Wrongful Convictions in the United States: A Study of Compensation Issues

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ABSTRACT

In the United States, about 2000 individuals have been wrongly convicted of crimes they did not commit since 1989. The paper aims to explore the factors influencing the likelihood of filing and prevailing state claims or civil rights compensation for these exonerees. The dataset used contains 1900 individual cases with 40 variables. The analysis used four main research methods: contingency table analysis, chi-square, odds ratio, two-way ANOVA table analysis, logistic regression analysis, and stepwise model selection. Based on the analysis, it can be concluded that various factors influence the likelihood of filing and prevailing state and civil rights claims for wrongful conviction. Race, sex, geographical area, guilty plea, innocence organization, crime, year of exoneration, DNA analysis, false confession, and mistaken witness identification will influence the likelihood of filing a state claim. On the other hand, race, sex, geographical area, innocence organization, political area, guilty plea, crime, DNA analysis, false confession, and official misconduct will influence the likelihood of filing a civil rights claim. The variables that will influence the likelihood of prevailing in a state claim are crime severity, year of exoneration, DNA analysis, mistaken witness identification, and innocence at the time of conviction. Finally, geographical area, political area, guilty plea, year of exoneration, DNA analysis, false confession, official misconduct, and innocence at the time of conviction will influence the likelihood of prevailing in a civil rights claim. The findings provide insights for improving the compensation system for exonerees and preventing wrongful convictions in the future.

1. INTRODUCATION

Since 1989, more than 2,000 individuals who were wrongly convicted of crimes they did not commit have been identified by researchers in the United States. There are two primary methods for these exonerees to seek compensation. The first method involves 33 states that have state statutes allowing exonerees to request compensation from a state court or administrative body. However, there are two limitations to this compensation. Firstly, not all states have such statutes, and secondly, exonerees who did not serve time in prison are not eligible. The amount of compensation awarded varies among different states. The second method involves seeking civil rights compensation, which is available to any exoneree even if they were not incarcerated. To receive this compensation, exonerees must demonstrate that misconduct by the state, county, municipality, or officer caused their wrongful conviction. It is important to note that there is no limit to the amount of compensation awarded if the plaintiff demonstrates misconduct.

A significant proportion of exonerees were not imprisoned, usually because they were accused of minor crimes. These individuals are not eligible for state statutory compensation but may still pursue civil rights or tort claims. Furthermore, not all incarcerated exonerees seek compensation. Some may only seek state statutory compensation, while others may only seek redress under civil rights or tort theories, and some may seek both. Unfortunately, many who apply for compensation are ultimately denied.

The focus of this report is to examine the factors that may influence wrongly convicted exonerees in seeking and receiving state claim compensation or civil rights compensation.

2. DATA SET

Data Description

The initial dataset comprises 1900 observations and 40 variables, including race, sex, year of exoneration, state claim made, and others. Table 1 below provides a description of some critical variables that will be referenced later in this report.

Variable	Meaning
Age	The age of the exoneree at the time the crime was committed
Race	Male and Female
Sex	Asian, Black, Caucasian, Hispanic, Native American, Other
No Time	The exonerees serve no time in prison
State of Conviction	The state where exonerees belong to

CIU	The exoneration was the result of work by the Conviction Integrity Unit
Guilty Plea	The exoneree pleaded guilty to the crime
IO	The exoneree was helped by an innocence organization
Worst Crime	Murder, Sexual Assault, Drugs, Child Sexual Abuse, Robbery, Other
Death Penalty	The exoneree faces the death penalty
DNA	The defendant was exonerated by DNA analysis
FC	A false confession was a contributing factor to the conviction
MWID	A mistaken witness ID was a contributing factor to the conviction
F/MFE	False or misleading forensic evidence is a contributing factor to the conviction
P/FA	Perjury or a false allegation was a contributing factor to the conviction
OM	Official misconduct was a contributing factor to the conviction
ILD	An inadequate legal defense was a contributing factor to the conviction
State Claim Made	A state statutory claim made
State Award	The state claim was granted
Non-Statutory Claim Filed	A non-statutory claim, e.g., civil rights claim against government entities, was filed.
Civil Rights Award	The exoneree recovers money by verdict or settlement
Civil Rights Amount	The amount of recovery
Years Lost	The number of years lost to wrongful conviction

Table 1. Data Description

Data Cleaning

To facilitate a more precise and convenient analysis, time, geographic area, and political area are added as auxiliary variables. Time divides the exoneration years into periods, starting with 1990 and grouping them every five years. This results in seven time periods, including 1990 and before, 1990 to 1995, 1996 to 2000, 2001 to 2005, 2006 to 2010, 2011 to 2015, and 2016 onwards. It will be used as a dependent variable most of the time. The geographic classification, named the "state" variable, divides the state into four regions: south, east, midwest, and west. The political classification, on the other hand, divides the state into two areas: blue and red, which are named "color areas".

To facilitate the analysis of the likelihood of filing and prevailing state claims or civil rights claims, the dataset is separated into five subsets. For the likelihood of filing a state claim, the total number of wrongly convicted cases is 1509, which is obtained by deleting observations where the "state statute" variable equals "N" (no state statutes) and the "NO TIME" variable equals 1 (never served in prison). This is because if the state does not have a statute that allows exonerees to seek state compensation or if exonerees have not been incarcerated, they cannot bring up the state claim. For the likelihood of filing a civil rights award, there is no limitation, so the total number of observations is 1900.

The likelihood of receiving a state claim or civil rights is based on the situation where the exoneree has already filed a state claim or civil rights. In this case, the total number of observations for receiving a state claim is 703, and the total number of observations for receiving a civil rights award is 802. The civil rights amount per year lost is based on observations where the exoneree has successfully received the civil rights reward. In this case, the total number of observations is 408.

Subsets	**Total Number of Observation**
Filing State Claim	1509
Filing Civil Rights	1900
Receiving State Claim	703
Receiving Civil Rights	802
Amount Civil Rights Per Year	403

Table 2. number of observations in subsets

3. RESEARCH DESIGN AND METHODS

The aim of this report is to investigate how different factors affect the likelihood of filing and winning a state claim or civil rights claim and to determine the impact of each factor on the amount of compensation awarded for each year lost. The study will begin with exploratory data analysis (EDA) to obtain a basic summary of each observation and, subsequently, employ advanced analysis techniques such as contingency table analysis, two-way ANOVA table analysis, and logistic regression analysis to uncover the relationships between various factors and derive conclusive results.

Analysis Methods

Contingency Table Analysis

Contingency tables can be used to investigate relationships between categorical variables, and a chi-square test can be conducted to assess the association between two categorical variables. In this study, the chi-square test was used to determine whether there was a significant association between the variables of interest. The resulting chi-square statistic was compared to the critical value of the chi-square distribution with degrees of freedom equal to (r-1)(c-1), where r is the number of rows and c is the number of columns in the contingency table. The observed frequencies are then compared to the expected frequencies using the chi-square test statistic. If the calculated chi-square statistic is greater than the critical value, the null hypothesis of independence between the variables is rejected, and it is concluded that there is a significant association between the variables. If the calculated chi-square statistic is not greater than the critical value, the null hypothesis is not rejected, and it is concluded that there is no significant association between the variables. The p-value is the probability to observe the chi-square test as extreme as or note extreme that the one observed from the data under the null.

Odds Ratio

The odds ratio is a measure used to assess the relationship between two categorical variables. To calculate it, a contingency table is constructed to display the frequency distribution of the variables. The rows of the table represent the levels of the independent variable, while the columns correspond to the presence or absence of the dependent variable. Next, the odds of the dependent variable occurring at each level of the independent variable are calculated by dividing the number of potential factors that have the outcome of interest by the number of potential factors that do not have the outcome at each level of the independent variable. The odds ratio is then calculated by dividing the odds at one level of the independent variable by the odds at the other level of the independent variable. A value greater than one indicates increased odds of the dependent variable occurring in the presence of the independent variable, while a value less than one indicates decreased odds of the dependent variable occurring.

Two-Way ANOVA Table Analysis

The two-way ANOVA is used to compare mean differences between groups that have been split into two independent variables, or factors. Its primary purpose is to determine whether there is an interaction between the two independent variables and the dependent variable. The F test is used as the criterion for the two-way ANOVA table. The p-value is the probability to observe the F-test as extreme as or note extreme that the one observed from the data under the null.

Logistic Regression Analysis

Logistic regression is an appropriate regression analysis to conduct when the dependent variable is binary. It is used to describe data and explain the relationship between one dependent binary variable and one or more independent variables that are nominal, ordinal, interval, or ratio-level. Logistic regression estimates a multiple linear regression function, which is defined as:

$$\log\left(\frac{1}{1-p}\right) = \beta 0 + \beta 1 x 1 + \cdots \beta n x n,$$

where p represents the probability when the response variable value is equal to 1.

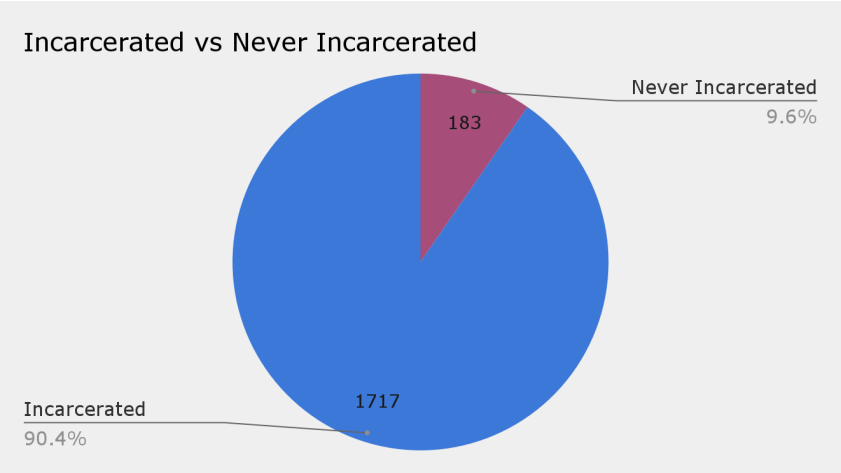
Stepwise Model Selection

Stepwise model selection is a method used to find the most relevant predictors that are significantly associated with the response variable. It starts with a null model and either adds or removes predictor variables based on statistical significance until the final model is reached. Forward selection involves adding predictors one at a time to the model, while backward elimination involves removing predictors one at a time. In this report, stepwise model selection is used in logistic regression analysis to reduce the number of predictors and improve model efficiency while maintaining the accuracy of the predictions.

4. ANALYSIS

4.1 Exploratory Data Analysis (EDA)

Incarcerated Exonerees



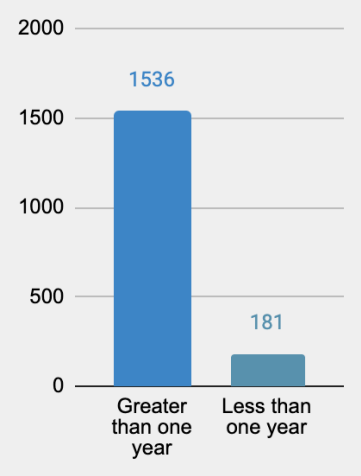


Figure 1. Incarcerated vs. Never Incarcerated (Left)
Figure 2. Years of Incarceration (Right)

By examining various conditions of the variable, Years Lost, it can be determined that out of the 1900 exonerees in the dataset, 183 were never incarcerated while 1717 served time in prison (figure 1). Among those who were incarcerated, 181 served one year or less, while the remaining 1536 served more than one year (figure 2).

Race

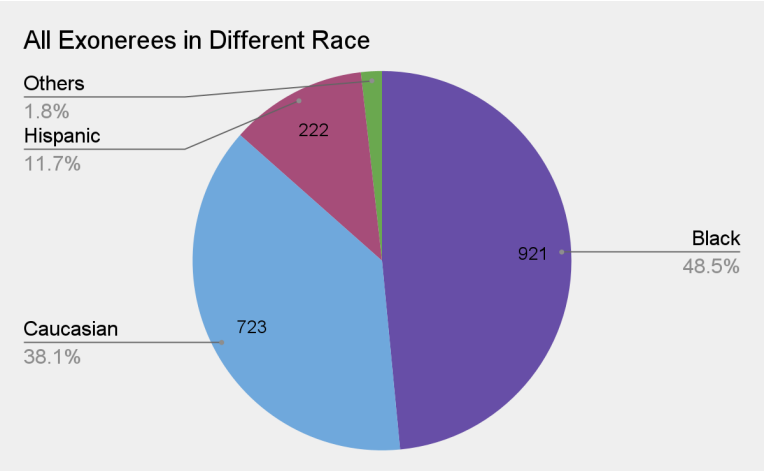


Figure 3. All Exonerees in Different Races

The majority of exonerees are Black, Caucasian, and Hispanic, while Native American, Asian, and other races do not offer significant analysis. Therefore, this research will only consider Black, Caucasian, and Hispanic individuals when examining race. There were a total of 921 Black exonerees, representing 48.47% of the total; 723 Caucasian exonerees, representing 38.05% of the total; and 222 Hispanic exonerees, representing 11.68% of the total (figure 3).

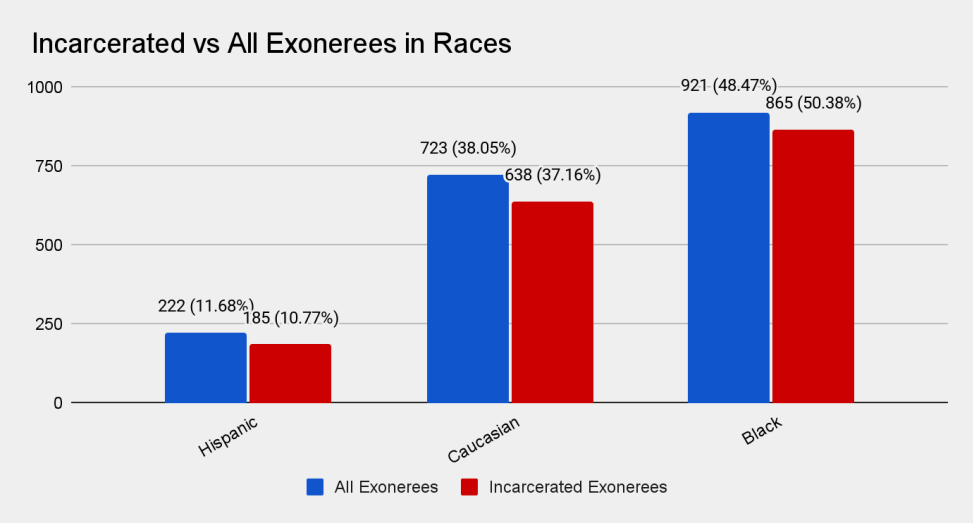


Figure 4. Incarceration vs. All Exonerees in Difference Races

Out of 1717 cases of incarceration, 865 of them involved Black exonerees, which constituted 50.38% of the incarcerated exonerees (figure 4). Caucasian exonerees made up 638 cases, representing 37.16% of the incarcerated exonerees, while Hispanic exonerees accounted for 185 cases, representing 10.77% of the incarcerated exonerees.

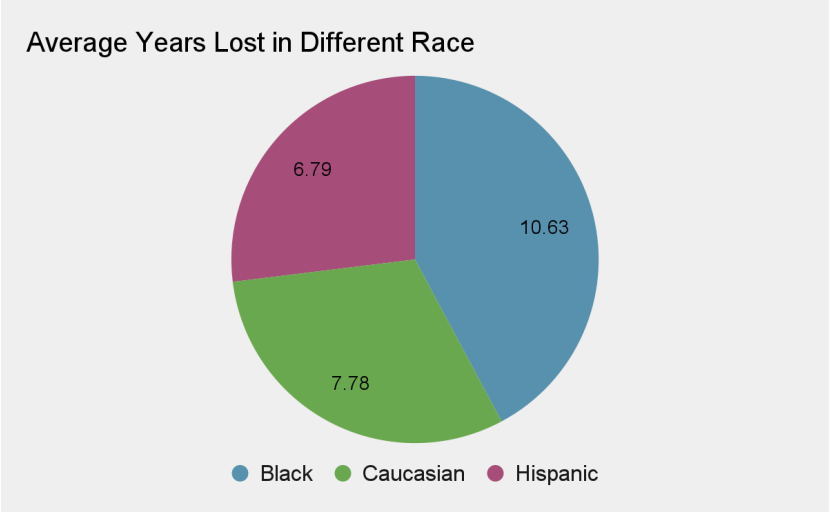


Figure 5. Average Number of Years Lost by Race

Figure 5 shows that the average number of years lost differed among racial groups, with Black exonerees having an average of 10.63 years lost, Caucasian exonerees having an average of 7.78 years lost, and Hispanic exonerees having an average of 6.79 years lost.

Gender

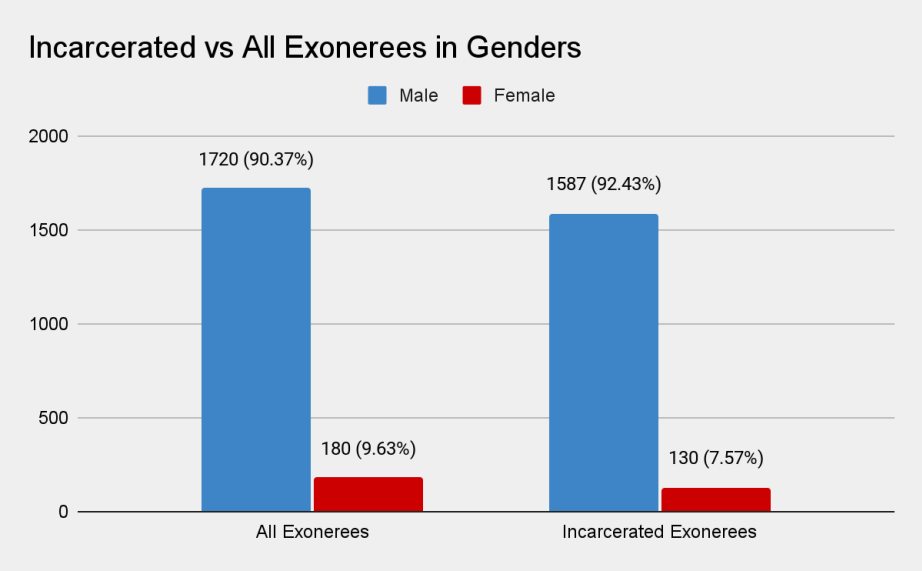


Figure 6. Incarceration vs. All Exonerees in Genders

The dataset includes 180 female exonerees, which accounts for 9.47% of the total, and 1720 male exonerees, which accounts for 90.53% of the total (figure 6). Out of the 1717 cases of incarceration, 130 involved female exonerees, which represents 7.57% of incarcerated exonerees, and 1587 involved male exonerees, which represents 92.45% of incarcerated exonerees.

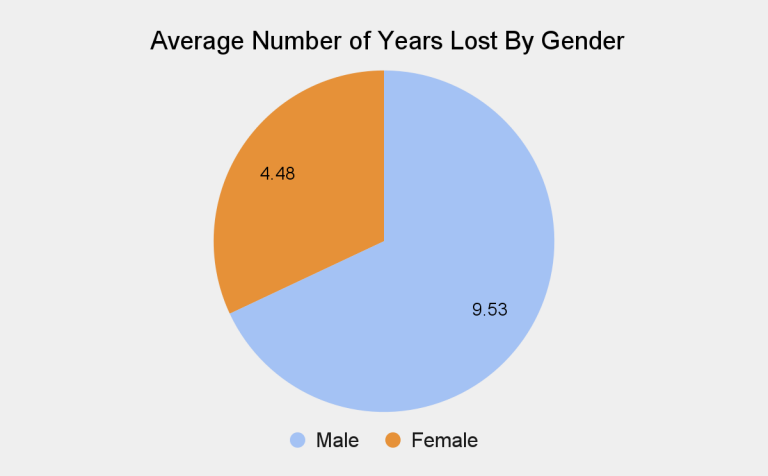


Figure 7. Average Number of Years Lost by Gender

Figure 7 shows that the average number of years lost for female exonerees was 4.48, while for male exonerees, it was 9.53.

CIU

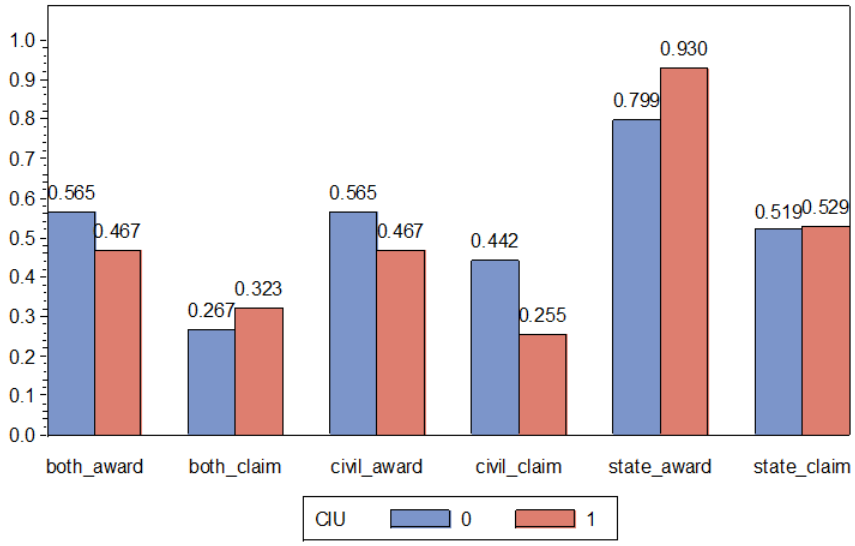


Figure 8. CIU in Seeking or Receiving Compensation

CIU refers to whether the exoneration was the result of work by a Conviction Integrity Unit, where 1 is yes and 0 is no. The percentage of seeking or receiving state claim compensation or civil rights compensation for different CIU groups is shown above the bar chart in figure 8. The results suggest that, regardless of the CIU group, exonerees had similar chances of filing a state claim. Additionally, if they sought assistance from CIU, they were more likely to receive state compensation. However, the likelihood of pursuing civil rights compensation varied. While the likelihood of winning state compensation was higher, CIU could not assist in increasing the likelihood of receiving civil rights compensation. As a result, it is understandable that exonerees were less likely to seek CIU's assistance when pursuing civil rights compensation.

Guilty Pleas

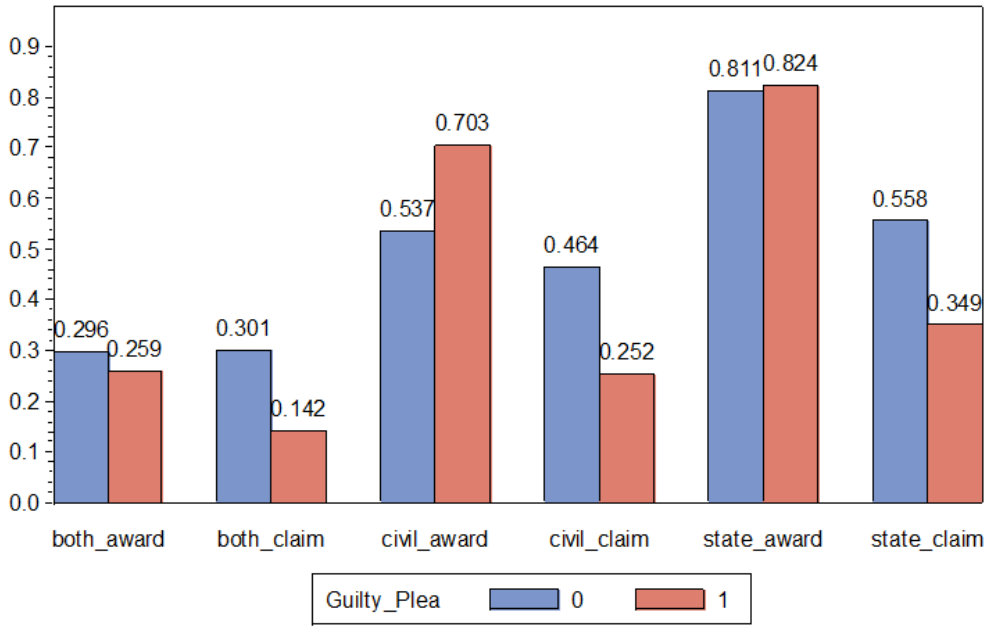


Figure 9. Guilty Pleas in Seeking or Receiving Compensation

Guilty pleas refer to people who actually plead guilty to a crime that they had not committed. Figure 9 displays the percentage of exonerees seeking or receiving state claim compensation or civil rights compensation based on their guilty plea status. Guilty pleas significantly influence whether exonerees file for compensation or not. If they plead guilty, they are less likely to pursue compensation, and the likelihood of receiving civil rights compensation is affected. Exonerees who were coerced into pleading guilty had a 20% higher likelihood of receiving civil rights compensation, but this did not impact their chances of receiving state claim compensation. Whether they pleaded guilty or not, their likelihood of receiving state claim compensation was almost the same.

DNA

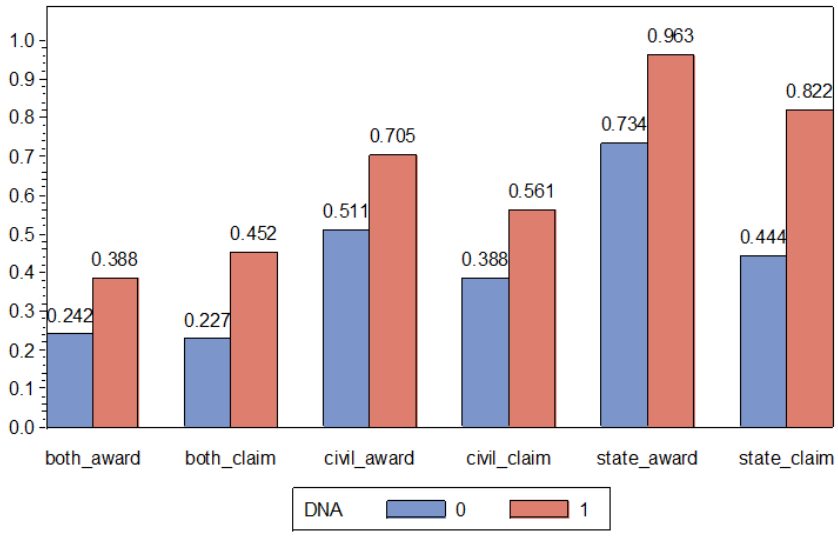


Figure 10. DNA Results in Seeking or Receiving Compensation

DNA, a forensic analysis method, refers to when the defendant is exonerated by DNA analysis. The percentage of exonerees seeking or receiving state claim compensation and civil rights compensation for different DNA analysis outcomes is depicted in Figure 10. If exonerees were wrongfully convicted due to DNA evidence, they had a higher likelihood of pursuing and obtaining both state claim compensation and civil rights compensation.

Crime

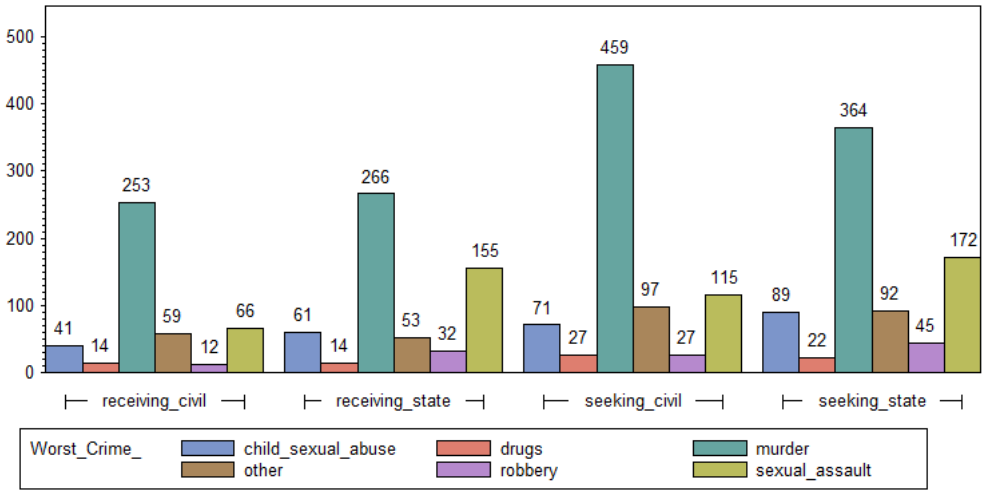


Figure 11. Crime in Seeking or Receiving Compensation

The six types of crimes examined are murder, sexual assault, drugs, child sexual abuse, robbery, and others. The type of crime significantly impacts the percentage of exonerees who file for state claims or civil rights compensation. Each type of crime has a different likelihood of resulting in compensation (figure 11). It is evident that murder and sexual assault exonerees were more inclined to seek and receive state compensation, whereas drug exonerees were less likely to do so. However, exonerees of all crimes except murder were not willing to pursue civil rights compensation. In terms of receiving compensation, the type of crime only affects the likelihood of receiving state claim compensation, not civil rights compensation.

Death Penalty

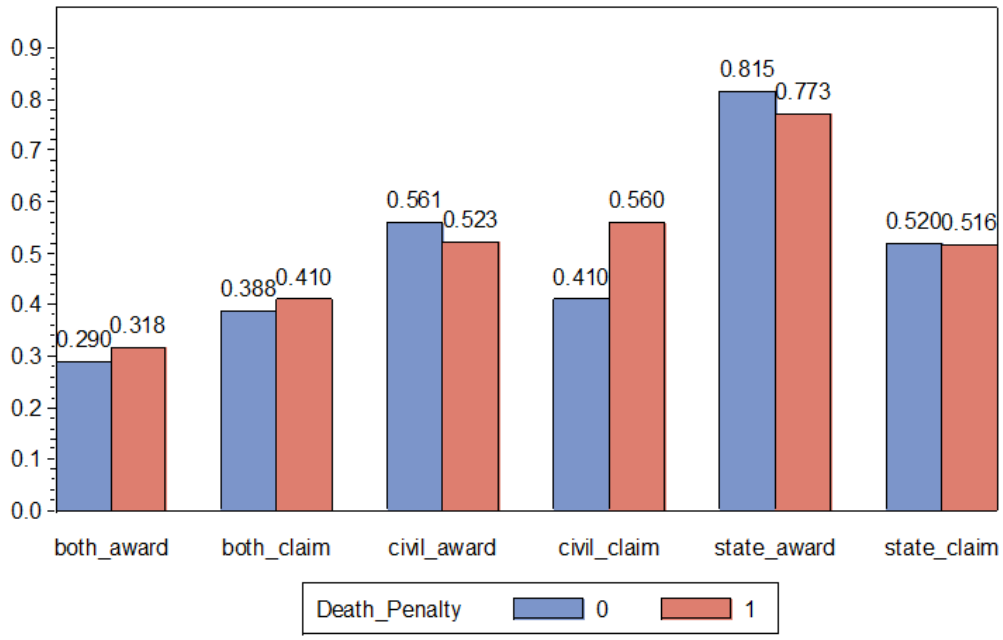


Figure 12. Death Penalty in Seeking or Receiving Compensation

The number displayed above the bar chart in Figure 12 indicates the varying percentages of seeking or receiving state claim compensation or civil rights compensation between exonerees who were sentenced to death and those who were not. While the death penalty factor would not impact the outcome of filing or prevailing in state claim compensation, it does influence the proportion of exonerees who pursue civil rights compensation. Exonerees who faced the death penalty were more inclined to file for civil rights compensation, but this factor does not affect the result of receiving civil rights compensation.

4.2 Single Variable Analysis

To investigate the association between factors and the likelihood of filing and prevailing state claim or civil rights compensation, this study employs several statistical methods, such as the contingency table, chi-square, odds ratio, two-way ANOVA table, general linear regression, and logistic regression. The dependent variable is time.

Race Effect

Contingency Table

Likelihood	Chi-Square	P-Value
Filing State Claim	13.84	0.0167
Filing Civil Rights	82.78	<0.0001
Receiving State Claim	4.85	0.4350
Receiving Civil Rights	3.25	0.5177

Table 3. Contingency Table Result by Race

Firstly, table 3 presents the results of the contingency table. The p-value associated with the chi-square test is used to interpret the strength of evidence against the null hypothesis. The p-value associated with the chi-square test is a measure of the strength of evidence against the null hypothesis, which assumes that there is no association between the row and column variables in the contingency table and that any observed association is due to chance. A small p-value (less than 0.05) indicates that the observed association in the contingency table is unlikely to be due to chance, and the null hypothesis can be rejected in favor of the alternative hypothesis. Conversely, a large p-value (greater than 0.05) suggests that the observed association could plausibly be due to chance, and the null hypothesis cannot be rejected.

By examining the p-values of the chi-square test, it is evident that the p-values of filing for state claims and civil rights compensation are both less than 0.05, indicating that race significantly impacts the likelihood. Different races have different likelihoods of filing for compensation. However, looking at the likelihood of prevailing a state claim or civil rights compensation, the p-values are both greater than 0.05, implying that race does not significantly influence the likelihood of prevailing both compensations. In other words, the likelihood of prevailing compensation for all races is similar.

Odds Ratio

Likelihood\Odds Ratio	Black	Caucasian	Hispanic
Filing State Claim	2.28	1	1.37
Filing Civil Rights	1.45	1	1.20
Receiving State Claim	2.24	1	2.17
Receiving Civil Rights	1.34	1	1.21

Table 4. Odds Ratio of Race

Table 4 shows the odds ratio of race, and the interpretations are listed below:

- Filing State Claim: The odds of Black individuals filing a state claim are 2.28 times the odds for Caucasian individuals. The odds of Hispanic individuals filing a state claim are 1.37 times the odds for Caucasian individuals.
- Filing Civil Rights: The odds of Black individuals filing a civil rights claim are 1.45 times the odds for Caucasian individuals. The odds of Hispanic individuals filing a civil rights claim are 1.2 times the odds for Caucasian individuals.
- Receiving State Claim: The odds of Black individuals receiving a state claim are 2.24 times the odds for Caucasian individuals. The odds of Hispanic individuals receiving a state claim are 2.17 times the odds for Caucasian individuals.
- Receiving Civil Rights: The odds of Black individuals receiving a civil rights claim are 1.34 times the odds for Caucasian individuals. The odds of Hispanic individuals receiving a civil rights claim are 1.21 times the odds for Caucasian individuals.

Based on the above analysis, black individuals are more likely to file and receive state claims than Caucasian individuals, while Hispanic individuals have slightly higher odds of filing and receiving state claims than Caucasian individuals. Black individuals also have slightly higher odds of filing civil rights

claims and receiving state compensation than Caucasian individuals, while Hispanic individuals have slightly higher odds of filing civil rights claims than Caucasian individuals.

ANOVA Table

Amount	F Value	P-Value
Race and Amount	2.58	0.0773
Race, Time and Amount	1.55	0.0695

Table 5. ANOVA Table of Race

Table 5 displays the ANOVA results. The objective was to investigate the correlation between different races and the amount received under prevailing civil rights. The p-value in the ANOVA table is the probability of obtaining an F-statistic as extreme as, or more extreme than, the one calculated from the sample data, assuming that the null hypothesis is true. The null hypothesis in ANOVA is that there is no significant difference in means between the groups, and any observed difference is due to chance. The alternative hypothesis is that there is a significant difference in means between the groups.

If the p-value is small (less than 0.05), it indicates that the observed difference in means between the groups is unlikely to be due to chance, and the null hypothesis can be rejected in favor of the alternative hypothesis. Conversely, if the p-value is large (greater than 0.05), it suggests that the observed difference in means between the groups could plausibly be due to chance, and the null hypothesis cannot be rejected. It is important to note that a significant p-value in the ANOVA table does not necessarily imply that the group means are different from each other but rather indicates that at least one of the group means is significantly different from the others.

In table 5, the p-value of 0.0773 is greater than 0.05, indicating that there are no differences between race and the received amount. This implies that race does not have an impact on the amount of civil rights compensation. The two-way ANOVA table was employed to determine whether the relationship changes over time. Despite the changing time, the p-value remains greater than 0.05, with a value of 0.0695. This suggests that the relationship between race and amount remains constant.

Gender Effect

Contingency Table

Likelihood	Chi-Square	P-Value
Filing State Claim	13.41	0.0020
Filing Civil Rights	9.06	0.0026
Receiving State Claim	0.10	0.7563
Receiving Civil Rights	2.66	0.1032

Table 6. Contingency Table Result by Gender

The p-value (table 6) for filing a state claim and a civil rights claim is both less than 0.05, indicating that gender has an impact on the likelihood of filing for compensation. Males are more likely to file for compensation. However, for the likelihood of receiving prevailing compensation, both p-values are greater than 0.05, indicating that there is no difference between genders.

Odds Ratio

Likelihood	Odds Ratio
Filing State Claim	2.68
Filing Civil Rights	1.62
Receiving State Claim	1.33
Receiving Civil Rights	1.66

Table 7. Odds Ratio of Gender

Table 7 shows the odds ratio of gender, and the interpretations are listed below:

- Filing State Claim: The odds of male individuals filing a state claim are 2.68 times the odds for female individuals.
- Filing Civil Rights: The odds of male individuals filing a civil rights claim are 1.62 times the odds for female individuals.
- Receiving State Claim: The odds of male individuals receiving a state claim are 1.33 times the odds for female individuals.
- Receiving Civil Rights: The odds of male individuals receiving a civil rights claim are 1.66 times the odds for female individuals.

Based on the above analysis, it appears that male individuals have higher odds of filing and receiving state and civil rights claims compared to female individuals.

ANOVA Table

Amount	**F Value**	**P-Value**
Gender and Amount	0.85	0.3579

Table 8. ANOVA Table of Gender

Additionally, when examining the relationship between gender and the amount received for civil rights compensation, the p-value in table 8 is 0.35, which is greater than 0.05. Therefore, gender would not significantly affect the amount received.

CIU Effect

Result of the Contingency Table and ANOVA Table

Table 9. The Test Result for CIU

Variables	**Test**	**Test Value**	**P-Value**
Filing Civil Rights	Chi square	29.04	<0.0001
Prevailing Civil rights	Chi square	1.15	0.2834
CIU and Amount	F test	0.04	0.8507

Table 9. The Test Result for CIU

Table 9 showed that CIU would only have an impact on the likelihood of filing civil rights claims with a p-value smaller than 0.05. However, CIU would not affect the outcome of prevailing civil rights compensation and the amount received. It can be concluded that exonerees who did not use CIU are more likely to file civil rights claims.

Odds Ratio

Likelihood	**Odds Ratio**
Filing State Claim	1.07
Filing Civil Rights	0.44
Receiving State Claim	3.21
Receiving Civil Rights	0.67

Table 10. Odds Ratio of CIU

Table 10 shows the odds ratio of CIU, and the interpretations are listed below:

- Filing State Claim: The odds of an exoneree with CIU involvement filing a state claim are 1.07 times the odds for exonerees without CIU involvement.
- Filing Civil Rights: The odds of an exoneree with CIU involvement filing a civil rights claim are 0.44 times than the odds for exonerees without CIU involvement. Exonerees with CIU involvement are more likely to file a civil rights claim than those without CIU involvement.

- Receiving State Claim: The odds of an exoneree with CIU involvement receiving state claim compensation are 3.21 times the odds for exonerees without CIU involvement.
- Receiving Civil Rights: The odds of an exoneree with CIU involvement receiving civil rights compensation are 0.67 times the odds for exonerees without CIU involvement.

Exonerees with CIU involvement tend to have higher odds of filing a state claim and receiving state compensation but lower odds of filing civil rights claim and receiving civil rights compensation compared to those without CIU involvement. However, despite the lower odds, it is still notable that exonerees with CIU involvement are more likely to file a civil rights claim than those without CIU involvement.

Guilty Plea Effect

Result of the Contingency Table and ANOVA Table

Variables	Test	Test Value	P-Value
Filing State Claim	Chi-Square	39.14	<0.0001
Filing Civil Rights	Chi-Square	58.63	<0.0001
Receiving State Claim	Chi-Square	0.0024	0.9611
Receiving Civil Rights	Chi-Square	12.20	0.0004
Guilty Pleas and Amount	F-Test	0.09	0.7656

Table 11. The Test Result for Guilty Plea

Based on the results shown in Table 11 and the p-value, it is evident that the guilty plea factor significantly affects the likelihood of filing both compensations. However, this factor would not affect the outcome of prevailing state claims. It would only influence the outcome of prevailing civil rights compensation. Regarding the relationship between the guilty plea and the amount, since the p-value is greater than 0.05, it would not affect the amount received.

Odds Ratio

Likelihood	Odds Ratio
Filing State Claim	2.33
Filing Civil Rights	2.57
Receiving State Claim	0.91
Receiving Civil Rights	2.11

Table 12. Odds Ratio of Guilty Plea

Table 12 shows the odds ratio of guilty plea, and the interpretations are listed below:

- Filing State Claim: The odds of individuals who pleaded guilty to a crime they had not committed filing a state claim are 2.33 times the odds for individuals who did not plead guilty.
- Filing Civil Rights: The odds of individuals who pleaded guilty to a crime they had not committed filing a civil rights claim are 2.57 times the odds for individuals who did not plead guilty.
- Receiving State Claim: The odds of individuals who pleaded guilty to a crime they had not committed receiving a state claim are 0.91 times the odds for individuals who did not plead guilty.
- Receiving Civil Rights: The odds of individuals who pleaded guilty to a crime they had not committed receiving a civil rights claim are 2.11 times the odds for individuals who did not plead guilty.

The results suggest that individuals who pleaded guilty to a crime they had not committed are more likely to file both state and civil rights claims, but less likely to receive a state claim. However, they are more likely to receive a civil rights claim compared to those who did not plead guilty.

DNA Effect

Result of the Contingency Table and ANOVA Table

Variables	Test	Test Value	P-Value
Filing State Claim	Chi-Square	138.74	<0.0001
Filing Civil Rights	Chi-Square	33.24	<0.0001
Receiving State Claim	Chi-Square	61.17	<0.0001
Receiving Civil Rights	Chi-Square	27.48	<0.0001
DNA and Amount	F-Test	1.52	0.2181

Table 13. The Test Result for DNA

Table 13 and the p value reveal that the DNA factor has a significant impact on both the likelihood of filing and prevailing. From the EDA section, it is evident that exonerees who were wrongfully convicted by DNA analysis had a higher chance of filing for both compensations. The p value also confirms that this factor would affect the result of prevailing compensation. Similarly, exonerees who were wrongfully convicted by DNA analysis were more likely to receive compensation. However, concerning the relationship between DNA analysis and the civil rights compensation amount, since the p value is greater than 0.05, it has no effect on the compensation amount.

Odds Ratio

Likelihood	Odds Ratio
Filing State Claim	5.79
Filing Civil Rights	2.02
Receiving State Claim	9.18
Receiving Civil Rights	2.32

Table 14. Odds Ratio of DNA

Table 14 shows the odds ratio of DNA, and the interpretations are listed below:

- Filing State Claim: The odds of exonerees being exonerated by DNA analysis and filing a state claim are 5.79 times the odds for exonerees who were not exonerated by DNA analysis.
- Filing Civil Rights: The odds of exonerees being exonerated by DNA analysis and filing a civil rights claim are 2.02 times the odds for exonerees who were not exonerated by DNA analysis.
- Receiving State Claim: The odds of exonerees being exonerated by DNA analysis and receiving a state compensation claim are 9.18 times the odds for exonerees who were not exonerated by DNA analysis.
- Receiving Civil Rights: The odds of exonerees being exonerated by DNA analysis and receiving a civil rights compensation claim are 2.32 times the odds for exonerees who were not exonerated by DNA analysis.

These findings suggest a significant difference in the likelihood of exonerees who were exonerated by DNA analysis filing and receiving both compensations compared to those who were not exonerated by DNA analysis. These results highlight the important role of DNA analysis in the exoneration process.

Crime Effect

Result of the Contingency Table and ANOVA Table

Variables	Test	Test Value	P-Value
Filing State Claim	Chi-Square	88.4339	<0.0001
Filing Civil Rights	Chi-Square	195.4974	<0.0001
Receiving State Claim	Chi-Square	34.7871	<0.0001
Receiving Civil Rights	Chi-Square	4.5455	0.4738
Crime and Amount	F-Test	2	0.0771

Table 15. The Test Result for Crime

Table 15 and the p-value indicate that the type of crime committed significantly affects the likelihood of receiving compensation. The p-value indicates that the type of crime would affect the result of the prevailing state claim, as those convicted of more severe crimes are more likely to receive compensation. However, this factor would not affect the result of prevailing civil rights compensation, as each type of crime has a similar likelihood of receiving civil rights compensation. With regard to the relationship between the type of crime and the amount of civil rights compensation, the p-value is greater than 0.05, indicating that it has no effect on the compensation amount.

Odds Ratio

Likelihood\Odds Ratio	Murder	Sexual Assault	Drugs	Child Sexual Abuse	Robbery	Other
Filing State Claim	2.83	0.72	0.29	1.34	0.85	1.07
Filing Civil Rights	1.97	0.77	0.48	1.23	0.71	1.21
Receiving State Claim	0.05	0.003	1.67	0.06	0.05	0.16
Receiving Civil Rights	3.41	0.50	0.48	0.77	0.62	0.78

Table 16. Odds Ratio of Crime

Table 16 shows the odds ratio of Crime, and the interpretations are listed below:

- Filing State Claim: The odds of an exoneree filing a state claim for murder are 2.83 times the odds for an exoneree not filing a state claim for murder. The odds of an exoneree filing a state claim for child sexual abuse are 1.34 times the odds for an exoneree not filing a state claim for child sexual abuse. The odds of an exoneree filing a state claim for other crimes are 1.07 times the odds for an exoneree not filing a state claim for other crimes.
- Filing Civil Rights: The odds of an exoneree filing civil rights claim for murder are 1.97 times the odds for an exoneree not filing civil rights claim for murder. The odds of an exoneree filing civil rights claim for child sexual abuse are 1.23 times the odds for an exoneree not filing civil rights claim for child sexual abuse. The odds of an exoneree filing civil rights claim for other crimes are 1.21 times the odds for an exoneree not filing civil rights claim for other crimes.
- Receiving State Claim: The odds of an exoneree receiving a state claim for drugs are 1.67 times the odds for an exoneree not receiving a state claim for drugs.
- Receiving Civil Rights: The odds of an exoneree receiving civil rights claim for murder are 3.41 times the odds for an exoneree not receiving civil rights claim for murder.

The result indicated that the odds of an exoneree filing a state claim for murder, child sexual abuse, and other crimes are higher compared to those who do not file such claims, while the odds of filing a state claim for drugs and robbery are lower. The odds of an exoneree filing civil rights claim for murder and child sexual abuse are higher, while the odds for sexual assault and robbery are lower. The odds of receiving a state claim for drugs are higher, while the odds for murder, child sexual abuse, and robbery are lower. Finally, the odds of receiving civil rights claim for murder are higher, while the odds for sexual assault, drugs, and child sexual abuse are lower.

Death Penalty Effect

Result of the Contingency Table and ANOVA Table

Variables	Test	Test Value	P-Value
Filing State Claim	Chi-Square	0.006	0.9396
Filing Civil Rights	Chi-Square	9.68	0.0019
Receiving State Claim	Chi-Square	0.67	0.4127
Receiving Civil Rights	Chi-Square	0.30	0.5826
Death Penalty and Amount	F-Test	0.25	0.6208

Table 17. The Test Result for Death Penalty

It can be observed from table 17 and the corresponding p value that the death penalty factor has a minimal effect on filing state claims, prevailing state claims, and civil rights compensation. However, exonerees who faced the death penalty were more likely to file for civil rights compensation. Furthermore, the death penalty factor does not have any impact on the amount of civil rights compensation.

Odds Ratio

Likelihood	Odds Ratio
Filing State Claim	1.01
Filing Civil Rights	1.86
Receiving State Claim	0.77
Receiving Civil Rights	0.85

Table 18. Odds Ratio of Death Penalty

Table 18 shows the odds ratio of the death penalty, and the interpretations are listed below:

- Filing State Claim: The odds of exonerees who were sentenced to death filing a state claim are 1.01 times the odds for exonerees who were not sentenced to death.
- Filing Civil Rights: The odds of exonerees who were sentenced to death filing a civil rights claim are 1.86 times the odds for exonerees who were not sentenced to death.
- Receiving State Claim: The odds of exonerees who were sentenced to death receiving a state claim are 0.77 times the odds for exonerees who were not sentenced to death.
- Receiving Civil Rights: The odds of exonerees who were sentenced to death receiving a civil rights claim are 0.85 times the odds for exonerees who were not sentenced to death.

Based on the analysis, it appears that being sentenced to death does not significantly impact the odds of an exoneree filing or receiving a state or civil rights claim compared to exonerees who were not sentenced to death. However, the odds of exonerees who were sentenced to death filing a civil rights claim were found to be 1.86 times higher than those who were not sentenced to death.

Tag Effect

Result of the Contingency Table and ANOVA Table

Likelihood\Tag	FC	MWID	F/MFE	P/FA	OM	ILD
Filing State Claim	I	I				
Filing Civil Rights	I			I	I	
Receiving State Claim		I				I
Receiving Civil Rights	I			I		I
Amount						

Table 19. List of Significant Tags for Each Likelihood

Table 19 presents the influential factors for likelihood, indicated by the "I", based on the results of the contingency table and chi-square analyses. It lists all the significant tags that have a significant impact on the likelihood of filing state and civil rights compensation claims, prevailing in these cases, and receiving compensation for civil rights.

In summary, the analysis suggests that several tags have an impact on the likelihood and outcome of compensation claims made by exonerees. The FC tag is associated with an increased likelihood of filing and prevailing in civil rights compensation as well as filing state claims, while the MWID tag is associated with an increased likelihood of filing and prevailing in state claim compensation. The P/FA tag is associated with an increased likelihood of filing and prevailing in civil rights compensation, while the OM tag is only associated with an increased likelihood of filing civil rights compensation. Finally, the ILD tag is associated with an increased likelihood of prevailing in state claims or civil rights compensation cases. However, none of these tags appear to affect the amount of compensation awarded for civil rights.

4.3 Multiple Variable Analysis

In order to find the most relevant predictors that are significantly associated with each likelihood, a general logistic model is used to identify significant variables instead of analyzing single variables. The stepwise selection method will be used to filter the variables out of all useable variables in the dataset.

Likelihood of Filing State Claim

Table 20 shows the result of the stepwise selection, where Years Lost, Geographic Area, DNA, No Time, Exoneration Date, Political Area and Crime were chosen as significant variables. These variables influence the likelihood of filing a state claim when they have different values.

Step	Variables	Chi-Square	P-Value
1	Years Lost	249.40	<.0001
2	Geographic Area	104.68	<.0001
3	DNA	102.20	<.0001
4	No Time	60.11	<.0001
5	MWID	15.12	0.0001
6	Exoneration Date	28.69	<.0001
7	Political Area	6.92	0.0085
8	Crime	13.44	0.0196

Table 20. Stepwise Selection for Likelihood of Filing State Claim

Likelihood of Filing Civil Rights

In the likelihood of filing a civil rights claim, the stepwise selection method chose OM, Years Lost, Geographic Area, DNA, Political Area, Crime, P/FA, IO, and Exoneration Date as significant variables (table 21).

Step	Variables	Chi-Square	P-Value
1	OM	259.93	<.0001
2	Years Lost	140.07	<.0001
3	Geographic Area	153.03	<.0001
4	DNA	27.21	<.0001
5	Political Area	18.34	<.0001
6	Crime	22.68	0.0004
7	P/FA	12.76	0.0004
8	IO	10.57	0.0011
9	Exoneration Date	13.26	0.039

Table 21. Stepwise Selection for Likelihood of Filing Civil Rights Claim

Likelihood of Prevailing State Claim

In the likelihood of prevailing a state claim, the stepwise selection method chose IO, Geographic Area, DNA, CIU, and Exoneration Date as significant variables (table 22).

Step	Variables	Chi-Square	P-Value
1	DNA	53.78	<.0001
2	IO	19.15	<.0001
3	Geographic Area	15.07	0.0018
4	Exoneration Date	21.89	0.0013
5	CIU	4.23	0.0396

Table 22. Stepwise Selection for Likelihood of Prevailing Civil State Claim

Likelihood of Prevailing Civil Rights

In the likelihood of prevailing a civil rights claim, the stepwise selection method chose Exoneration Date, Geographic Area, DNA, color area, ILD, P/FA, and Guilty Plea as significant variables (table 23).

Step	Variables	Chi-Square	P-Value
1	Exoneration Date	64.43	<.0001
2	Political Area	23.43	<.0001
3	DNA	17.79	<.0001
4	Guilty Plea	11.96	0.0005
5	ILD	9.53	0.002
6	P/FA	8.41	0.0037
7	Geographic Area	11.25	0.0105

Table 23. Stepwise Selection for Likelihood of Prevailing Civil Rights

5. CONCLUSION

The dataset analyzed in this study includes 1900 observations, of which 1717 were incarcerated exonerees. The majority of the exonerees were male, and most were either black or Caucasian. The analysis revealed that male exonerees were more likely to receive compensation, while black exonerees had a higher likelihood of seeking and receiving compensation compared to Caucasian and Hispanic exonerees. The use of CIU was not common among exonerees seeking compensation, but it could increase their chances of receiving state claim compensation. Exonerees who did not plead guilty were more likely to seek compensation, while those who did plead guilty were more likely to receive compensation. The study also found that exonerees who were wrongly convicted by DNA analysis had a higher likelihood of seeking and receiving compensation. The death penalty did not have a significant influence on seeking and receiving compensation. The analysis showed that no variables were affected by the amount received per year lost.

The study also investigated the influential variables with multinomial logistic regression in the likelihood of filing a state claim, where Years Lost, Geographic Area, DNA, No Time, and Exoneration Date were found to be significant. In the likelihood of filing a civil rights award, OM, Years Lost, Geographic Area, DNA, Political Area, Crime, P/FA, IO, and Exoneration Date were identified as significant variables. In the likelihood of prevailing a state claim, IO, Geographic Area, DNA, CIU, and Exoneration Date were significant variables. Finally, in the likelihood of prevailing civil rights compensations, Exoneration Date, Geographic Area, DNA, color area, ILD, P/FA, and Guilty Plea were identified as significant variables.

Likelihood	Factors
Filing State Claim	Race, Sex, State, Guilty Plea, IO, Crime, Year of Exoneration, DNA, FC, MWID
Filing Civil Rights	Race, Sex, State, CIU, Guilty Plea, IO, Crime, DNA, FC, P/FA, OM
Receiving State Claim	Crime, Year of Exoneration, DNA, MWID, ILD
Receiving Civil Rights	State, Guilty Plea, Year of Exoneration, DNA, FC, P/FA

Table 24. Influential Factors for Each Likelihood

Based on the results of both single-variable and multiple-variable analyses, it can be concluded that various factors have a significant impact on the likelihood of filing and prevailing in state and civil rights claims (table 24). The factors found to be influential for all four likelihoods are race, sex, state, guilty plea, innocence organization, crime, DNA, FC, MWID, and year exonerated for filing a state claim. Similarly, race, sex, state, color state, CIU, guilty plea, innocence organization, crime, DNA, FC, PFA, and OM were found to influence the likelihood of filing a civil rights claim. Crime, year exonerated, DNA, MWID, and ILD were found to influence the likelihood of prevailing in a state claim, while state, color state, guilty plea, year exonerated, DNA, FC, PFA, and ILD were found to influence the likelihood of prevailing in a civil rights claim. The findings can be valuable to policymakers, legal practitioners, and exonerees themselves in navigating the compensation process and ensuring that justice is served.

Reference

Exoneree Dataset. The National Registry of Exonerations - Exoneration Registry. (n.d.). https://www.law.umich.edu/special/exoneration/Pages/about.aspx