnesses, Specialists

Most studies conclude that the cost of expert testimony is a significant part of the overall cost to the death penalty. Because we were unable to observe the cost of expert witnesses, we estimate this cost based upon a federal study of the death penalty (1998). This study estimates the percentage of overall cost which can be attributed to reimbursements to experts, which includes forensic science experts, experts in interpretation or authentication, mitigation specialists, jury consultants, psychologists, and psychiatrists. Overall, 19% of payments for representation went to services for experts and investigators for capital cases. In non-capital cases death eligible case, 16.2% of total costs were spent on experts. We apply our estimates to the cost of attorney fees for the guilt and penalty phase.

We note that it is possible that in the post-conviction stage of a case, these same specialists will again be called upon for expert guidance, this time by a different set of defense attorneys. However, interviews with attorneys in the field suggest that a common grounds for a post-conviction petition for relief is inadequate counsel, the proof being that experts were under-invested in the original trial and that mitigating circumstances were not presented. Thus, we assume that the total expenditure on experts can be estimated by assuming that all expenditures will occur during the original trial.

We note that it is possible that a re-trial will occur in a case, and that these experts will again be called upon for expert guidance. In the event of a retrial, we did add the additional costs.

Courtroom Costs

In addition to labor costs, we also estimate the value of the courtroom. The opportunity cost of the court room is the value of the space in its next best use, e.g. the rental of that space for another purpose. The rental value of one day of a courtroom is estimated by the prevailing market rental rates for an average square footage of Circuit Court space appropriate for trying a murder case.

To calculate the square footage of relevant courthouse facilities we solicited estimates of the size of court space from the Administrative Office of the Courts, the Department of Public Works and/or the Department of General Services in five counties in our sample. Specifically, we requested the square footage of a typical courtroom, jury room, judge's chamber and jury pool room. Of the five counties surveyed, only Baltimore City and Prince George's County did not process our request. Taking the average square footage of each facility, we estimated 1,534.3 square feet for a typical courtroom, 341.3 for a jury room, 541.7 for a judge's chamber and 4,458.7 for a jury pool room.

Table A2.9

Estimates of Circuit Court Facilities (sq ft)

Facility	Square Feet
Courtroom	1,534
Jury Room	341
Judge's Chamber	548
Jury Pool Room	4,459

Source: Administrative Office of the Courts, Department of Public Works, Department of General Services

To assign value to courthouse facilities, we used a seven year average (in 2007 dollars) of market rates for class B office rental space in suburban Maryland.[22] Applying the rental rate of $27.09 per square foot to the average area of the four relevant Circuit Court facilities, we calculate the annual rental value for each facility. Assuming court is in session 240 days a year, we estimate the following daily rental values for each facility: $173.19 for a courtroom, $38.53 for a jury room, $61.14 for a judge's chamber and $503.27 for a jury pool room.

[22] These market rates were drawn from several fourth quarter reports published by Grubb & Ellis, a commercial real estate firm specializing in the metro area.

Table A2.10

Rental Value of Circuit Court Facilities (sq ft)	
Facility	Daily Rental Value
Courtroom	$173
Jury Room	$39
Judge's Chamber[23]	$61
Jury Pool Room	$503

Source: Grubb & Ellis Research. *Office Market Trends Washington, DC Metro, 4th Quarter (2002-2007)*

To calculate courtroom usage, we assume one day of court usage per trial day, one day of court usage per hearing day, and one day of court usage per full day of voir dire. For trial days, we assumed that the jury room and the court room were used. For hearing days, we assumed the courtroom was used. For days of voir dire we assumed that the jury pool room and courtroom were used.

Judge Costs

To calculate per day costs of the judge and Circuit Court judicial staff, we follow the same general approach as was used to estimate fully loaded attorney wages. We assume fringe benefits are 30% of annual salary, judges receive 43.5 days of annual leave and judges work a 1,740-hour year. We use the annual salary of $134,352 for a Circuit Court Judge listed by the Maryland Judiciary to compute the salary-benefits total for that position. Salary estimates for other Circuit Court staff—court clerk, law clerk, court reporter and bailiff (deputy sheriff)--are again computed from the Anne Arundel County Class and Compensation Plan. We estimated hourly wage rates for Circuit Court staff at $100.38 for a Circuit Court Judge, $22.75 for a Court Clerk, $32.15 for a Court Law Clerk, $39.17 for a Court Reporter and $34.78 for a Deputy Sheriff serving as Court Bailiff.

Table A2.11

Estimated Hourly Wage Rates of Circuit Court Staff	
Position	Hourly Wage Rate
Circuit Court Judge	$100
Court Clerk	$28
Court Law Clerk	$32
Court Reporter	$35
Court Bailiff	$35

Source: Maryland Judiciary; Anne Arundel County Class and Compensation Plan

[23] Because we were unable to observe the square footage of the judge's chamber in the Court of Appeals, we left this cost out of our calculation of courtroom rental costs for all stages of a case. On the average, one room is 341 square feet and would have amounted to an additional $39/day.

We calculate cost of judges for trial days as well as hearing days in the guilt and penalty phase and assumed 8 hour workdays. Each trial day and hearing day was given one full day of judge time.

Jury Costs

Jury costs were estimated as the opportunity cost of one hour of an average juror's time. In other words, the opportunity cost is the foregone income of a juror. In economic analyses, the value of one hour of an adult's time is generally assumed to be equal to an hour of wages. Using state-level data from the Bureau of Labor Statistics, we calculated the average hourly earnings of a Maryland citizen 18 years or older. This rate reflects employed as well as unemployed persons and averages to approximately $12.59/hr.

This hourly rate was then applied to the process of jury selection. Using data from our interviews and surveys, we concluded that the average length of voir dire for a capital case is five days and two days for a non-capital case. For capital cases, semi-structured interviews with judges and attorneys report that 800 individuals fill out the juror-selection survey and estimate an hour of time per individual. We estimate that 175 potential jurors appear for jury selection and each spends, on average, 2.5 days in the juror pooling process (we assume that each juror is not present for all the days of voir dire). Twelve jurors and at least two alternate jurors are selected from the pool of 175 prospective jurors. We assume an opportunity cost of eight hours per trial day.

For non-capital cases, we assume that 120 individuals complete the juror-selection survey (one hour of time). We estimate sixty jurors appear for one day of jury pooling (we assume not all prospective jurors are present for all two days of voir dire) and the selected fourteen are present for all trial days, assuming eight-hour trial days.

Retrials and Pleas

In the event of a retrial of either the entire guilt phase or the sentencing (penalty) phase, we apply the same methods used for calculating the original trial costs.

In the event of a plea, we also apply the same estimates used for calculating original trial costs. That is, we increase the amount of time an attorney spends on a case the same way we would as a case approaches trial. We assume that an attorney treats a case as though it will go to trial until the moment of a plea. For trials in which the actual timeline did not allow for our estimation timeline (i.e. the phase was less than 90 days or the death notice filing date occurred within 90 days of the trial), we used only the applicable time percentages to the actual number of days. For example, if a case had a pretrial phase of 50 days, we used the attorney time percentage 90 days out (50%) for 5 days, 45 days out (75%) for 15 days, and 30 days out (100%) for 30 days.

PENALTY PHASE COSTS

The penalty phase is unique to cases where the death penalty is sought. In this phase, mitigating circumstances are often presented, and a defendant may elect to be either sentenced by a jury or by a judge. Costs were calculated as follows:

Attorney Costs

Wage rates for defense and prosecution attorneys for the penalty phase are identical to the hourly wage rates employed in the guilt/innocence phase. Again, survey responses were used to estimate the time attorneys spend preparing for a day of trial or a hearing day in the penalty phase. Typically, these estimates are the same as for the trial phase.

Table A2.12

Prosecution and Defense Time-based Estimates for Processing Cases in the Penalty Phase

Item	Death-Notice	No Death-Notice
Attorney time to prepare for each trial day (hours)	60	
Paralegal time to prepare for each trial day (hours)	5	
Attorney time to prepare for each hearing day (hours)	12	
Paralegal time to prepare for each hearing day (hours)	2	
% of time on a case (during phase)	100%	

Source: Staff Attorneys from the Office of the Public Defender and the State's Attorney's Office

One difference between the trial and penalty phase is that we assume that attorneys spend 100% of their time working on the case during this phase (which we estimate to last an average of 13.8 working days). Thus, in order to avoid double counting, time associated with the penalty phase was calculated as the total number of hours in the phase minus trial and hearing day hours and preparation hours for trial days and hearing days. Any remaining hours were then assumed to also have been spent working on the case.

Experts, witnesses, specialists

Our method of calculating specialists was based upon the total expenditure of the trial and penalty phase combined. For a full explanation of how costs were calculated, see the section on experts and witnesses in the trial phase chapter. As a note, in tables where costs are broken down by phase, since there was no way to differentiate costs associated with trial versus penalty phase, we added the total cost of experts to the trial phase cost.

Courtroom Costs

Courtroom costs were calculated using the same method as the trial phase.

Judge Costs

Here, we employ the identical Circuit Court staff wages used in the guilt/innocence phase. In the penalty phase, the defendant has the right to elect between sentencing by a jury or sentencing by a judge, and we were able to observe these events in our data. Where sentencing was done by a judge, we calculated cost the same as the cost of the judges' time during the trial days. For the penalty phase, we were able to observe instances in which sentencing was conducted by a judge instead of a jury and accounted for this cost as well. We calculated judge costs the same whether or not the defendant elected to be sentenced by a judge (we assume no extra time on the judge's part if he is doing the sentencing rather than a jury). Since the number of trial days were similar regardless of whether one was sentenced by a judge or by a jury, cases in which a defendant elected to be sentenced by a jury were more expensive.

Table A2.13

Sentences in Capital Cases

Sentenced by:	Count	Trial days
Judge	15	2.93
Jury	76	3

Source: Compiled from case dockets collected from the Maryland Judiciary Case Search (MDJCS) database

Jury Costs

Jury costs were calculated using the same method as was used for the trial phase, although, in the penalty phase the cost of voir dire was not included. This is because, generally, the same jury that sat in the guilt phase will sit in the penalty phase. However, in the event of a retrial, jury costs of voir dire were calculated, using the same assumptions as in the trial phase.

Handling Retrials, Pleas

There were 13 instances in which an offender was remanded for a retrial of the penalty phase only. For these events, the average length of a phase was much longer, an average of 292 working days. In these cases, we calculated time devoted to a case using the same percentages as the trial phase, 30 % in the beginning, 50% 90 days out, 75% 45 days out, and 100% 30 days out. There were only two cases in which a death notice was filed, a plea was made, and a penalty trial was still held. These were calculated the same as the typical penalty phase cases, using the plea as the start date of the phase.

COST OF CASE REVIEW

We differentiate costs associated with state-level post-sentencing proceedings into costs associated with appeals (both to the Court of Appeals and the Court of Special Appeals in non-capital cases) and costs associated with petitions for post conviction relief.

Post Conviction Costs

Costs associated with adjudicating the post-conviction phase are similar to costs associated with other phases. The prosecuting attorney represents the State. However, because post-conviction petitions are often based on the claim of inadequate counsel, the state hires private attorneys to represent the defendant. These attorneys then file for reimbursement. We assume that all defense attorneys in this stage are private.

Attorney time

Survey data indicated that attorney time on a case during the post conviction phase differs from time during the trial or sentencing phase. Since this phase often spans many years, from the day that a petition is filed to the day a decision is handed down, attorneys estimate they spent, on the average, 15% of their time on a case during this process. However, in the weeks before a hearing on the petition, time increases to 40%. While we did inquire as to the difference in time commitment in adjudicating a capital versus a non-capital case, estimates of time exhibit no major differences. One should note that at this stage a sentence has already been handed down. Thus, our treatment group has now become those sentenced to death (rather than those who received a death notice). Thus, death notice cases which did not receive a death penalty now use the same attorney time estimates as do no-death notice cases.

Table A2.14

Prosecution and Defense Time-based Estimates for Post-conviction Phase

Item	Death Penalty	No Death Penalty
Hours/week	40	40
% of time on a case	15%	10%
% of time on a case (two weeks prior)	40%	40%
% of time on a case (during the hearing)	100%	100%
Attorney time to prepare for each hearing day (hours)	8	8
Paralegal time to prepare for each hearing day (hours)	1	1

Source: Staff Attorneys from the Office of the Public Defender and the State's Attorney's Office

Many petitions for post conviction relief are not filed by attorneys but by the defendants themselves. Consequently, many are withdrawn or dismissed and the costs associated with such petitions are the opportunity costs of the defendant. However, because defendants are incarcerated,

we assume their opportunity costs are zero. Because we were unable to observe when a petition was filed by an attorney and when it was not, we made the following assumptions based on interviews with attorneys with experience in death penalty cases:

- All death penalty cases are represented by an attorney;
- Cases in which a death sentence was handed down and subsequently revoked will continue to be represented by an attorney during the post conviction process
- Costs associated with petitions which do not make it to a hearing will be assumed at zero.
- All petitioners which are heard have representation.

Specialists

Petitions for post conviction relief can generate large costs in capital cases. Since one of the main claims is inadequate counsel, new counsel typically has to recreate the entire case, including hiring mitigation specialists, in order to prove that an unsatisfactory job by former counsel neglected important mitigating factors which may have affected sentencing. While it was impossible to directly observe costs associated each individual case at this phase, one must still account for these costs. A difficulty we encounter in our technique of estimating costs of experts, however, is that of double counting costs- that is counting high costs of specialists in both the guilt and penalty phase. It is a logical assumption that claims of inadequate counsel which are granted a hearing most likely did not have the specialist expenditures associated with an adequately represented case. Based on this assumption, we believe that the estimated mitigation expenditure (19% of total attorney cost for capital cases) denotes the expenditure of a typical, well-represented case. Thus, if that amount is $50,000 for a case, if only $20,000 is spent in the trial and penalty phase, then $30,000 will be spent in post-conviction phase. Thus, the expenditure calculated in the trial phase is seen as the total expenditure of specialists, across all phases. This is admittedly a conservative assumption that we test in our sensitivity analysis.

Courtroom costs

Courtroom Costs were only calculated for the time spent in hearings. Each hearing day was estimated as one full day of use of the courtroom using the same methods and estimates outlined above.

Judge Costs

In our interviews with judges with experience in capital cases, the consensus was that during the trial and penalty phases, judges spend little, if any, time on a case outside of the courtroom. Thus, we estimate only judge costs for hearing days. One full day of judge time was assumed for each hearing day.

For post-conviction, we employ the same hourly wage rates for judicial staff: $100.38 for a Circuit Court Judge, $22.75 for a Court Clerk, $32.15 for a Court Law Clerk, $39.17 for a Court

Reporter and $34.78 for a Deputy Sheriff serving as court bailiff. The total judicial labor cost for a full-day hearing is $1,833.88.

Appellate Costs

Attorney time

Attorney time associated with appeals was calculated as the average number of hours necessary to draft an appeal, rather than a percentage of attorney time dedicated to a case throughout a phase. This assumption was made after interviews with public defenders and prosecutors indicated that the majority of work was done filing the appeal, rather than in the time between when the appeal was filed and when a decision was handed down. Attorney hours associated with appeals was one of the few areas in which we were told that there is, on the average, a difference in preparation time between the defense and prosecution. Because the defense has the burden of drafting the appeal and the prosecution responds, we were told that the prosecution devotes less time to this particular stage. Consequently we have estimated attorney time in the appeals phase as follows:

Table A2.15

Prosecution and Defense Time-based Estimates for Appellate Phase

Item	Death Penalty	No Death Penalty
Attorney time to prepare an appeal (hours)	600	300

Source: Staff Attorneys from the Office of the Public Defender and the State's Attorney's Office

Courtroom Costs

In estimating the value of an appellate-level courtroom, we used an approach similar to that of estimating value at the Circuit Court level. The Maryland Administrative Office of the Courts provided an estimate of 2,000 square feet for a courtroom at the appellate level, resulting in an estimate of $225.75 in rental costs per day.

Judge Cost

We continued our assumptions of fringe benefits at 30% of annual salary, 43.5 days of total leave and a 1,740-hour year to estimate hourly wage rates to calculate wage rates for judicial staff of the Special Court of Appeals and the Court of Appeals. We adopt Appellate Judges' salaries listed by the Maryland Judiciary and the previous wage estimate of a Circuit Court Law Clerk for the Appeals and Special Appeals Clerks. Accordingly, we estimated hourly wage rates as follows: $106.13 for a Special Appeals Associate Judge, $108.37 for a Special Appeals Chief Judge, $27.52 for an Appeals courtroom clerk, $128.77 for a Court of Appeals Chief Judge and $114.57 for a Court of Appeals Associate Judge.

Table A2.16

Estimated Hourly Wage Rates of Appellate and Special Appellate Staff

Position	Hourly Wage Rate
Special Appeals Assoc. Judge	$106
Special Appeals Chief Judge	$108
Appellate Law Clerk	$28
Appeals Chief Judge	$129
Appeals Assoc. Judge	$115

Source: Maryland Judiciary; Anne Arundel County Class and Compensation Plan

For the Court of Special Appeals, we assumed a three judge panel composed of the chief judge and two associate judges. For the Court of Appeals, we assumed all seven judges are involved in handing down a decision. In both instances, we accounted for the hourly time of one courtroom clerk. Assuming an eight-hour day, the labor cost of judicial staff of a day in the Court of Special Appeals is $2,785.25 and $6,749.85 for a day in the Court of Appeals.

For appeals, we assumed that all first appeals in non-capital cases go to the Court of Special Appeals and attribute one full day of judge time per appeal filed. While this amount of time fluctuates greatly with the strength of the appeal and severity of the case, we believe that on the average, our assumption holds. For the second and subsequent appeals for non-capital cases as well as all state-level appeals for capital cases, we used the hourly rate of judges at the Maryland Court of Appeals level. Similarly, we assume one full day of judge time per decision handed down.

Federal Costs

Once an appeal for post conviction is denied, the defendant may file for habeas relief in the federal court. Costs associated with the federal level can be broken down into Federal Habeas Petitions and Federal Appeals.

Judge Cost

Hourly wages for the Judges in the US District Court- 4th circuit and US Court of Appeals were calculated using the same estimates as above. It was assumed for the US District Court, 1 judge was involved in handing down a decision and for the US Court of Appeals, it involved a panel of 3.

Information on costs associated with the federal stages was obtained from electronic dockets located on PACER, the federal judiciary's central location for court records for the US. District Court and US Court of Appeals. Docket information was only obtained for cases which had received a death sentence. At the US District Court level, we observed the date of filing for petitions for habeas corpus, hearings, and the date decisions were handed down. At the Federal Appellate

level, we observed the number of appeals filed and decided upon. Appeals which were withdrawn or dismissed did not factor into our cost analysis.

While we were unable to collect docket data at the federal level for our control group (those with no death sentence), we estimated the probability of a case proceeding to each federal stage. In addition, we estimated the cost of adjudication of a non-capital case at the federal habeas and federal appeal level. We then distributed this expected cost amongst our no death sentence group. The data we used to create these estimates are those reported by the Bureau of Justice Statistics in their report on petitions to the federal court (Scalia 1997), which reports data on the rate of capital and non-capital petition filing on a state by state basis. Scalia also estimates the average length of time between a filed petition and a decision, differentiated by capital and non capital cases; the percentage of petitioners who have representation rather than represent themselves; and, the rate petitions are dismissed. This study was done over the years 1980-1996. All these data were used to determine the expected cost of a petition for federal habeas or a federal appeal for non-capital cases.

Federal Habeas

According to the Bureau of Justice Statistics, 928 petitions were filed in 1995, an average of 43/1000 inmates. Once we accounted for the percentage that were adjudicated by the US District Court (43%) and the percentage that were represented by counsel (12%), only 2/1000 inmates were represented by counsel and had their petitions adjusted by the US District Court. Given our sample of 509, this resulted in one case likely to reach the level of federal habeas.

The average length of time for cases where inmates were represented by counsel was 825 days, 659 working days. Based on interviews, we assumed attorneys spent on the average 15% of their time working on the case. Thus, we calculated the expected cost of a case as the expected attorney cost as well as the expected cost of judges' time in adjudication. The attorneys' cost was applicable to the one likely adjudicated case with counsel, the judge costs were applicable to 9 likely adjudicated cases, with or without counsel. We estimated one day of judge time per decision.

Because we were unable to associate the cost of the federal habeas stage to a particular non-capital case, the total expected cost was dispersed evenly across all cases. While this does not allow for variation, we do not believe that this low cost per case will have any real impact on results.

Federal Appeals

Only about a quarter (23.7%) of cases filed in US district courts are ever appealed to the US Court of Appeals. Given this low percentage and our sample size, the costs associated with this phase for our control group were negligible and left out of the sample.

Additional Costs

There were some hearings we were unable to allocate to any specific phase. To account for these, we tallied the number of "unknown" hearings and calculated their costs using the same estimates as a trial hearing.

Cost of Prison

Prison costs were calculated using information from the Maryland Department of Public Safety and Correctional Services. Budget books available for 2002-2006 years provide information on cost for every correctional facility in the state. Annual costs for Maryland House of Correction - Jessup Region were used as an estimate of incarceration costs for those not sentenced to death row (around $30,000 in 2006). Costs for Maryland's death row were taken from the same data source. All costs for the given period were converted into 2007 constant dollars and the change in cost over this time period was used to estimate the real prison-specific inflation rate (2.1%) above and beyond the rate of inflation. According to the Bureau of Justice Statistics, inmate medical care totaled approximately 12% of operating expenditures . To account for the fact that health care costs rise at different, presumably higher rates, 12% of the incarceration costs were inflated at different rate. Past prison costs beginning from 2007 were deflated at a rate of 2.1%. Future cost costs were inflated at a rate of 2.1% to account for real prison-specific inflation and were subsequently discounted at a rate of 5% to account for time value of money, the assumption being that states can reserve money today that will be needed in the future and receive a reasonable rate of return on that investment, a rate we assume, for now, to be 5%.

In order to determine the amount of time that prison costs accrue for each inmate in our sample, it was necessary to estimate two pieces of data – the expected length of each inmate's natural life and the expected length of an inmate's sentence if that sentence was not death or life without the possibility of parole. Since data on the ages of death for those prisoners who died in custody were not available and because the majority of individuals in our sample are currently living, it was necessary to estimate a counterfactual age of death for each inmate. While the Bureau of Justice Statistics' Death in Custody Reporting program records the ages and manners of death in custody for all deaths occurring in the nation's prisons, these data were insufficient to estimate counterfactual ages of death for our sample for two reasons. First, as the majority of prisoners in state and federal prisons do not die in custody and, instead are released prior to death. As a result, mean ages of death in custody do not reflect an unbiased sample of ages of death among the prison population. Second, as individuals in our sample – all convicted murderers – serve longer sentences than the average prisoner, compounding the likelihood that their death will occur while in custody.

Unfortunately, while extant research does not explicitly estimate life expectancy for the prison population, data on age-specific mortality rates and life expectancy are available for the general population. The National Center for Health Statistics provides estimates of life expectancy as well as age-specific mortality rates for the general population groups, estimated separately by race and gender. Life expectancy in prison was modeled in three stages. First, life expectancy was linked to mortality rates for the general population via a simple OLS regression of life expectancy on mortality rates. Next, using linear transformations of in-prison race, gender and age-specific mortality rates to mortality rates in the general population calculated by cite, we calculated in-prison mortality rates for each age, by race and gender groups. Finally, in-prison life expectancy was estimated by regressing life expectancy for the general population on in-prison mortality rates. The model was specified as a

log-log relationship between prison life expectancy and national life expectancy and was estimated separately for each gender and race for age group, for ages 17-65. Finally, the fitted values from this regression model were estimated for each member of our sample, yielding an expected age of death.

Death is only one means of ending one's tenure in prison. The other means of doing so is by serving out the entirety of one's sentence or via parole or early release. In order to estimate an expected length of time served in prison, it was first necessary to generate an expected length of sentence served. Sentence (in years) available in the dataset used by Paternoster et al (1999) was multiplied by 54%, the average length of sentence served for a violent crime in Maryland (cite) and an estimated year of release was created. Next, the expected year of release was compared to the expected year of death and, for each inmate in the dataset, the minimum of these two numbers – the expected year of exit from prison – was taken. Finally, the year of entry into prison was subtracted from the expected year of exit from prison, yielding the amount of time over which prison costs accrued or are expected to accrue for each offender. The one exception to this calculation concerns individuals who, at one time or another, were on Maryland's death row. For executed inmates, actual ages of death were substituted for expected ages of death in order to account for savings in lifetime prison costs associated with execution. Likewise, for inmates currently on death row, an expected age of exit from death row was calculated by taking a weighted average of the mean time until execution multiplied by the probability of execution and the mean time until leaving death row multiplied by the probability of leaving death row. Upon leaving death row, inmates were assumed to accrue business-as-usual prison costs until their forecasted date of death or release.

Cost of Healthcare

The extant literature suggests that the increasing cost of health care for aging offenders is a significant cost associated with life without parole (Goodpaster 2002). Increases in the cost of healthcare are driven by two factors: real growth in healthcare costs over time and individual-level increases in costs associated with aging. Because data on per capita healthcare expenditure by age-group was not readily available for Maryland, age-specific prison healthcare costs calculated by an Indiana study of the death penalty were used (Goodpaster 2002). A comparison between the national average used by Indiana and Maryland suggests similar per capita annual healthcare costs that may slightly overestimate Maryland-specific healthcare costs (Stephan 2001; Stephan 1996). Since Indiana's estimates only included costs for ages 30-75, costs for younger inmates were estimated as the same as that of the 30-year-old cohort, and costs of older inmates were estimated using the average rate of increase in healthcare costs for 70-75 year olds. Healthcare costs estimated in Goodpaster (2002) were transformed into 2007 constant dollars, and past expenditures were calculated by deflating these costs by the estimated real rate of increase in healthcare costs . This rate (2.3%) was calculated as the average of the historical average excess cost growth for Medicare and Medicaid as given by the Congressional Budget Office (Orszag 2008). Future costs were projected by first inflating costs for the real rate of increase in healthcare costs and then by deflating

this cost by a 5% discount rate to account for the time value of money. In order to avoid double counting healthcare costs and prison costs, the estimated percentage of prison costs attributable to healthcare costs were subtracted from the total prison costs. This percentage was estimated at 12% based on the national average (Stephan 2001). Finally, lifetime healthcare costs were estimated for each inmate based on their age of entry into prison and their expected age upon exit.

Costs of the Office of the Public Defender, Capital Defense Division

As a statewide office established in 1988, the Capital Defense Division coordinates the delivery of legal defense services, arranges for experts and advises counsel in capital cases. However, the Division's work is not restricted solely to cases in which the prosecution files a death notice. The Division expends much of its efforts in "convincing the State pretrial that a notice to seek a sentence of death should not be filed because it did not satisfy legal criteria or because it was not warranted despite technical eligibility" (Office of the Public Defender 2006, 124). As a result, the total number of death notice cases "does not appear to accurately represent the potential workload involved in handling these complex matters" (Ostrom, Kleiman and Ryan 2005, 112).

Accordingly, we consider the cost of the Division as a cost of capital punishment for all capital eligible cases, whether or not the prosecution eventually files a death notice. Employing State of Maryland Operating Budget Details, we record total expenditures (in 2007 dollars) over a period of five years and subtract out technical and special fees to avoid double-counting the cost of specialists and expert witnesses. We take the inflation-adjusted, five-year annual average of Division expenditures, $563,575.46, and apply it to the years in the sample for which the Division operated (1988-1999). This estimate adds an additional $6.2 million to cases in our sample occurring 1988-1999. However, due to the protracted nature of capital litigation, we must also account for the cost of cases originating within our sample timeframe but with activity beyond 1999. The combined 2000-2001 percentage of transferred (old) cases is 41%. Discounting by .41 for each subsequent year beyond 1999, we estimate another $.95 million in Capital Defense Division costs accruing to the cases in our sample beyond 1999. The total estimated cost of the Capital Defense Division accrued to cases in our sample is $7.15 million.

We are confident the cost model does not account for this additional figure of nearly $7.15 million in costs because the Division "is generally administrative in nature and rarely litigates death penalty cases" (Department of Legislative Services 2004, 4). Moreover, the estimate is likely a conservative one given that some technical and special fees are inevitably unaccounted for.

APPENDIX C – ECONOMETRIC MODELS

Stage 1 – Accounting for Missing Cases

Our population of interest includes all 1,136 capital eligible cases in Maryland prosecuted between 1978 and 1999 that resulted in a guilty verdict. Case records were either missing or incomplete for 627 of these cases, yielding a final analytical sample of n = 509. An analysis of the missing cases revealed that cases are not missing at random, and, as such, failure to account for the influence of missing cases may bias estimates of the cost of the death penalty.[24] We followed the literature on non-responses in surveys and use sampling weights to adjust for potential bias due to missing data. Weights were generated using the following logistic regression model which regresses whether or not a case had complete data on attributes of the case that may be related to why the case was missing.

$$p_i = \exp(X\lambda) / (1 + \exp(X\lambda)) \qquad \text{(A3.1)}$$

In (A3.1), p_i is an indicator variable for whether or not case *i* had complete case data and X is a vector of covariates theoretically linked to the probability the data are missing. In order to generate sampling weights for each case, model (A3.1) was run separately for treatment cases and comparison cases generating a predicted p_i-hat value, the probability that the case contained complete records. For each of the 509 complete cases, we generated a base weight, w_i which is given by:

$$w_i = 1/p_i \qquad \text{(A3.2)}$$

In (A3.2), p_i is the probability that case *i* is complete (non-missing) in the dataset. Thus, cases that have a high probability of having missing data – and are therefore the cases that most closely resemble the cases where data were missing -- but are not missing data receive a higher weight in the analysis. In order to ensure that no single case contributed undue influence to subsequent models weights are winsorized at a value of four. The weights were then normalized so the sum of the weights were equal to the sample size of the complete cases (n = 509). The normalized weights did not differ significantly by treatment condition, indicating no bias in case missingness along treatment status. **Table A3.1** contains a list of predictor variables used to generate sampling weights.

[24] In order to investigate whether missingness was related to observable covariates, a logistic regression analysis was run on a binary measure of missingness.

Table A3.1.

Independent variables used in the regression models to generate weights to account for missing values.

Defendant Characteristics:

Age of defendant, defendant race is white, defendant has a prior felony charge, defendant has a history of alcohol abuse, defendant has a troubled job history

Victim characteristics:

Victim race is white, victim is unable to defend oneself, victim is elderly or frail

Offense characteristics:

Multiple victims, defendant was a stranger to any victim, victim was executed, victim made to beg for life, victim took a long time to die, victim was killed in own home, defendant persisted even when victim 's death was certain, defendant attempted to evade capture, defendant confessed to the crime, evidence against Defendant was circumstantial

Statutory Aggravators

A1 - Victim was a law enforcement officer

A2 - Defendant committed murder while in a correctional institution

A3 - Defendant committed murder while trying to escape custody

A4 - V Victim was murdered in the course of an abduction

A5 - Victim was a child abductee

A6 - Defendant murdered pursuant to agreement for remuneration

A7 - Defendant employed another who killed for remuneration

A8 - Defendant committed murder while under life sentence

A9 - Same incident produced multiple murder victims

A10 - Defendant committed murder in the commission of another offense

County Dummies (reference category = all other counties)

Anne Arundel, Baltimore City, Baltimore County, Harford, Montgomery, Prince Georges, Other

Year of Case

Source: Urban Institute analysis.

As the generation of sampling weights is largely atheoretic, all variables that were either empirically or theoretically related to case missingness were included in the model. The explanatory power of the model ($R^2 = 0.44$) was high, indicating that the model is able to accurately predict whether or not cases were complete. In order to verify that the selection weights successfully re-weighted the sample, independent samples t-tests were run to compare the unweighted and weighted means for each predictor in the model. This analysis returned no significant differences across all

twenty-four variables, indicating that bias caused by incomplete case records is successfully removed by model (1), conditional upon no omitted variable bias.

Stage 2 – The Decision to Seek a Death Notice

In quasi-experimental designs, factors not included in models that are related to both selection into treatment (the filing of a death notice) and outcomes (cost) have the potential to bias resulting point estimates on the treatment parameter in final outcome models (Heckman 1977; Greene 1981; Berk 1983; Heckman 1990). Propensity score models have been proposed as a viable solution to modeling selection bias arising under this scenario (Rosenbaum and Rubin 1983; Heckman Ichimura and Todd 1997; Dehejia and Wahba 1999; Caliendo and Kopeinig 2006). Using fitted values generated from multivariate model on a binary measure of selection, researchers can control for the impact of observables on the selection process.[25]

We use propensity scores to address the possibility that there are cases that would have been processed more intensively (at higher cost) even in the absence of the death penalty. Such a scenario might occur, for example, in cases where the victim is elderly or was unable to defend himself or if the certain counties that are more likely to file a death notice also tend to adjudicate cases more intensively than other counties. If this is the case, explicitly modeling the process by which selection occurs reduces threats to internal validity in the outcome model and, under certain conditions, propensity score analysis has the potential to mimic a randomized controlled trial and generate unbiased estimates of the treatment effect (Caliendo and Kopeinig 2006).

Little advice is available on the ideal functional form that a propensity score model should take (Smith 1997). As logit and probit models yield similar results for binary measures of treatment, we follow Caliendo and Kopeinig (2006) and use a logit specification as the logistic distribution has more density mass in the bounds. Predicted propensity scores can be sensitive to variable selection criteria utilized by researchers. Omission of important variables in propensity score models can seriously bias resulting estimates (Heckman Ichimura and Todd 1997; Dehejia and Wahba 1999). However, overparameterization of propensity score models can decrease the sample space on the propensity scores across treatment and comparison conditions and can increase the variance of the propensity scores and the standard errors around the resulting treatment effect (Augurky and Schmidt 2001; Bryson Dorsett and Purdon 2002). Rubin and Thomas (1996) recommend against trimming models in the name of parsimony arguing that variables should be excluded from the model only if it is unrelated to outcomes or if it violates the assumption that predictors are exogenous with the selection variable.

In selecting variables for inclusion of our propensity score model, we follow Rubin and Thomas (1996) and exclude all variable that are unrelated to outcomes but retain all other available predictors, so as to minimize the probability of omitted variable bias. We follow Heckman,

[25] The use of selection models is not without statistical cost. Propensity scores - whether used in matching, stratification or weighting - result in increased standard errors and, as such, are relatively inefficient estimators.

Ichimura, Smith and Todd (1997) and began with a parsimonious model containing several theoretically important predictors of selection (the filing of a death notice) and add predictors one by one, retaining all predictors that are significant at $p < 0.5$. This process yields a propensity score model with fifteen predictors, and a Pseudo R^2 of 0.25.

Table 2 lists the predictors that were retained in the analysis. In order to assess the quality of our propensity score model, we compare follow Sianesi (2004) and compare the Pseudo R^2 of the propensity score prior to and after using inverse probability of treatment weights. After weighting, the Pseudo R^2 of the propensity score model is just 0.04 and a likelihood ratio test fails to reject that coefficients in the propensity score model are jointly equal to zero. In addition, independent samples t-tests confirm that no differences remain among variables in the weighted versus unweighted sample, indicating that our model is sound.

Table 2 – List of Predictors in Propensity Score Analysis (Stage 2)

Age of defendant
Race of victim (1 if white, 0 if not)
Victim was executed
Victim was killed in own home
Victim was elderly or frail
Victim was unable to defend himself
Evidence against the defendant was circumstantial
A9 – The same incident produced multiple murder victims

County dummy variables (reference category = all other counties)

- Anne Arundel
- Baltimore City
- Baltimore County
- Harford
- Montgomery
- Prince Georges

Year of Case

Stage 3 – Outcome Models

In the third stage of the analysis, outcome models are specified using the sampling weights generated in (A3.2). Next, outcome models are of the form specified in (A3.3):

$$COST_i = \beta 0 + \beta 1 * DN_i + \beta 2 * DS_i + \pi PS_i + Z\varphi + \varepsilon_i \qquad \text{(A3.3)}$$

In (A3.3), $COST_i$ is the total cost of processing case *i* to all stakeholders, DN_i is an indicator variable equal to 1 if the case had a death notice filed and 0 if not and DS_i is an indicator variable equal to 1 if a death sentence was handed down and 0 if not. PS_i is the propensity score estimated

in Stage 2 and represents the probability that case *i* receives a death notice. Z is a vector of covariates theoretically related to the cost of processing a case. In models without any additional covariates, the intercept parameter, $\beta 0$, is the average cost of a capital-eligible case in which the death penalty was not sought. It is possible to obtain estimates of the total cost of each category of capital-eligible case by adding each successive coefficient. For example, $\beta 0 + \beta 1$ yields the average total cost of a case in which a death notice was filed and $\beta 0 + \beta 1 + \beta 2$ yields the average total cost of a case in which a death sentence is handed down. All outcome models are run using the sampling weights estimated in Stage 1 of the analysis.