

Pain, Suffering and Jury Awards: A Study of the Cost of Wrongful Convictions

Mark A. Cohen*

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Abstract

This paper estimates the cost of wrongful convictions and the time spent in prison based on a cross sectional regression analysis of awards and settlements for individuals who were wrongfully convicted and incarcerated for crimes they did not commit. Key variables of interest are number of days spent in prison, days on probation, and demographics of wrongfully convicted and their families. The sample consists of all known individuals (n=514) who successfully sued for damages and received payment through either trial or settlement between 1992 and 2019. Wrongful convictions cause significant tangible and intangible harm to individuals and their families which can be monetized using *ex post* jury awards. The average “cost” of a wrongful conviction is estimated to be \$6.1 million, or \$1,334 per day of incarceration. The marginal cost decreases over time: initial incarceration is valued at over \$50,000 for the first day; year one is valued at \$1.5 million (\$4,000/day), while the marginal cost of the 10th year is estimated to be approximately \$350,000 (\$950/day). Wrongfully convicting and incarcerating one individual is about as costly as the harm caused by a career criminal over their lifetime. Future research might focus on society’s *ex ante* willingness-to-pay to avoid wrongful convictions. This study provides policymakers with a tool to value increased expenditures for DNA testing, indigent defense counsel, and other innovations designed to reduce wrongful convictions.

Keywords: wrongful conviction, false imprisonment, cost of incarceration, jury awards

JEL: D61, K42, H40, K13

* Mark A. Cohen, Owen Graduate School of Management, Vanderbilt University, 401 21st Avenue South, Nashville TN 37203 (email: mark.cohen@vanderbilt.edu).

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1. INTRODUCTION

Despite the high legal standards of criminal conviction and many safeguards built into the U.S. criminal justice system, there is growing evidence that a significant number of individuals have been wrongfully convicted and incarcerated - and that they either never committed the crime or there was insufficient evidence at the time of conviction under traditional legal standards. The National Registry of Exonerations (“Registry”) based at the Newkirk Center for Science & Society at UC Irvine (operated jointly with the University of Michigan Law School and Michigan State Univ. School of Law), maintains a registry of convicted offenders in the US who were later exonerated for their crimes of conviction – most of whom served time in prison (<http://www.law.umich.edu/special/exoneration/>). Between January 1989 and November 2020, the Registry identified nearly 2,700 defendants who were exonerated for crimes they were convicted of previously – serving over 24,350 years in prison before being released. About 40% of these defendants were convicted of murder, 13% for sexual assault or rape, 11% for child sexual abuse crimes, with the remaining crimes mostly being other violent crimes such as assault or nonviolent drug offenses. The average time served for these defendants was approximately 10 years, with some individuals having spent more than 30 years in prison before being exonerated.¹ Because not all wrongfully convicted offenders are identified by the criminal justice system, some are let out after normal time served and/or die in prison, and others whose convictions are later overturned but were never formally exonerated are excluded from the database, the number of wrongfully convicted individuals is certainly higher.

¹ These figures have been estimated from various annual reports by the National Registry of Exonerations.

This paper attempts to place a dollar “cost” on the time spent in prison to those who are wrongfully convicted of a crime they did not commit. There are several reasons why one might want to estimate the cost of wrongful convictions. One reason might be to compensate individuals who have been wrongfully convicted and served time in prison. Much like a tort action, compensating victims can serve the dual purpose of mitigating the harm they endured as well as providing an incentive on the part of the tortfeasor to avoid causing the harm in the first place – i.e., to deter wrongful convictions. While the socially appropriate victim compensation might not be the same as the optimal penalty charged to the tortfeasor, most such calculations will start from the perspective of victim harm (Viscusi, 2007).

Aside from *ex post* victim compensation, from an *ex ante* benefit-cost perspective, economists want to know the “price” society should be willing to pay to avoid wrongful convictions. Thus, for example, if changing a legal standard to require DNA testing of all accused felons cost \$1 million annually and avoided wrongfully convicting one individual, is that a price we are willing to pay? As with any criminal justice enforcement policy, there are bound to be both false positives (Type I errors) and false negatives (Type II errors). Presumably, the high legal standards of proof in criminal cases are designed to minimize the number of false positives – even allowing for the fact that the price of protecting the innocent is likely to be a higher level of false negatives – letting offenders off the hook due to lack of sufficient evidence. From a public policy perspective, one way to think about this trade-off is the social benefits and costs of a Type I versus Type II error. Indeed, the economics of crime literature recognized early on that one reason society does not impose draconian penalties as a deterrent to criminal behavior is the social cost associated with wrongful conviction – including the long-term impact on the well-being of individual wrongfully incarcerated (Becker, 1968; Harris, 1970). It has also

been noted that wrongful incarcerations might reduce the deterrent effect of punishment (Polinsky and Shavell, 2007); although more recently the impact of wrongful conviction on deterrence has shown to be ambiguous (Lando and Mungan, 2018).

Whether designed for victim compensation or as part of a social benefit-cost analysis, the starting point for our analysis is to understand the cost to wrongfully convicted individuals. Section 2 reviews the prior literature on the prevalence and impact of wrongful convictions, while Section 3 reviews the literature on compensation for wrongful convictions. The present study's data collection methodology and definitions are explained in Section 4. Section 5 summarizes the empirical analysis, while policy implications are contained in Section 6. Finally, Section 7 concludes with an exploration of future research needs.

2. PREVALENCE AND IMPACT OF WRONGFUL CONVICTIONS

2.1 Prior Research on Prevalence

Not too long ago, it was thought that wrongful convictions were extremely rare. In fact, although there is considerable uncertainty about the rate of wrongful convictions in the U.S., there is also growing evidence that the problem is more prevalent than thought prior to the advent of DNA testing. One study estimated that at least 4.1% of all death-sentence defendants were wrongfully convicted (Gross *et al.*, 2014). As the authors note, death sentences represent only a small fraction of defendants – even for those convicted of murder. Moreover, there is no way to generalize from these estimates to other felony convictions – and in fact, the wrongful conviction rate for murder might be higher than average. For example, murder cases are high profile and police might be under more pressure to ‘solve’ these crimes compared to other felonies.

Beyond studies of death-sentence defendants, estimates of wrongful convictions vary widely. For example, surveys of criminal justice professionals estimate the rate to be 1-3%; studies of DNA exonerations for rape and murder cases have found rates of 3-5%; and those who have evaluated all the relevant evidence estimate the wrongful conviction rate to be 1-5% of all convicted felons (Zalman, 2012; Gross, 2013). A recent survey of new prisoners in one state found that 6% had “plausible” claims of wrongful conviction – varying from as little as 2% of DUI convictions to as much as 40% in rape convictions (Loeffler, Hyatt and Ridgeway, 2019). A random sample of cases in Virginia concluded that as many as 12% of all murder and sexual assault cases may have been wrongful convictions (Walsh *et al.*, 2017). On the other hand, a secondary analysis of existing studies suggests the wrongful conviction rate might be considerably below 1% (Cassell, 2018) – particularly when moving beyond murder and rape cases.

In addition to the difficulty of estimating something we cannot fully observe, the definition of a wrongful conviction itself varies. For example, there is a big difference between an instance where DNA evidence has conclusively shown that the wrong person was convicted and a case where evidence that convicted someone was thrown out because it was illegally obtained. In the first case, the individual was factually not guilty while in the second case they might have been guilty but not under the law. Thus, one might conceptually distinguish between a “factual” and “legal” wrongful conviction.

Following the advent of DNA testing in the early 1990s, numerous nonprofit organizations sprung up to investigate and assist convicted felons who were wrongfully convicted. The Innocence Network (www.innocencenetwork.org) is an affiliation of organizations that investigate and provide free legal assistance to those seeking exoneration. As

of 2018, they listed 68 member organizations, 56 in the U.S. and in 10 other countries, including Argentina, Australia, Canada, Ireland, Israel, Italy, The Netherlands, New Zealand, Taiwan and the U.K. There is also growing legal scholarship on wrongful convictions (Garrett, 2011, 2020; Gutman, 2017; Gutman and Sun, 2018).

2.2 Prior Research on Harm to Wrongfully Convicted and their Families

Conceptually, there are three types of harms to an individual who is wrongfully convicted: (1) direct monetary costs such as lost earnings while incarcerated and future lost earning capacity, (2) lost freedom and dignity from the conviction and/or incarceration, and (3) any pain, suffering and lost quality of life caused by the wrongful conviction and/or incarceration. In addition to these direct harms, however, individuals who are incarcerated oftentimes suffer physical assaults or other injuries that are incidental to the incarceration itself. Finally, family members of the wrongfully convicted might suffer – both in monetary terms (e.g., legal fees, cost of visiting incarcerated family members) and psychological harm (especially to young children). This section briefly reviews the evidence on the harm to individuals who are incarcerated; detailed literature reviews are contained in Cohen (2020: Chapter 6), and more recently, Brooks and Greenberg (2021).

Most of the empirical evidence on the impact of incarceration to date has focused on prisoners writ large – not the small subset of wrongfully convicted. Growing anecdotal evidence suggests that while the impacts are likely to be similar – they are not necessarily identical. For example, it has been noted that the wrongfully convicted might suffer more while in prison due to their adherence to their self-proclaimed innocence that sometimes precludes them from seeking certain prison services, visiting with their families, being placed in isolation, etc. (Campbell and Denov, 2004). In addition, it has been noted that oftentimes the abruptness of

being exonerated and let out of prison with no “pre-release” planning and post-release support services might also make life more difficult upon release (Shlosberg *et al.*, 2020).

2.2.1 Lost Earnings

Wrongfully incarcerated individuals lose the earnings they would have made during their period of incarceration, and may also have reduced earnings once they are released. Based on various Bureau of Justice Statistics (“BJS”) surveys, Cohen (2020) estimated annual pre-incarceration earnings to be between \$13,800 to \$26,300 per offender (2018 dollars); however, once income from sources other than employment are factored in (such as government transfer payments, pensions, and contributions from other family members), average wage earnings prior to arrest are likely to be no more than one-half to three-quarters of this amount – perhaps as little as \$7,000 or as much as \$20,000 annually. Of course, prior earnings for the wrongfully convicted might differ from that of the average incarcerated offender.

The evidence on the long-term earnings of individuals (post-incarceration) with a criminal history is somewhat mixed. Overall, evidence suggests that employers are less likely to hire or promote individuals with a felony record. In addition, in some states, felony offenders are unable to obtain professional licenses – even in trades such as plumbing, food catering and haircutting; while prior drug offenders might have driver’s licenses revoked (National Research Council, 2014: 306). In theory, these restrictions would not apply to the exonerated individual who is reentering the workforce if they did not otherwise have a felony record – although the stigma of incarceration is not necessarily erased in the minds of prospective employers. While the bulk of evidence points to lower earnings for former prisoners, several studies find no earnings reductions – partially explained by increased training programs in prison and/or tight

labor markets (National Research Council, 2014: 245-6). Moreover, there is evidence that well designed reentry programs can mitigate or even eliminate these earnings losses (National Research Council, 2014: 250-255). However, more recent evidence points to significant long-term earnings losses (Mueller-Smith, 2015; Western, 2018).

Regardless of whether or not any employer bias exists, being out of the labor force for a period of time might reduce offender's employment skills and hence reduce productivity.

Anecdotal evidence based on extensive interviews with 24 exonerees found significantly reduced earnings and/or potential due to these factors (Shlosberg *et al.*, 2020).

2.2.2 Value of Lost Freedom/Quality of Life from Incarceration

Another cost to the wrongfully convicted is the value of lost freedom while incarcerated. To date, there have been a few attempts to value lost freedom due to incarceration. These studies have focused on either the choice of bail versus pretrial detention or the behavior of criminals in reducing their risk of being caught – not the behavior of those wrongfully convicted (see Cohen, 2020: 131-3). In theory, individuals should be willing to pay to reduce the risk of being wrongfully detained and/or incarcerated – something that could be measured through willingness-to-pay surveys (Cohen, 2017). Such studies would result in an *ex ante* estimate of the valuation of risk of wrongful incarceration to the general population. To date, I am unaware of any such studies. The present study asks instead how much society deems to be appropriate *ex post* compensation to those wrongfully convicted. Thus, the value of lost freedom and lost quality of life from incarceration is determined by jurors and judges.

2.2.3 Physical Harm or Death from Incarceration

Incarceration brings with it the risk of serious injury or death – either by the hands of other inmates or by correctional officers. For example, a recent survey of adult prison and jail

inmates estimated that 4% of prison inmates and 3.2% of jail inmates experienced one or more incidents of sexual victimization over a 12-month period. About half of these incidents were by other inmates while the other half were perpetrated by prison staff (Beck *et al.*, 2013). Moreover, studies of individual prisoners who have been assaulted in prison have found a significant percentage of them suffer from fear, difficulty sleeping, crying, flashbacks, and nightmares (see e.g., Wolff and Shi, 2009).

The evidence on mortality rates is somewhat mixed. While a comprehensive study of existing data concluded that compared to their demographic peers, mortality rates within prison and jails are “comparable to those among the general population for white males and lower than among nonincarcerated peers for black males....ex-prisoners are nearly 13 times more likely than the general population to die in the 2 weeks following release....Release from incarceration often is accompanied by stress and anxiety as people struggle to reestablish housing, employment, and social relations (National Research Council, 2014: 226-7).” These higher mortality rates post-release have been attributed to both higher suicide and drug overdose rates.

Even if not physically or sexually assaulted, inmates might risk negative health outcomes associated with the prison environment. The evidence on the impact of incarceration on the health conditions of prisoners is mixed. For example, while the prison environment might lead to improved health behaviors such as more physical activity, better nutrition, etc., it “may exacerbate health conditions such as asthma because of poor ventilation, overcrowding and stress (National Research Council, 2014: 221-2).” A more recent study in Sweden found positive long-term health benefits from incarceration – presumably due to better care to offenders who oftentimes suffer from mental health issues and/or lack of adequate health care (Hjalmarsson and Lindquist, 2020). Of course, the evidence from these prior studies has focused on all incarcerated

offenders and there is no reason to believe that those wrongfully incarcerated – who are not necessarily representative of the overall prison population - receive any of these offsetting health improvements. In addition, to the extent they have difficulty finding employment, those who are released might be less able to obtain health insurance – thereby increasing their chances of future untreated medical problems. Perhaps most importantly, any mental health issues brought about through their wrongful imprisonment are likely to carry forward with them for some time after release.

2.2.4 Harm to Families of Wrongfully Convicted

According to the most recent BJS data available (Glaze and Maruschak, 2008), more than half of all prisoners held in federal or state prisons in the U.S. in 2007 reported being parents of minor children under age 18. The potential impacts on family members of incarcerated offenders are far reaching. Financially, family members may incur costs associated with visiting the offender and may suffer financial hardships associated with loss of income that the incarcerated offender contributed to the family. If there are children in the household, grandparents or other family members may take on new formal or informal childcare responsibilities which may result in both a financial and psychological burden on the caregivers. More importantly, all of these related stresses may cause serious collateral consequences on families and long-term child development and outcomes (Turanovic, Rodriguez and Pratt, 2012; National Research Council, 2014).

Beyond any financial harm, families of the incarcerated – and children in particular – are likely to suffer from serious non-monetary harms. In an exhaustive review of the literature, Murray & Farrington (2008: 135) “conclude that parental imprisonment is a strong risk factor (and possible cause) for a range of adverse outcomes for children, including antisocial behavior,

offending, mental health problems, drug abuse, school failure, and unemployment. Parental imprisonment might cause these outcomes through several processes: the trauma of parent-child separation, children being made aware of their parent's criminality, family poverty caused by the imprisonment, strained parenting by remaining caregivers, stigma, and stresses involved in maintaining contact with the imprisoned parent."²

3. COMPENSATION FOR WRONGFUL CONVICTIONS

3.1 Prior Literature and Evidence on Wrongful Conviction Compensation

Not surprisingly, following revelations of wrongful convictions, there have been calls for monetary compensation to those who wrongfully spent time in prison or whose freedom was otherwise restricted. Currently, 31 states have statutorily designed compensation programs – although the amount of compensation varies widely. The average compensation by these state programs is estimated to be about \$70,000 “per year” of incarceration – although the range is huge, with a low of \$3,100 per year in Wisconsin to a high of \$376,000 in the District of Columbia (Gutman and Sun, 2018: 786-7). However, the statutes that authorize these payments generally recognize that unlike tort awards that are meant to make a victim ‘whole,’ these awards are only partial payments and instead are part of a political calculation about what the state believes is affordable and politically feasible. Thus, the true value of a year in prison is likely higher than these amounts.

Depending upon the circumstances, individuals who are wrongfully convicted may also be able to file a lawsuit in state or federal court alleging wrongdoing on the part of police,

² Note that there is some conflicting evidence on the impact of imprisonment depending on the pre-incarceration family dynamics; for example, having a violent father taken out of a family situation could have a positive impact (National Research Council, 2014: 262). However, this is unlikely to be the case for the wrongfully convicted.

prosecutors, or other government agencies. Jury awards for wrongful convictions can result in millions of dollars in payments to those who were incarcerated. For example, in one case, a judge awarded over \$9 million to an individual, based on \$1000 per day of imprisonment, \$250 per day on parole, and \$200 per day between exoneration and a trial focused on damages; with an additional \$500,000 for post-trial relief. None of these damages were for pecuniary losses. In another case, a judge awarded \$400,000 per year of incarceration. Finally, in a case that went before a jury, an individual convicted of murder who was later exonerated was awarded \$1 million per year in damages, a total of \$15 million. The judge added \$850,000 to account for attorney fees (Gutman, 2017: 381). A comprehensive analysis of about 450 successful wrongful conviction lawsuits from the early 1990s through 2018 found the average civil award to be \$305,000 per year of incarceration (Gutman and Sun, 2018). While the findings in the current study are generally consistent with Gutman and Sun (2018), the empirical analysis in this paper extend and expands upon that earlier study in many ways.

3.2 Jury Awards as a Measure of “Cost”

Tort law provides an avenue for the wrongfully convicted to seek monetary redress for the pain, suffering and lost quality of life endured while incarcerated and wrongfully accused of a crime they did not commit. However, jury awards may also provide a meaningful metric for policy analysis of the external costs associated with wrongful convictions. Under U.S. tort law, juries are instructed to award a sum of money that in theory is designed to “make the victim whole.” This *ex post* compensation measure of tangible and intangible costs such as pain, suffering, and lost quality of life was introduced into the criminology literature by Cohen (1988), but had previously been used by government agencies such as the Consumer Product Safety

Commission to estimate the benefits of product recalls and safety regulations (e.g., Aiken & Zamula, 2009); and subsequently by the Department of Justice to analyze the benefits of the Prison Rape Elimination Act (U.S. Department of Justice, 2012: executive summary).

From a social benefit-cost perspective, *ex ante* estimates of the willingness-to-pay to reduce harm are generally considered more comprehensive and preferable to *ex post* measures because the former focuses on the “expected cost” or risk of a bad outcome from occurring. However, *ex post* compensation methods such as jury awards are often more conservative and also serve the purpose of focusing directly on victim harm instead of social costs. In addition, jury awards might be considered more realistic than public survey methods to the extent they are based on the legal institution that society has deemed appropriate to compensate victims of tort actions (see Cohen, 2020 for a more detailed comparison of *ex ante* versus *ex post* estimation methods).

4. DATA COLLECTION

4.1 Scope of Study

The goal of the data collection process was to obtain all publicly available instances of an individual who was wrongfully convicted and successfully obtained a state or federal court award - whether through judge, jury, or negotiated settlement. To be included in the study, the individual must have been released from (or died while in) prison between 1989 and 2019, and the case must have been closed prior to January 2020.³ Only lawsuits subject to traditional state

³ The search process for new wrongful convictions stopped at the end of April 2019, but we continued searching for final case outcomes through the end of December 2019. As of January 2020, there were still many lawsuits pending. The earliest settlements in our dataset are from 1992.

or federal civil rights or tort claims are included. Thus, we specifically excluded state awards under special legislation or statutory processes under which limited or standardized payments are permitted per year of incarceration. These statutorily authorized awards are largely independent of any civil court award.⁴ Since the goal of this study is to understand the amount that judges and/or juries award for damages, including statutorily limited awards would interject factors such as the political process and constrained government finances, and ultimately result in an underestimate of the public's view of the cost of wrongful convictions. We did include awards made by special legislatively identified bodies in a few states – notably New York and West Virginia – where state laws on awarding tort damages apply and are not capped or specially designed for the wrongfully convicted (Gutman, 2017: 404).

4.2 Data Collection Process

The data collection process followed several parallel and independent paths. The Registry purports to be a relatively comprehensive list of prisoners exonerated after being wrongfully convicted since 1989, and we started with their publicly available dataset of 2,422 exonerated individuals through April 29, 2019. Their website includes a narrative about the crime and post-crime evidence as well as follow-up information about the released prisoner including information about any lawsuits filed to recover damages.

⁴ In some instances, a litigant received both a court award or settlement and a statutorily prescribed award through a state mandated process. While we have recorded both, only the court award or settlement amount is used for our analysis. Because court awards are made independently of any statutory payment, including them would overstate the judicial or jury valuation of the wrongful conviction. Note that in some states, plaintiffs who receive civil awards must reimburse the state for any prior statutory payments, while in other states, accepting a statutory payment precludes a recipient from further civil claims against the state. See Gutman and Sun (2018). While these differing laws might affect the likelihood that a wrongfully convicted individual will pursue civil litigation, it should not affect the size of any award. Regardless, state-specific dummy variables are included in the regression analysis reported in Section 5.

Independently, we conducted a thorough search of the Lexis Advance “Jury Verdict and Settlements” database using the keyword “wrongful conviction.” This led to approximately 140 unique dockets – some with multiple plaintiffs. Most of the cases identified through Lexis Advance were either already in the Registry or were “false imprisonment” cases where the individual was never convicted and/or never spent any significant time in prison; hence they were outside the scope of this study. Only 17 individuals were identified and included in our study that were not in the Registry. None of these individuals were formally exonerated and thus are not eligible for the Registry.⁵ We include them in this study because they successfully sued and were awarded damages (or settled) for a wrongful conviction. This process did not identify any exonerated individuals who were not already included in the Registry.

For each individual identified through either the Registry or our independent search process, we searched for any primary documents as our first and definitive source of information. Using Bloomberg Law, we searched for any court dockets, Complaints, Jury Awards, and other relevant court documents. These primary sources were augmented with the narratives on the Registry’s website, the Innocence Project website, and general Google searches for news articles about the wrongfully convicted individual. News articles were often helpful in identifying collateral consequences such as family members or post-release employment. A standardized

⁵ The distinction between “wrongfully convicted” and “exonerated” is oftentimes legally important but subtle. For example, a 2014 probe in Massachusetts uncovered thousands of falsified drug tests by state examiners. Since then, thousands of convictions have been overturned and many will likely receive reimbursement of court costs, fines, etc. (Estes, 2021). None of these individuals have thus far shown up on our search for tort awards. While these individuals were wrongfully convicted, unless factual evidence shows they were innocent, they are unlikely to be “exonerated” by the courts – and thus are excluded from the Registry. As noted above, state compensation laws often require exoneration, for example, to obtain nonpecuniary damages for time spent in prison.

coding document was developed, and two research assistants independently coded each case.⁶ This process involved ongoing meetings and training sessions to ensure consistency in definitions and coding. I personally compared and identified any discrepancies between the two coders and they jointly resolved the final coding (with my input as needed).

Finally, with the generosity of Professor Jeffrey Gutman, a pioneer in the empirical research on wrongful conviction compensation, we cross referenced our data with a spreadsheet of cases that he provided. Again, only minimal differences were found – generally when Professor Gutman had obtained private settlement data from attorneys (with their permission) that were not otherwise publicly disclosed in the media. Overall, this process resulted in a very convincing assessment that we have virtually all awards and that our data are accurate.

4.3 Data Definitions

Dollar Value of Award. The key dependent variable in this study is the dollar value of any civil damages award. We only include compensatory damages that might account for past and/or future lost wages, medical costs, pain and suffering, lost quality of life, and the value of lost freedom from the wrongful incarceration. Additional losses might be incurred by family members, for example, for “lost consortium,” although we have excluded any such claims as they are generally separated out in both court-ordered awards as well as settlements.⁷ We exclude any punitive damage awards as these are based on the egregiousness of the event and culpability of offender and are not intended to make the victim “whole.”⁸ We also exclude any

⁶ The coding document is available upon request.

⁷ There were 10 instances of these awards – ranging between \$50,000 and \$2 million. Combined, they represent about 1/10 of 1% of the total value of awards and including them does not make any significant difference in the estimates reported here.

⁸ There were 10 instances of punitive damage awards - ranging between \$15,000 and \$4.5 million. Combined, they represent about 2/10 of 1% of the total value of awards and including them does not make any significant difference in the estimates reported here.

award for court costs or attorney fees that are explicitly identified in court documents, and any statutory state payments (other than New York and West Virginia) which are generally made independently from any court award. We include both jury/judge awards as well as settlements – although in all of our analyses we analyze them separately (or in a combined regression where settlements are identified with a dummy variable). Because the awards span a 27-year time period, all dollar awards have been converted to constant 2018 dollars based on the consumer price index.

Days in Custody. The key explanatory variable of interest is the number of days of incarceration. We include days in jail (awaiting trial), prison, as well as a few instances of home confinement or other alternative arrangements where the individual's daily activities are restricted. When information on the exact length of custody was ambiguous or inconsistent, we deferred to statements in official legal documents such as the Complaint. However, in some instances days in custody had to be inferred or estimated from narrative statements that did not provide exact details. For example, in cases where an individual was arrested and charged with murder and there was no information that the defendant was released on bail, we begin counting at the time of arrest instead of the date of conviction. When the year of imprisonment (or release) is known but not the date, we assume June 30. Similarly, we estimate the 15th of the month when the actual day of imprisonment (or release) is known. These judgments were made by two research assistants and the author; however, they are obviously subject to some error. If anything, we might have slightly over-estimated the number of days of incarceration; hence slightly under-estimated the value of a day in prison.

Other Impacts on Wrongfully Convicted. We created three additional variables to control for severity of punishment and thus harm to the wrongfully convicted. First, we recorded the

number of months that an individual spent on either parole upon release from prison or probation in cases where the individual was not sentenced to jail or prison prior to exoneration. Second, we recorded the number of months that an individual spent on a sex registry after being released but prior to exoneration. Finally, we created an indicator variable to identify when there were credible allegations that the wrongfully convicted suffered serious injuries either during the process of police arrest or interrogation, or while in prison. Examples of reported injuries included assaults and rapes while in prison by either guards or prisoners, torture during interrogation, solitary confinement leading to PTSD, and untreated medical conditions while in prison leading to more serious illness. This information was generally contained in any civil Complaint or other news reports.

Demographic Variables. Demographic information such as age, gender, race, and ethnicity were generally available from the Registry or other sources. Other variables were available only sporadically either through the Complaint or news media reports. Educational attainment, employment status, and occupation were available in about half the cases. In addition, while marital status and children at the time of incarceration were not systematically available, it was common in the Complaint and any media reports to identify any family members who were directly impacted by the wrongful conviction. Thus, we assumed that if marital status was not mentioned, the individual was unmarried, and if no children were mentioned, they did not exist at the time of wrongful conviction. Similarly, we recorded any known instance where a defendant had a criminal record prior to the wrongful conviction.

Legal Control Variables. Numerous control variables were collected and coded, including the crime of conviction (e.g., murder, rape), method of conviction (plea, jury, bench trial), state of conviction, and original sentence length. Additional variables focused on the civil

litigation process included the nature of defendants (e.g., individual, city/county, state, federal); venue (federal vs. state court); and length of time between exoneration and the final award.

5. STATISTICAL ANALYSIS OF WRONGFUL CONVICTION LAWSUITS

5.1 Demographic Data on Wrongfully Convicted

Table 1 reports on the basic demographic breakdown of our sample. The sample is overwhelming male (94%), with the majority being African-American (53%). Hispanics represent 13% of the sample. The median age at time of imprisonment was 25 – with about 8% of the sample under 18 and 24% aged 18-21. The median age at release from prison was 39. At least 14.5% of the sample were reportedly married at the time of imprisonment, with at least 35% known to have at least one child – about 16% with a known child under age 6. While information on education was sporadically available, of those where educational attainment was reported, over half (83 out of 159) had less than a high school education and 19% (31 out of 159) had at least some college.

The demographics of our exonerated sample are generally consistent with the overall U.S. prison population in 2004 – the average year of exoneration. For example, BJS reported that 93% of prisoners were male, 60% were African-American and 19% Hispanic (Harrison and Beck, 2005) – very close to our sample.⁹ On the other hand, educational attainment in our sample appears to be somewhat more skewed on both ends of the spectrum. While more than half our sample had less than a high school education, about 41% of the incarcerated population in 1997 reported this level of attainment (Harlow, 2003). On the other hand, 19% of our sample had

⁹ A recent study suggests that African-Americans were more likely to be wrongfully convicted of rape than Whites (Bjerk and Helland, 2020). However, 50.5% of those wrongfully convicted of rape are African-American in our sample – a figure that is slightly lower than the 53.3% African-American rate for those wrongfully convicted of other crimes. On the other hand, 58.8% of those wrongfully convicted of murder are African-American in our sample.

completed at least some college, compared to about 13% for prisoners overall. Given the fact that we only know educational attainment for only about 35% of our sample, it is unclear whether these differences would apply to our entire sample of wrongfully convicted. Similarly, while we know that at least 24% of our sample had children under the age of 18 at the time of their incarceration, we do not know if the actual percent is closer to the national average where reportedly more than half of all incarcerated offenders have minor children (Glaze and Maruschak, 2008).

5.2 Legal Outcomes for Wrongfully Convicted

Table 2 reports on the original criminal charges and legal outcomes in our sample of 514 wrongfully convicted individuals. The most common charge of conviction was murder (54.5%), followed by rape, sexual assault or child sexual abuse (24.9%), or other violent crimes (9.3%). Only a very small percentage were for nonviolent crimes such as property crimes (2.7%), drug-related offenses (2.3%) or misdemeanors (2.5%). Perhaps the most interesting finding in Table 2 is that only 10.3% of the wrongfully convicted plead guilty; nearly 90% went to trial. This is directly the opposite of national estimates that 95% of criminally prosecuted individuals plead guilty and only 5% go to trial (Durose and Langan, 2007). This might be explained by the difficulty of obtaining exoneration after pleading guilty. However, it is also likely that a significant percentage of wrongfully convicted individuals believe in their innocence and thus insist on a trial and refuse to plead guilty.

Given the severity of crimes, it is not surprising that the typical sentence length is also quite severe – with the minimum sentence of life or life without the possibility of parole being meted out in about 25% of cases, and 4% being given the death sentence. Less than 10% of wrongfully convicted received a sentence of five years or less. Only 6.4% of our wrongfully

convicted sample spent less than a year in prison – while the median time served was 11.9 years (mean 12.6 years). Seven individuals were sentenced to probation and did not receive a prison sentence.¹⁰

While most wrongfully convicted were exonerated while they were in prison, about 18% of our sample served their full time and were released on parole before being exonerated. For those who spent time on parole, their median length of parole was 24 months prior to exoneration (or expiration of parole term). In addition, about 7% of our sample spent a median of 43.4 months on a sex registry following release and prior to exoneration.

In contrast to the wrongful conviction sample, a much smaller percentage of incarcerated offenders in the U.S. are convicted of murder or manslaughter (13%), or rape or sexual assault (11.5%). On the other hand, property and drug offenders made up over 40% of the prison population in 2004 (Harrison and Beck, 2005). These findings are consistent with the anecdotal evidence of pressure on police and prosecutors to solve the most serious crimes in a community – putting undue pressure to obtain a confession, eyewitness, or even falsified evidence even if they ultimately convict the innocent. Thus, individuals who are wrongfully convicted of crimes and later exonerated appear to be more heavily skewed towards these serious offenses. It is also possible, however, that due to the cost of obtaining legal counsel and exoneration, we are more

¹⁰ Excluding these individuals would not substantively affect our findings. Moreover, because I am not only interested in the cost of prison per day, but also in how that cost varies by time served and in the cost of a “wrongful conviction” itself, keeping those with no time in prison in the sample seemed more appropriate. In fact, while five of these individuals settled out of court, two were awarded compensation by jury. The range of these cases is wide from \$2,001 to \$3.5 million with a median of \$250,000. While the \$3.5 million verdict appears as an outlier (and following an appeal was later settled for \$225,000), the plaintiff in this case was a well-known local businessman whose business reputation allegedly suffered for many years while his case had been publicly aired following claims that he had committed arson to burn down his restaurant.

likely to observe offenders wrongfully convicted of serious crimes than lesser offenses that do not result in significant prison time.

5.3 Litigation Outcomes for Wrongfully Convicted

Table 3 reports on the mean, median and range of litigation outcomes for our sample. As shown, the mean case stretched out over 51.3 months (more than 4 years) from the time of exoneration until a final settlement or award; while the median was 44.2 months. While some were settled within a few months, the longest took 18 years. Cases that went to court took about 18 months longer than those that settled (mean 67.9 months versus 48.6 months). The long time between exoneration and ultimate award is likely due to the length of the litigation process – not any delay in filing suit. On average, there was about a 10-month delay between the time of exoneration and the filing of a civil damage lawsuit. Thus, the average length of time between filing a lawsuit and ultimately receiving a settlement or award was 41.6 months (median 34.9).

As shown in Table 3, the average jury award was \$10.3 million, while the median was \$6.5 million. Mean settlement values were about \$4.1 million, with the median being \$2.1 million. Although not shown in Table 3, for the 11 cases involving an initial award and subsequent settlement (based on a pending appeal of the verdict), the median settlement was 67% of the award. The range of awards and settlements was quite large - from as little as \$1 (in one case) to as much as \$56.8 million. Table 3 also estimates the award on a “per day” of actual time served. A day in prison, on average, is awarded \$3,600 (median \$2,230) through the court process, and \$1,149 (median \$649) through settlement. Once again, the range of payments is quite large – with some awards averaging as much as \$20,000 or more per day and one settlement exceeding \$50,000 per day. The largest per day settlement was \$53,110 (\$50,000 in current dollars) to an individual who served one day in jail, while the lowest award of \$2 (\$1 in

current dollars) was awarded by a jury to an individual who was exonerated after having spent four years in prison after being charged with assaulting his wife. The next section attempts to explain some of this variation by estimating awards through multiple regression analysis.

5.4 Methods and Statistical Model

Figure 1 summarizes the pathways by which exonerated individuals may receive monetary compensation through the civil court system. Not all exonerated individuals will file a lawsuit, and only some of those who do file will be successful in receiving damages. Among the reasons individuals might not sue in civil court are: (a) the inability to identify individuals responsible for intentional or negligent behavior leading to the wrongful conviction, (b) inability to assess blame on parties who have adequate assets to obtain meaningful compensation, (c) the size of expected damages which might be relatively small for short times spent in prison, (d) the inability to fund a lawsuit and/or to find adequate legal representation, and (e) state-specific legal factors that either make it difficult to sue for damages or where statutory compensation schemes provide significant payments to the exonerated who spent time in prison. See Gutman (2017) for a detailed discussion of state statutes and barriers to filing civil lawsuits.

Our sample consists of 2,428 wrongfully convicted individuals – 514 of whom successfully pursued a civil damages lawsuit. In our data, we cannot observe which individuals of the remaining 1,914 exonerated opted not to sue versus those whose lawsuits were unsuccessful or still pending as of December 2019. However, for those who successfully sued, we have 71 jury awards and 460 out-of-court settlements. In some cases, the defense will appeal an initial jury award and that award will either be affirmed, reduced, or the parties will ultimately settle for a lower amount. This occurred in 11 cases, and both the initial award and the final settlement are used in the statistical analysis. However, in econometric specifications that include

both settlements and awards, both of these observations are included along with clustered standard errors to account for this duplicity. In 6 cases, the plaintiff settled out-of-court with some defendants but ultimately received a court award against one or more of the defendants.

Assuming that judges and juries award damages based on victim harm, I hypothesize that the key variables affecting the size of an award will be the length of time in prison (impacting both pain, suffering and lost quality of life as well as past earnings) and the severity of any injuries sustained by the wrongfully accused. Given the skewed nature of both time in prison and awards, a log-log specification was deemed more appropriate.¹¹ In addition to time in prison and injuries, control variables that might potentially affect an award include demographic characteristics, legal venue, and characteristics of the defendant(s). In a small number of our cases, more than one individual was wrongfully convicted and exonerated for the same crime. Because there might be unobservable reasons why two or more individuals were wrongfully convicted of the same crime that might affect their ultimate compensation, regression models are estimated using clustered standard errors.

While some data are missing, in order to maintain a large sample size, we do not exclude any observations in the regression analyses. In virtually all cases, we could identify basic demographics such as age, gender and race, as well as details on the charge of conviction and legal venue. However, in some cases, we coded “no” as a default and only coded “yes” when we had evidence in the record. In particular, this approach was used for serious injury while in prison, marital status, young children, education, and prior criminal record. Note that excluding these variables had no significant impact on our findings.

¹¹ Both a visual examination as well as a Box-Cox test confirmed that log-log transformations of these key variables was appropriate. This is also consistent with the diminishing marginal utility of money and time. Results are qualitatively similar using a linear regression.

Finally, when awards and settlements are estimated in a combined regression, we include two indicator variables identifying whether the monetary amount was obtained through an award or settlement, or a “mixed” award where some defendants settled and others were required to pay damages through court action.

5.5 Statistical Analysis of Awards for Wrongful Conviction

Table 4 reports on our main regression equations - where the dependent variable is the natural log of the total compensatory dollar award (in 2018 dollars). The first regression is based on 71 cases that went to trial with the award being set by either a judge or jury. Next, the same regression is estimated for 460 cases in which there was an out-of-court settlement. Finally, the last column represents a combined regression of 525 cases (with a dummy variable indicating if the award was through a settlement).¹² Focusing on the full sample (controlling for settlement), the key variable of interest - the number of days in prison - is positive and statistically significant. However, this relationship is not linear - with the estimated coefficient of 0.56 indicating that a 1% increase in days spent in prison increases the award by about 0.56%. Spending time on parole after serving a prison sentence and before exoneration also significantly increases the award. In addition, those imprisoned as juveniles generally have significantly higher awards.

5.6 Value of Lost Freedom from Wrongful Incarceration

¹² Note that 11 cases have both awards and subsequent lower settlement amounts (typically because the defendant appealed liability and/or the award amount). Thus, there are a total of 514 individuals wrongfully convicted in our dataset. While these 11 cases are included in both the first and second columns, and are included twice in the last column, we have estimated robust standard errors clustered around the individual plaintiff. In addition, 6 cases involve both a final settlement and jury award because some of the defendants settled while others went to trial.

From the sample means and regression coefficients in the last column of Table 4, we can generate a predicted award for wrongful incarceration. To do this, I have made several assumptions. First, I have set the variable indicating whether or not a serious injury occurred while in prison equal to zero – to negate the physical injury portion of any monetary award. Second, I have estimated the predicted award based on two different assumptions. Table 5 presents the analysis based on the ratio of settlements (87.6%) to jury awards (12.4%) in the data. As shown in Table 5, the value of the first day is estimated to be \$19,415, while six months in prison is valued at \$358,732, and one year in prison is valued at \$533,581. As shown in Table 5, the marginal cost of an additional year in prison declines over time. For example, two years in prison is valued at \$787,532, which is \$253,950 higher than the first year; the third year is valued at \$201,399, etc. The difference between 20 and 30 years is \$733,981 – or about \$73,400 per year for the last 10 years in prison. Given the average time in prison of 12.6 years in our dataset, the predicted cost to the typical wrongfully incarcerated individual is \$2.2 million, or \$175,702 per year. On a daily basis, the average cost is estimated to be approximately \$482. This compares to the unadjusted average of \$305,000 per year estimated by Gutman and Sun (2018),¹³ or unadjusted average of \$390,000 (2018 dollars) per year or \$1,459 per day in our dataset.¹⁴

¹³ Gutman and Sun (2018) have estimated this amount based on 448 cases with either a settlement or award by dividing the total dollar awards by the total number of years in prison by the wrongfully incarcerated. Our samples overlap considerably (although my sample includes an additional 77 cases). As noted above, I include cases where the individual spent no time in prison as well as cases of wrongful conviction where the individual was not formally exonerated. In addition to being a prediction from log-log regression analyses that mitigates some of the outliers, I have also taken out the effect of serious injuries while in prison. As noted in the next paragraph, however, my estimate is larger once the impact of settling out of court is accounted for.

¹⁴ From Table 3, the average settlement or award is \$4.8 million. The average time served is 12.6 years (Table 2); hence, the average annual award is \$388,888 or \$1,459 per day.

While Table 5 reports on the predicted value of filing a successful lawsuit for wrongful conviction, this value includes the majority of cases that ultimately settle out of court. Defendants are likely to settle wrongful conviction lawsuits for many reasons – including the likelihood they will be found liable if they try to defend themselves in court, egregiousness of the events leading up to the wrongful conviction, concern about negative publicity, remorse, etc. Similarly, plaintiffs are likely to settle out of court for various reasons – including the immediate need to obtain a cash settlement and to put the matter behind them. As noted above, settling out of court reduces the delay by about 20 months. Given the fact that most of the plaintiffs have limited financial means (having spent years in prison) and the length of time between filing a lawsuit and obtaining a judgment, it is not surprising that most litigants settle out of court.

Table 6 estimates the same predicted value of time in prison based on the assumption that all cases would ultimately be valued by a judge or jury. In other words, I have set the coefficient for “settlement” equal to zero and instead use the information from all 525 cases under the assumption that they would not have settled out of court. This results in valuations that are approximately double those shown in Table 5. As shown in the top half of Table 6 (ignoring the impact of serious injuries as in Table 5), the value of the first day is estimated to be \$47,631, while six months in prison is valued at \$880,053, and one year in prison is valued at \$1.3 million. Two years in prison is valued at \$1.9 million, which is about \$623,000 higher than the first year. The average daily cost of a day in prison for someone who is incarcerated for one year is estimated to be \$3,586. Given the average time in prison of 12.6 years in our dataset, the estimate cost to the average wrongfully incarcerated individual is \$5.4 million, or \$431,037 per year. On a daily basis, the average cost is estimated to be approximately \$1,181.

As indicated above, the estimates in Tables 5 and 6 assume no serious injuries while in prison in order to isolate the effect of wrongful imprisonment itself. However, many of those who sued did indeed receive serious injuries for which they were presumably compensated. To estimate the additional cost of these injuries, the bottom half of Table 6 adds the mean number of injuries in the sample (20.4%) multiplied by the coefficient estimate in Table 4. This adds \$169,000 to the award for the wrongfully convicted spending one year in prison, and approximately \$700,000 for the average wrongfully convicted serving 12.6 years. Thus, including the cost of injuries increases the average cost of wrongful conviction from \$5.4 million to \$6.1 million.

5.7 Disentangling Lost Earnings from Pain, Suffering & Lost Quality of Life

Presumably, part of the compensation for wrongful conviction includes the value of lost earnings. While a portion of any award or settlement might be considered as compensation for lost earnings (in addition to the value of lost freedom/quality of life), we were only able to locate legal documents identifying lost earnings in six cases. However, in an additional 228 cases, the Complaint and/or media reports mention the educational level and/or prior occupation of the wrongfully convicted individual. In another 35 cases, the evidence indicated that the individual was either unemployed or a homemaker, or they obtained income primarily through illegal means (e.g., mafia member or drug dealer who were wrongfully convicted for other crimes). As shown in Table 1, occupation or employment status prior to incarceration was identified in only about 50% (253 out of 514) of our sample. In addition, educational level was identified (or estimated based on occupation) in about 27% of our cases (140 out of 514). In the six cases where pre-incarceration income was identified in the case file, we used that annual figure directly (updated to 2018 dollars). In other cases, we estimated annual income based on the

available information and government statistics. When we could identify occupation, we used the median income for an individual with that occupation. When only educational attainment was available, we used the median income by gender, age and educational level.¹⁵ For older workers or those who spent many years in prison, their time in prison might have exceeded their expected worklife. Thus, I also estimated worklife based on estimated educational level (when available) and age at the time of conviction (Skoog, Ciecka and Krueger, 2019). If an individual was in prison past their estimated worklife, lost earnings were only estimated through typical worklife.

While this methodology yielded estimated pre-incarceration earnings in less than half of the cases, the sample of 242 individuals with estimated income is still reasonably large and instructive. Table 7 compares estimated annual earnings to the awards and settlements for wrongful conviction (all figures in 2018 dollars). For the 47 individuals where we estimated positive (and legal) pre-incarceration earnings and who were awarded judgments by a jury or judge, the average annual earnings in 2018 dollars was estimated to be \$58,249 (median \$44,960). This is higher than average earnings of \$39,850 (median \$37,884) for the 195 individuals who settled their lawsuits ($p < .01$). Although this is speculation, the difference is interesting – perhaps those with higher pre-incarceration earnings are able to sustain themselves longer through the more lengthy trial process as opposed to those who are less able to do so and thus settle their cases earlier and for less money. Further research on this topic could be

¹⁵ Most salary estimates were taken from the BLS Occupational Employment Survey and Occupational Outlook Handbook based on the closest job title. Military pay rates were estimated from on 2018 Military Pay Tables using average pay scale and an estimate of the number of years of service based on the age of the individual. Average earnings for those with unidentified occupations were estimated (based on gender and educational background when available) from U.S. Census, Current Population Survey, 2019 Annual Social and Economic Supplement. Other estimates were taken from www.payscale.com.

productive. As noted above, annual pre-incarceration income has been estimated to range between \$7,000 and \$20,000 nationally for all prisoners. Thus, our sample of wrongfully convicted individuals who successfully sued for damages appear to have higher earnings than other incarcerated offenders.

As shown in Table 7, the median award for the sample of 47 jury award cases was \$6.5 million, with time spent in prison of 10.3 years. This translates into an annualized award of \$764,146. The annual earnings for those individuals was estimated to be \$44,960. Thus, the award for wrongful conviction was 17 times annual earnings. However, over 10.3 years in prison, lost earnings would have totaled \$463,088.¹⁶ In addition, the average age at release for these individuals was 37; hence they are likely to suffer additional future earnings losses. To place an upper bound on this loss, assuming 100% future earnings loss and 25 years of remaining worklife expectancy, total future earnings loss could be as high as \$1.1 million, with combined earnings losses of \$1.6 million. Based on a typical tort claim that would include the value of lost fringe benefits, an additional 27% could be considered pecuniary losses.¹⁷ Viewed in that way, as much as \$2.1 million of the estimated \$6.5 million award could be considered as replacement for prior and future lost earnings. If the remainder of \$4.4 million is considered pain, suffering and lost quality of life, that would imply an annual valuation of \$427,000 per year in prison - in addition to any foregone past or future income.

¹⁶ In wrongful death cases, lost earnings are typically reduced by an amount meant to replicate what the individual would have spent on their necessary expenditures such as food, clothing and shelter. In theory, one might similarly offset any lost earnings while incarcerated by such reduced expenditure that the wrongfully convicted would have spent if they had been free. Such an offset would likely exclude any portion of earnings that would have been used to support a family, savings, wealth build-up from mortgage payments, etc.

¹⁷ <http://www.bls.gov/news.release/ecec.t02.htm>, Table 2, June, 2020. For all civilian workers, the total cost of benefits is \$8.09 compared to average hourly earnings of \$30.12, or 27.0% of earnings.

As a robustness check and to try to sort out the portion of the award that is for lost earnings versus the pain and suffering of enduring time in prison, Table 8 replicates the combined regression shown in Table 4 with the sample restricted to 242 cases with positive estimated income during incarceration. The coefficient estimates in Table 8 are similar in size and significance to those shown in the last columns of Table 4.¹⁸ Using the same methodology to predict awards, the median award for 10.3 years in prison would be valued at \$2,885,821. Based on mean annual income of \$43,423 and 10.3 years in prison, prior earnings losses are estimated to be \$447,257, while future earnings (based on average 25 years remaining worklife) are estimated to be approximately \$1 million.¹⁹ Thus, ignoring direct earnings losses, the average award for pain, suffering and lost quality of life ranges between \$1,800,246 (\$2,885,821 minus \$1 million – assuming 100% future earnings loss) to \$2,438,564 (\$2,885,821 minus \$447,257 – assuming no future earnings loss), or about \$175,000 to \$235,000 per year of imprisonment.

5.8 Sample Selection Issues

The fact that we only observe dollar awards for those who successfully sue for damages does not mean that other wrongfully convicted individuals suffer no losses. Instead, there are likely to be other reasons for their lack of compensation – whether due to legal barriers or other individual circumstances. In some instances, there is no deep pocket to sue. For example, some wrongful convictions take place primarily because a witness mistakenly identified an individual as being the offender. In that case, the witness is unlikely to be legally liable even if they had the

¹⁸ Although not shown in Table 8, because total past lost earnings are highly correlated with the number of years in prison, including that variable in the regression equation results in similar findings with neither variable being statistically significant due to multicollinearity.

¹⁹ Obviously, the present value of future losses will depend upon the net discount rate. Assuming no wage growth beyond average in the population, 25 years of income is \$1.085 million at a zero net discount rate, while it is \$886,170 at a 2% discount rate. To be conservative, I assume a zero discount rate.

resources to compensate the wrongfully convicted. Individuals might also be much less likely to sue for damages in civil courts in states that offer significant statutory compensation and/or have requirements to waive further civil litigation when accepting such an award (Gutman, 2017; Gutman and Sun, 2018). To examine the potential sample selection bias in analyzing only those who receive compensation, I have estimated a two-stage Heckman sample selection model, where the first stage estimates the probability of a successful civil court award for wrongful conviction, and the second stage is the size of the award (Heckman, 1979).

While our analysis is focused on wrongfully convicted individuals who successfully sued for monetary damages, we started with the larger Registry dataset of all exonerated individuals. Table 9 compares our sample of 514 individuals to the 1,914 other wrongfully convicted who did not receive monetary compensation through the courts. As shown, those who were awarded compensation were more likely to be male (93.8% versus 90.4%), Black (52.7% versus 46.7%), and younger at age of imprisonment (26.0 years versus 29.5 years). The comparison of sentence severity is somewhat mixed. For example, while a larger percentage of those awarded compensation were sentenced to prison terms of 20 years or more (37% versus 24.5%), a smaller percentage received life or life without parole (24.9% versus 37.5%).

There also appears to be some important differences in the reason that the individual was falsely convicted and ultimately exonerated. Those who received compensation were more than twice as likely to have been exonerated based on DNA evidence (36.6% versus 15.8%), and were more likely to have been coerced into a false confession (21.8% versus 9.5%), more likely to have been subjected to official misconduct (74.1% versus 47.8%), and more likely to have been falsely accused by a witness (71.6% versus 54.2%). In contrast, those who received compensation were less likely to have alleged inadequate legal defense (19.1% versus 26.8%).

However, there was little difference in the rates of misleading evidence or mistaken witness identity. Thus, it appears that a monetary award is more likely when there was egregious behavior such as official misconduct or coercing a false confession – or when there is indisputable evidence of exoneration such as DNA evidence.

Table 10 reports on the first stage of this model. As suggested by the comparisons described above, a successful award is more likely when the circumstances of wrongful conviction are most egregious – such as perjury or official misconduct. The wrongfully convicted are also much more likely to obtain an award if there was subsequent DNA evidence that assisted in their exoneration. On the other hand, those who are convicted through mistaken identity, receive only probation or other non-prison sanctions (or have relatively shorter sentences) are considerably less likely to receive an award.

Although not shown in Table 10, dummy variables were included for 34 states with 15 or more observations. The coefficient estimates do **not** support the hypothesis that individuals are more likely to sue in states with more generous statutory compensation systems. For example, the coefficients for both Arizona and Illinois are positive, statistically significant, and virtually identical despite the fact that Arizona has reportedly one of the least comprehensive compensation systems and Illinois one of the best (Gutman and Sun, 2018: 785). Thus, exonerated individuals in Arizona and Illinois are equally likely to sue for compensation in court despite widely differing statutory compensation systems available to them.

Table 11 reports on the second stage of this sample selection model. To help identify the selection model, the only contributing factor included in the second stage is DNA.²⁰ The results

²⁰ None of the other variables – mistaken witness identification, perjury, false or misleading forensic evidence, official misconduct, or inadequate legal defense – were statistically significant predictors of the award size.

are qualitatively similar to those reported in Table 4 with all significant variables being of the same sign and magnitude.

The Mills Ratio (λ) estimated in stage one was $-.35$ ($p = .08$), indicating a negative selection bias. In other words, estimated monetary awards would be higher if based on the full sample. At first, this might seem counterintuitive as the most egregious cases appear to be those that are more likely to be selected into the award category. However, the egregiousness of conduct is something that (in theory) should be part of any punitive damage award and not a tort award for damages suffered by the plaintiff. Instead, note that those who did not receive monetary awards tend to have been in prison for shorter time periods (10.1 versus 12.6 years) – a factor that would generally make the cost per year higher. Similarly, while we do not have income estimates for the non-awarded sample, they are more likely to be White (50.7% versus 44.4%), which also indicates their lost income (and hence jury award) is likely to be higher. Finally, due to the time lag between exoneration and receiving an award, many of those who have not received an award might receive an award in the future. Note that the coefficient on year of exoneration is negative in stage one, while there is an upward trend in dollar values of awards shown in the second stage.

5.9 Comparison of the Value of Wrongful Conviction to Victim Costs

Because those who are wrongfully convicted suffer significant reductions in their quality of life, an interesting comparison can be made to independent valuations of the “Quality-Adjusted Life Year” (QALY) – a methodology utilized in health economics. QALYs are a measure of the number of years of perfect health for an individual. Each physical or mental injury is assigned a lost QALY by consensus through a group of health care professionals or the

public at large. For example, the World Health Organization has developed standardized QALYs for hundreds of diseases and injuries and the most recently published QALYs are based on over 60,000 survey respondents from around the world (Salomon *et al.*, 2015). The question then becomes how to value one QALY. Using an *ex ante* risk perspective, society's "willingness-to-pay" is oftentimes based on studies of the value of a statistical life. Recent estimates place the value of one QALY at about \$335,000 in 2010 (Lawrence and Miller, 2020) – about \$385,000 in 2018 dollars. Based on average annual earnings of \$43,423 (for those in our sample for whom we were able to estimate income), fringe benefits of 27%, and an average annual jury award of \$431,037 (for the average wrongfully convicted serving 12.6 years), the non-monetary valuation of a year in prison is estimated to be about \$375,000 – a figure that is virtually identical to the value of a QALY. Put differently, the implied pain, suffering and lost quality of life based on jury award valuation of a year in prison is equivalent to nearly 100% reduction in the quality of life. This is an upper-bound estimate, however, because the \$375,000 estimated non-monetary valuation might include an unknown amount for future income loss. Since the median age of the wrongfully convicted at the time of exoneration is about 39 in our dataset, a typical exoneree maintains an additional 20-25 years of future worklife at the time of release.

Another interesting comparison can be made to the cost imposed on the victims of crime. A recent paper estimated the cost of crime to victims (including valuation of intangible costs but excluding public sector costs such as police, courts, and prison) in the U.S. to be \$2.3 trillion (Miller, Cohen, Swedler, Ali and D. V. Hendrie, 2020). As noted earlier, while the evidence is still rather weak, some have estimated that as many as 1-5% or more of all felons are wrongfully convicted. Currently, there are approximately 600,000 new prison admissions in the U.S. annually (Carson, 2020: Table 8). If 1-5% of these newly incarcerated offenders were

wrongfully convicted, this amounts to 6,000 to 30,000 individuals annually. Based on an average \$6 million cost per wrongfully convicted, this amounts to \$36 billion to \$130 billion – anywhere from 1.5% to 6% of the annual cost of crime. Given the fact that federal, state and local governments annually spend about \$275 billion on police, courts, and corrections, if governments were to fully compensate these wrongfully convicted individuals, the cost could represent anywhere from 13% to nearly 50% of annual criminal justice expenditures in the U.S. While these comparisons are meant to provide a measure of the potential magnitude of the problem, these large payments are unlikely to be made – and the 1-5% wrongful conviction rate might be too high.

As another point of comparison, Cohen and Piquero (2009) estimated the present value costs imposed by a 14 year old juvenile who drops out of high school, abuses drugs, and embarks upon a lifetime career of crime totaled between \$3.2 and \$5.8 million (2007 dollars) – the equivalent of about \$3.8 to \$6.9 million in 2018 dollars – a figure that is close to the estimated \$6 million cost of wrongfully convicting the innocent.

6. POLICY IMPLICATIONS

The purpose of this paper was to develop a methodology and empirically estimate the cost of wrongful conviction to those who have been charged with a crime they did not commit. Two immediate policy-relevant issues follow from this research. Most directly, the empirical analysis of existing litigation raises the question of whether or not existing compensation for those wrongfully convicted of crimes they did not commit is appropriate. Second, an obvious policy question is how society might weigh the added cost versus benefits of avoiding wrongful convictions. Both of these issues are examined in turn.

6.1 Appropriate Compensation for Wrongful Conviction

One obvious policy implication is to use this analysis as a benchmark for compensating the wrongfully convicted. While jurors in the United States are generally instructed to award an amount that would make the victim “whole,” as we have seen, due to the high cost and time involved with litigation as well as the high legal standards and uncertainty of obtaining an award, most cases settle out of court for lower amounts. As a first approximation, based on the valuation implied by jurors and judges who have weighed in, an individual might be compensated as much as \$1.3 million for their first year in prison, with an average annual compensation award of over \$400,000 per year of incarceration (Table 6). Since about 20% of the wrongfully convicted also incur serious injuries while in prison, these figures would increase to about \$1.5 million in the first year, and an average of nearly \$500,000 per year.

The above figures are based on valuing the cost of wrongful conviction using jury (or judicial) awards – even though the bulk of cases are settled out of court. As shown in Table 5, valuing cases based on whether they settle or go to court would significantly reduce the annual cost to about \$175,000, with the first year being valued at \$500,000. Although one might argue this is more appropriate for compensation, that ignores the harsh realities of litigation. Indeed, aside from the rare individual, those who are wrongfully convicted have few financial resources or few immediate job prospects. The time lag between exoneration, filing a lawsuit, and final award can take years. In our sample, cases that went to court took about 18 months longer – an average of 5 ½ years from the time of exoneration until final award.

An important caveat to this higher level of compensation was noted by Gutman and Sun (2018) who argue that “First, compensation and non-compensatory social services should be

provided quickly after exonerations. Second, the amount of compensation should be large enough to permit the exoneree to be sufficiently compensated and to incentivize improvements in policy and procedure to reduce the incidence of future wrongful convictions without being so large as to deter states and municipalities from cooperating in the effort to surface wrongful convictions and from settling meritorious cases seeking compensation.” Thus, to the extent this amount is so high so as to deter states and municipalities from cooperating, it might need to be reduced.

How does this compare to current state compensation schemes? While 31 states have existing statutory compensation set for the wrongfully convicted, the amounts vary dramatically. For example, Alabama calls for a minimum of \$50,000 per year of incarceration, while Iowa caps its compensation at \$50 per day – about \$18,250 annually! More generous is D.C., which caps its awards at \$200,000 per year of incarceration and \$40,000 for each year served on parole, probation, supervised release or on a sex offender registry. The Innocence Project recommends **minimum** compensation levels of \$50,000 per year of incarceration and \$100,000 per year spent on death row (Innocence Project, 2016). In comparing the wide variation in state wrongful conviction compensation statutes and the significantly higher court awards often provided to those exonerees who are able to successfully sue for tort damages, Professor Gutman concluded that the evidence provides “the basis for an economic argument that most states can compensate exonerees more generously and more equitably” (Gutman, 2017). As noted above, ignoring political concerns, this paper suggests a more appropriate level of compensation would be close to \$500,000 per year in prison.

6.2 Social Costs and Benefits of Reducing Wrongful Incarcerations

The estimates in this paper only represent the private costs borne by individuals who are wrongfully convicted of crimes they did not commit. However, the costs of wrongful conviction are also high to governments and private organizations. If a benefit-cost analysis were to be conducted on policies designed to reduce wrongful convictions, additional costs/benefits would need to be estimated, including: (1) costs associated with the criminal justice system that charged and punished the wrong individual, (2) private and legal system costs to exonerate the wrongfully convicted, and (3) costs of the litigation system that ultimately results in a monetary award for wrongful conviction. In addition, although difficult to measure, to the extent an innocent person is charged with a crime they did not commit, the actual offender might be committing more crimes instead of spending time in prison. While this paper does not attempt to rigorously analyze these costs, it is informative to consider each briefly below.

6.2.1 Cost of Conviction and Imprisonment

When an individual is wrongfully convicted of a crime, the criminal justice system essentially wastes valuable resources in apprehending, arresting, convicting, and incarcerating that individual. For example, a recent study estimated these criminal justice system costs for the average murder to be \$478,072 in 2017 dollars, while the cost for the average police-reported rape was \$44,660 (Miller, Cohen, Swedler, Ali and D. Hendrie, 2020). In our sample, with an average time served of 12.6 years and the average cost of a year in prison estimated to be over \$33,000 (Cohen, 2020: 85), incarceration costs per exonerated offender alone are over \$400,000. For the full sample of exonerated (including those who have not received civil awards), the average 10.1 years of incarceration costs corrections departments about \$350,000.

6.2.2 Cost of Exoneration

A study of 607 individuals in California whose convictions were reversed between 1989 and 2012, estimated the cost to the court system for trials and appeals (including prosecutors, defense attorneys, judges and court fees) totaled \$68 million in 2013 dollars – about \$112,000 per case (Silbert, Hollway and Larizadeh, 2015). However, this does not include any costs to private parties who assist the wrongfully convicted in their appeals process. One case study in California of an individual who spent 17 years in prison estimated the total cost to be \$10.9 million. This included compensation of \$9.8 million to the individual as well as taxpayer costs estimated to be \$1 million for the time he spent in prison, plus \$112,000 associated with the costs of trial and appeals. In addition, however, the study estimated that 5,100 hours of time was spent by the Loyola Law School's Project for the Innocent. Based on a court appointed lawyer rate of \$100 per hour, these costs alone would be valued at \$510,000. However, if valued at the hourly rate of a mid-level associate at a law firm, the value would be over \$2 million (Giosiosa, 2016). Whether or not 5,000 hours is typical for a wrongful conviction case to be overturned is unknown. Thus, a rough estimate of the legal costs of a single exoneration is between \$500,000 and \$2 million. Between 2014 and 2018, there were approximately 160 individuals exonerated annually – thus total exoneration costs could approach \$80 to \$320 million annually.

6.2.3 Cost of Litigation to Obtain Monetary Damages for Wrongful Conviction

Attorney fees were noted to have been deducted from the award amount in 24 cases, with the median attorney fee being 31% of the award. In addition, attorney fees were awarded on top of the payment to the plaintiff in 59 cases, with the median fee being 19% of the combined award. For these 83 cases, the award for attorney fees ranged from \$63,372 to \$5.6 million, with the median being \$700,000 (mean \$1.3 million). Of course, the defendant's attorney fees are not included in this estimate and are likely to be considerably higher than this amount. Thus, a very

conservative estimate of the cost of litigation would be \$1.4 million to \$2.6 million per case. While it is not known if the reported cases are representative – and they might be skewed towards the higher end - they do represent about 15% of our sample.

6.2.4 Additional Crimes by Actual Offenders

We must not forget that if someone is wrongfully convicted of a crime, in some cases there was a real perpetrator who was free during the time that the wrongfully convicted was charged and imprisoned. While the real offender might be serving time in prison for another offense or might not be inclined to commit additional crimes, he or she might just as easily be committing additional crimes instead of being incarcerated and prevented from wrongdoing. Thus, one potential cost of wrongful incarceration is the fact that additional crimes might be committed that would not have been if the actual offender had been prosecuted. While it is difficult to estimate this cost, depending upon the age and criminal trajectory of the actual offender, the cost of future crimes that might otherwise be averted could also be in the hundreds of thousands of dollars or more (Cohen and Piquero, 2009; Cohen, Piquero and Jennings, 2010).

The costs associated with additional crimes being committed by those who should otherwise have been convicted might be significant. A study of approximately 300 exonerations made through DNA evidence through 2013 found that 143 actual perpetrators could be subsequently identified. In other cases, either no perpetrator could be definitively identified or there was no crime in the first case (e.g., wrongfully accused of child molestation, rape, or arson). Those perpetrators were known to have committed 337 additional crimes – including 43 attempted or actual homicides, 94 completed or attempted sexual offenses, 35 drug-related offenses, and approximately 165 other crimes (Norris *et al.*, 2020). Based on estimated costs to victims of these crimes, these 143 offenders imposed costs of at least \$15 million and no more

than \$330 million.²¹ Thus, the average cost of not properly identifying the actual offender in each of these 300 wrongfully convicted individuals is estimated to range between \$50,000 and \$1.1 million. Of course, the fact that someone else was wrongfully convicted oftentimes (but not always) means that it was particularly difficult to apprehend the real offender; hence, it is not clear how often these costs would have been avoided.

6.2.5 Summary of Costs to Government and Society Beyond the Wrongfully Convicted

To summarize, the cost to the criminal justice system of wrongfully convicting and incarcerating the average offender who is later exonerated is estimated to range between \$350,000 and \$400,000. While we do not know if those who are exonerated are likely to have spent more or less time in prison than those wrongfully convicted who are **never** exonerated, these costs (whether higher or lower) would apply to all wrongfully convicted. For those who are ultimately exonerated, there are also significant cost to the courts and to private nonprofits who assist the wrongfully accused. While there are no systematic estimates of these costs, one study in California estimated the cost to the court system to be \$112,000 per case. Additional costs include the significant amount of time spent by lawyers and law students working on overturning the wrongful conviction – in one case over 5,000 hours of time spent by law students and other volunteers were documented. For those wrongfully convicted who ultimately sue and receive a

²¹ Estimates are based on medical costs, mental health, lost productivity and property losses, and lost quality of life to victims of crime based on Table 5 of (Miller, Cohen, Swedler, Ali and D. V. Hendrie, 2020). The low end of the estimate is based on a combination of “all violent crime” (\$87,152) in the case of attempted/completed homicides, completed or attempted sexual assaults; “drug possession/sales” (\$5,046) for drug crimes, and “all personal crimes” (\$20,033) for the other crime category in Norris *et al.* (2020). The upper end of the estimate assumes all attempted/completed homicides are valued at the \$7.15 million cost of murder and all completed or attempted sexual assaults are valued at the \$225,238 cost of rape or attempted rape. Note that because these perpetrators were not charged with a crime, I have excluded the cost of adjudication and sanctions and perpetrator work loss from Table 5 of (Miller, Cohen, Swedler, Ali and D. V. Hendrie, 2020).

court award or settlement out of court, additional legal costs may be incurred. Finally, additional costs might include crimes committed by the actual offender who should have been apprehended and incarcerated instead of the wrongfully convicted. Based on a study of 300 exonerations through DNA evidence that could have otherwise identified the actual perpetrator, I have shown that the estimated increase in crime caused by those offenders during the time that the wrongfully incarcerated were in prison might cost between \$50,000 and \$1.1 million per wrongfully convicted individual.

7. CONCLUDING REMARKS AND FUTURE RESEARCH

While this paper provides a framework and some initial benefit and cost estimates, further research would be required to conduct a benefit-cost analysis of alternative policies designed to reduce wrongful convictions. Policies such as mandatory DNA testing or enhanced standards of proof might reduce wrongful convictions but also cost real resources (in the case of DNA testing) and/or opportunity costs (e.g., enhanced standards of proof leading to an increase in Type 2 errors). As noted earlier, while the evidence is still rather weak, some have estimated that as many as 1-5% or more of all felons are wrongfully convicted. Currently, there are approximately 600,000 new prison admissions in the U.S. annually (Carson, 2020: Table 8). If 1% of these new incarcerated offenders were wrongfully convicted, this amounts to 6,000 individuals. If we value wrongful convictions based on average time served for all felons - about 2.6 years (Carson and Sabol, 2016; Kaeble, 2018), the cost per case would be approximately \$2.3 million to the wrongfully convicted plus \$86,000 in prison costs to government agencies; with an aggregate annual cost of approximately \$14 billion (6,000 x \$2.39 million). Of course, if we use the upper end of the wrongful conviction rate estimate (5%), these figures would be five times

higher (about \$70 billion annually). Thus, if we estimated that a 10% reduction in wrongful convictions could be achieved at a cost of \$1 to \$5 billion, for example, this type expenditures could easily be justified. Of course, while some of the benefits are reduced taxpayer costs and private resources devoted to exoneration and litigation, the bulk of these benefits are in the form of reduced tangible and intangible costs to the wrongfully convicted themselves.

In addition to compensation, one goal of tort law is to deter wrongful actions or negligence such as wrongful convictions. While we all wish for zero wrongful convictions, there will inevitably be a small percentage of individuals who are convicted and punished for crimes they did not commit. From a policy perspective, the question one needs to ask is at what cost? Put differently, how much should society spend on DNA evidence, criminal investigations, and other costly mechanisms to reduce the risk of wrongfully incarcerating an individual? One way to estimate the amount we should be willing to spend is to ask the reverse question – what is the cost of wrongful incarceration? Future research might focus on the cost and efficacy of further technology or spending on wrongful conviction avoidance, with our data providing the benefit side of any benefit-cost analysis of programs designed to reduce wrongful convictions.

While we know a lot about the number of individuals who have been exonerated for crimes they did not commit – and the compensation they have received for this injustice, little is known about the impact on their lives and the lives of their families. Future research that systematically studies these impacts would be useful. Thus far, anecdotal evidence is mixed – with some individuals being unable to return to a productive and happy life, while others have found purpose in their struggles to be exonerated – even writing books, giving speeches, working on behalf of other wrongfully convicted, and making movies. Although nobody would suggest their wrongful convictions were a positive experience, a few who have been exonerated are

clearly better off today than they were before their imprisonment. Most are likely to be worse off. None of this suggests that the time spent wrongfully incarcerated was a positive experience – instead, I have estimated the cost to those most directly affected at over \$400,000 per year on average. In addition, while our data suggests a significant number of the wrongfully convicted had young children at the time, little is known about the long-term impact on those children.

Finally, this study estimates the cost of wrongful conviction to the individual who suffers from this ordeal – and it does so based on *ex post* valuation using jury awards. However, society presumably values reductions in wrongful convictions for additional reasons. In addition to the harm to family and friends of the wrongfully convicted, those who are not wrongfully convicted might suffer from being at risk themselves from a future wrongful conviction. More broadly, the public might value a society that has a lower rate of wrongful convictions. Members of the public - even if they perceive they have a zero risk of being wrongfully convicted might be willing to pay to live in a society that does not impose these burdens on others.²² Thus, future research on the cost of wrongful convictions might focus on estimating the public's willingness-to-pay for reduced wrongful convictions – much like previous studies on the public's willingness-to-pay for reduced crime itself (Cohen *et al.*, 2004; Picasso and Cohen, 2019).

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²² A similar argument has been made in the case of the public's willingness to pay to reduce racially targeted police enforcement (Cohen, 2017).

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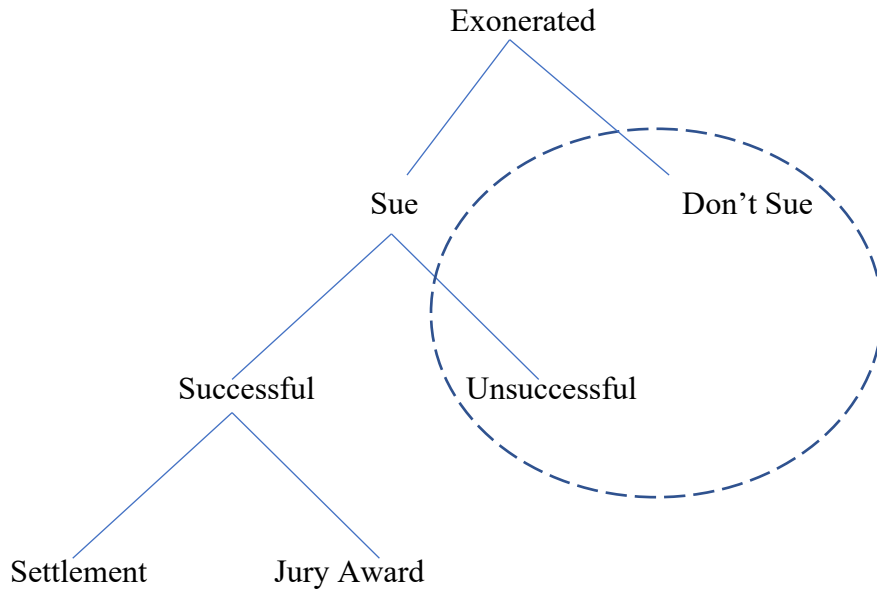


Figure 1 – Pathways to receiving compensation for wrongful convictions in civil courts

Table 1. Demographics of Wrongfully Convicted Dataset

Variable	Number (n=514)	Percent ^a
Male	482	93.8%
Race/Ethnicity		
White	228	44.4
African American	271	52.7
Hispanic ^b	67	13.0
Asian, American Indian, Other	6	1.2
Age at Imprisonment (9 unknown)		
Under 18	41	8.0
18-21	125	24.3
22-24	69	13.4
25-34	175	34.0
35-44	73	14.2
45-54	15	2.9
55+	7	1.4
Median age	25	--
Age at Release		
Under 18	2	0.4
18-21	15	2.9
22-24	16	3.1
25-34	86	16.7
35-44	178	34.6
45-54	117	22.8
55+	100	19.4
Median age	39	--
Married	74	14.4
Youngest child: None or unknown	387	75.3
Under age 6	83	16.2
Age 6-12	36	7.0
Age 13-17	4	0.8
Age 18+	4	0.8
Education: Unknown	374	72.3
Less than High School	81	15.8
High School/GED	38	7.4
At least some College	21	4.1
Employment Prior to Incarceration: Unknown	261	50.8
Unemployed or illegal income only	30	5.8
Student	29	5.6
Employed	194	37.7
Prior record	169	32.9

Note: Wrongful conviction awards are based on 514 individuals. Eleven of these individuals received a jury award that was subsequently appealed and settled out of court. Thus, there were 525 cases in the dataset.

^a Unknowns are included in the case counts for computing percent.

^b All but one Hispanic in dataset is White.

Table 2. Legal Outcomes for Wrongfully Convicted

Variable	Number (n=514)	Percent ^a
Most serious charge of conviction		
Murder	280	54.5
Rape or sexual assault	98	19.1
Child sexual abuse	30	5.8
Violent crime (e.g., robbery, assault)	48	9.3
Property crime (e.g., burglary, arson)	14	2.7
Drug-related crime	12	2.3
Misdemeanor crime	13	2.5
Original conviction		
Trial by jury	412	80.2
Trial by judge	37	7.2
Trial (uncertain if jury or judge)	9	1.7
Plea agreement	53	10.3
Unknown	3	0.6
Minimum Sentence		
Less than 1 year	12	2.3
1-5 years	33	6.4
6-19 years	109	21.2
20-39 years	119	23.1
40+ years	71	13.8
Life	81	15.8
Life without possibility of parole	47	9.1
Death	22	4.3
Time actually served in prison before release		
Less than 1 year	33	6.4
1-5 years	105	20.4
6-19 years	283	55.1
20-39 years	93	18.1
Mean	12.6 yrs.	
Median	11.9 yrs.	
Additional time spent on parole		
Number released on parole	93	18.1
Median months on parole	24	--
Sex Registry after release		
Spent time on sex registry while on parole	36	7.0
Median months on sex registry	43.4	--
Year of Imprisonment (median)	1990	
Year of Exoneration/Settlement (median)	2012	

Table 3. Litigation Outcomes for Wrongfully Convicted^a

Variable	Mean	Min	10 th Perc.	Median	90 th Perc.	Max
Months between exoneration & award (n=515)	51.3	0.3	0.7	44.2	92.3	216.9
- Awarded by judge or jury (n=71)	67.9	11.5	29.9	61.1	108.0	208.6
- Settlement (n=444)	48.6	0.3	14.9	42.3	88.4	216.9
Months between filing lawsuit & award	41.6	0.1	13.3	34.9	77.7	180.3
Award (n=71)	\$10.3m	\$1.7	\$0.9m	\$6.5m	\$23.4m	\$56.8m
Award per day (n=63)	\$3,600	<\$1	\$488	\$2,230	\$8,947	\$23,259
Settlement (n=454)	\$4.1m	\$2,189	\$0.2m	\$2.1m	\$11.2m	\$21.2m
Settlement per day (n=448)	\$1,149	\$2.4	\$102	\$649	\$2,038	\$53,110
Combined (n=525)	\$4.9m	\$1.7	\$0.2m	\$0.3m	\$13.0m	\$56.8m
Combined per day (n=517)	\$1,59	<\$1	\$123	\$788	\$2,654	\$53,110

^a All dollars have been updated to constant 2018 dollars based on the consumer price index.

Table 4
 Regression Analysis of Settlements and Awards for Wrongful Convictions
 Dependent Variable = Ln(Inflation-Adjusted Total Dollar Award)

	Judge/Jury Award		Settlements		Combined	
	Coef.	SE	Coef.	SE	Coef.	SE
Ln (Days in Prison)	0.38	0.17	0.58***	0.06	0.56***	0.07
Time Trend	0.04	0.04	0.03***	0.01	0.04***	0.01
Settlement	--	--	--	--	-1.02***	0.26
Mixed (settlement & award)	0.32	0.58	1.16***	0.19	0.79*	0.44
Injured while in prison	0.51	0.55	0.64***	0.14	0.60***	0.15
Spent time on parole	-0.82	0.84	0.19	0.15	0.28*	0.15
Age at Imprisonment: < 18	-0.17	0.63	0.60***	0.18	0.60***	0.18
Age at Imprisonment 55+	-8.14*	4.54	-0.98**	0.46	-2.71	1.77
Married	0.82	0.56	-0.26	0.19	0.08	0.22
Children (at least 1 < 18)	-0.14	0.54	0.20	0.13	0.20	0.13
High School/GED degree	0.13	0.65	0.75***	0.22	0.64***	0.20
Some College (or degree)	0.16	0.79	0.61***	0.26	0.34	0.35
Male	0.53	1.32	-0.18	0.26	-0.05	0.24
Black	0.41	0.55	0.02	0.14	0.07	0.14
Hispanic	1.39**	0.69	0.14	0.21	0.34	0.23
Prior Record	0.35	0.47	-0.27**	0.13	-0.23*	0.13
Child Sex Crime	-0.03	0.97	-0.99**	0.29	-0.67**	0.32
Pled Guilty	-0.89*	0.53	-0.27	0.19	-0.29	0.20
DNA	0.31	0.53	0.62***	0.12	0.54***	0.12
Indiv. Defendant	0.59	0.60	0.05	0.19	0.01	0.18
State Defendant	0.11	1.36	0.27	0.21	0.20	0.20
City/County Defendant	-1.39	0.88	0.31	0.17	-0.01	0.20
Federal lawsuit	2.19***	0.73	0.05	0.24	0.18	0.22
Fed & State lawsuit	-1.71	1.68	0.15	0.24	0.22	0.24
Months before final award	0.01	0.01	0.001	0.001	0.0003	0.00
Constant	-63.1	88.1	-52.2***	20.9	-62.7***	26.3
Adj. r-square	.648		.597		.543	
N	71		460		525	

Robust standard errors. See text. Additional control variables included for states with more than 15 cases: CA, IL, MA, MI, NY, NC, WA.

Note: 6 cases have both awards that were appealed and ultimately resulted in lower settlements. An additional 6 cases included at least one party who settled out of court and another whose judgment was imposed by judge or jury.

Table 5
 Predicted Dollar Award for Wrongful Convictions
 (Settlements valued at their reduced levels and Ignoring Cost of Injuries)

Time in Prison	Total Cost	Average Daily Cost	Average Annual Cost	Marginal Cost of Additional Year
1 day	\$ 19,415	\$ 19,415	--	--
6 Months	358,732	1,993	--	--
1 Year	533,581	1,462	533,582	533,582
2 Years	787,532	1,079	393,766	253,950
3 Years	988,931	903	329,644	201,399
4 Years	1,162,345	796	290,586	173,414
5 Years	1,317,536	722	263,507	155,191
10 Years	1,944,595	533	194,460	125,412
12.6 years (ave)	\$2,213,844	\$482	\$175,702	--
20 Years	2,870,094	393	143,505	92,550
30 Years	3,604,075	329	120,136	73,398

Note: All costs in 2018 dollars.

Table 6
 Predicted Dollar Award for Wrongful Convictions
 (Settlements valued at the level of court awards)

Time in Prison	Total Cost	Average Daily Cost	Average Annual Cost	Marginal Cost of Additional Year
Assuming no Serious Injuries				
1 day	\$ 47,631	--	--	--
6 Months	880,053	\$ 4,889	--	--
1 Year	1,309,001	3,586	\$ 1,309,001	\$ 1,309,001
2 Years	1,931,999	2,647	965,999	622,997
3 Years	2,426,077	2,216	808,692	494,078
4 Years	2,851,501	1,953	712,875	425,425
5 Years	3,232,220	1,771	646,444	380,719
10 Years	4,770,542	1,307	477,054	307,664
12.6 years (ave)	\$5,431,072	\$1,181	\$431,037	--
20 Years	7,041,002	965	352,050	227,046
30 Years	8,841,628	807	294,721	180,063
Including Serious Injuries while Incarcerated				
1 day	\$ 53,779	\$53,779		
6 Months	993,664	5,520		
1 Year	1,477,987	4,049	\$1,477,987	\$1,477,987
2 Years	2,181,411	2,988	1,090,705	703,424
3 Years	2,739,272	2,502	913,091	557,861
4 Years	3,219,617	2,205	804,904	480,345
5 Years	3,649,485	2,000	729,897	429,868
10 Years	5,386,397	1,476	538,640	347,382
12.6 years (ave)	6,132,199	1,334	486,682	---
20 Years	7,949,964	1,089	397,498	256,357
30 Years	9,983,042	912	332,768	203,308

Note: All costs in 2018 dollars.

Table 7

Comparison of Income to Awards and Settlements for Wrongful Conviction

(Subset of cases with estimated pre-incarceration earnings)

	Awards (n=47)		Settlements (n=195)		Combined (n=242)	
	Mean	Median	Mean	Median	Mean	Median
Total Award	\$9.6 mil	\$6.5 mil	\$3.3 mil	\$5.1 mil	\$6.0 mil	\$3.8 mil
Years in prison	10.7	10.3	13.7	13.0	13.1	12.7
Annualized award	\$1.3 mil	\$764,146	\$421,075	\$312,262	\$587,351	\$382,091
Annual earnings	\$58,249	\$44,960	\$39,850	\$37,884	\$43,423	\$38,530
Multiple of lost earnings	22.3	17.0	10.6	8.2	22.3	17.0

Note: all dollars have been updated to constant 2018 dollars based on the consumer price index.

Table 8
 Regression Analysis of Settlements and Awards for Wrongful Convictions
 (Subset of cases with estimated pre-incarceration earnings)
 Dependent Variable = Ln(Total Dollar Award)

	Coef.	SE
Ln (Days in Prison)	0.32***	0.13
Time Trend	0.06***	0.02
Settlement	-0.82***	0.31
Mixed (settlement & award)	0.65	0.53
Injured while in prison	0.49***	0.19
Spent time on parole	0.18	0.22
Age at Imprisonment: < 18	0.25	0.24
Age at Imprisonment 55+	-5.01*	2.68
Married	0.07	0.29
Children (at least 1 < 18)	0.09	0.9
High School/GED degree	0.65**	0.28
Some College (or degree)	0.34	0.31
Male	0.78	.36**
Black	0.19	0.18
Hispanic	0.57	0.25**
Prior Record	-0.28	0.20
Child Sex Crime	0.51	0.58
Pled Guilty	-0.45**	0.22
DNA	0.74***	0.20
Indiv. Defendant	-0.03	0.26
State Defendant	-0.08	0.25
City/County Defendant	-0.07	0.29
Federal lawsuit	0.29	0.33
Fed & State lawsuit	0.33	0.34
Months before final award	0.0003	0.00
Constant	-103.4**	49.0
Adj. r-square	.515	
N	242	

Table 9
Comparison of Successful Litigants to other Wrongfully Convicted Individuals^a

Variable	Awarded Compensation (n=514)		Not Awarded Compensation (n=1914)	
Male	482	93.8%	1,730	90.4%
Race/Ethnicity				
White	228	44.4	971	50.7
African American	271	52.7	893	46.7
Hispanic	67	13.0	219	11.4
Asian, American Indian, Other	6	1.2	50	2.6
Age at Imprisonment				
Under 18	41	8.0	142	7.4
18-21	125	24.3	364	19.0
22-24	69	13.4	252	13.2
25-34	175	34.0	611	31.9
35-44	73	14.2	345	18.0
45+	22	4.3	156	8.2
Approx. age at imprisonment	26.0		29.5	
Sentence Length				
None (probation, fine, etc.)	0	0	205	10.7
< 10 years	46	8.9	476	5.2
10-20 years	75	14.6	235	12.3
> 20 year	190	37.0	468	24.5
Life	81	15.8	302	15.8
Life w/o possibility of parole	47	9.1	114	21.7
Death	22	4.3	91	6.0
Year of conviction (mean)	1992		1998	
Year of exoneration (mean)	2005		2008	
Estimated time (years) served	12.6		10.1	
Contributing Factors:				
False confession	112	21.8	182	9.5
Mistaken witness identification	164	31.2	521	27.2
Perjury or false accusation	368	71.6	1,037	54.2
False or misleading forensic evidence	139	27.0	430	22.5
Official misconduct	381	74.1	915	47.8
Inadequate legal defense	98	19.1	514	26.8
DNA evidence assisted in exoneration	188	36.6	302	15.8

^a Source: National Registry of Exonerations. Data for those awarded compensation differ slightly from Table 1 due to different sources, estimates, and measurements. See text.

Table 10
Sample Selection Model – Stage One
Dependent Variable = Probability of Award for Wrongful Conviction

	Coef.	SE
Days in prison	.013***	.004
Year of exoneration	-.03***	.005
Age at Imprisonment	-.01***	.004
Male	-.10	.14
Black	.09	.08
Hispanic	.21*	.12
Asian	.68	.44
Native American	-.32	.43
Federal crime	-.81***	.29
Sentence: Not sentenced	-.57***	.23
Other than prison (e.g. probation)	-6.7***	<.01
< 1 year	-.75**	.38
1-5 years	-.27	.15
5-10 years	.07	.14
10-15 years	.06	.13
15-20 years	-.15	.15
Life	-.06	.09
Death	-.02	.16
Contributing Factors: False confession	.09	.10
Mistaken witness identification	-.07	.09
Perjury or false accusation	.21**	.09
False or misleading forensic evidence	.14	.09
Official misconduct	.56***	.08
Inadequate legal defense	-.13*	.08
DNA evidence assisted in exoneration	.77***	.09
Constant	58.3***	9.5
Lambda/Mills ratio	-.35*	.20
Wald Chi-squared	360.1	
N	2,421	

Note: Additional control variables included for states with more than 15 exonerations: Arizona, California, Connecticut, DC, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nevada, New Jersey, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Tennessee, Texas, Utah, Virginia, Washington, West Virginia, and Wisconsin.

Table 11
 Sample Selection Model – Stage Two
 Regression Analysis of Settlements and Awards for Wrongful Convictions
 Dependent Variable = Ln(Inflation-Adjusted Total Dollar Award)

	Coef.	SE
Ln (Days in Prison)	.43***	.05
Time Trend	.05***	.01
Settlement	-.96***	.19
Mixed (settlement & award)	.79	.53
Injured while in prison	.55***	.14
Spent time on parole	.39**	.16
Age at Imprisonment: < 18	0.53**	.22
Age at Imprisonment 55+	-2.68***	.49
Married	.05	.18
Children (at least 1 < 18)	.20	.13
High School/GED degree	.64***	.20
Some College (or degree)	.27	.24
Male	.13	.25
Black	.005	.14
Hispanic	.27	.20
Prior Record	-.18	.12
Child Sex Crime	-0.64***	.25
Pled Guilty	-.44**	.20
Indiv. Defendant	-.05	.18
State Defendant	.14	.20
City/County Defendant	-.16	.17
Federal lawsuit	.29	.21
Fed & State lawsuit	.18	.27
Months before final award	-.001	.001
DNA evidence assisted in exoneration	.38***	.15
Constant	-92.9***	20.8
N	525	

Note: Additional control variables included for states with more than 15 awards or settlements: California, Illinois, Massachusetts, Michigan, New York, North Carolina, and Washington.