Detailed research of wrongful convicted defendant

Objective

Exoneration occurs when the conviction for a crime is reversed. This process can happen through demonstration of innocence, a flaw in the conviction, or otherwise. Study of the data of 1900 exoneration example can be particular helpful to understand and make inference about the total population.

Research methods

Since most of the data is categorical data, we mainly calculate the frequency of each variable and make contingency table. Chi-square test of independence and Linear regression model is also being used. Hypothesis testing is implemented through Chi-square test.

Results: <u>Overview</u>

      40 variables on 1900 observations were analyzed through the statistical

software. The descriptive statistics of the year of the crime, year of the conviction and

the year of exoneration are displayed as followed:

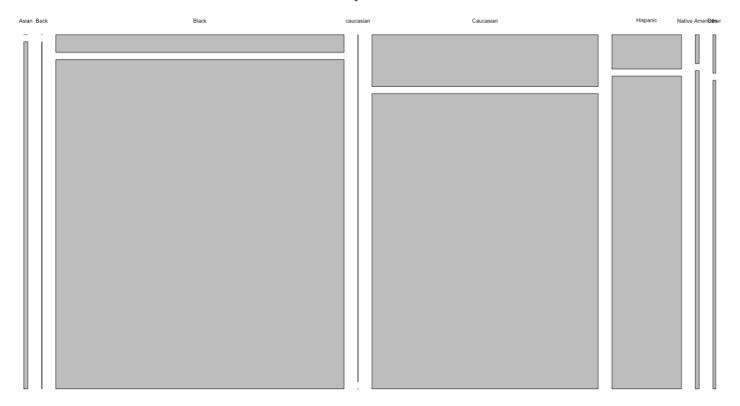| Year of the crime	Year of the conviction	Year of the exoneration	Years Lost
Min. :1955	Min. :1956	Min. : 1989	Min. : 0.000
1st Qu.:1986	1st Qu.:1988	1st Qu.: 2001	1st Qu.: 2.100
Median :1993	Median :1995	Median : 2008	Median : 7.000
Mean :1994	Mean :1996	Mean :2006	Mean : 9.049
3rd Qu.:2002	3rd Qu.:2004	3rd Qu.:2014	3rd Qu.:14.700
Max. :2016	Max. :2016	Max. :2017	Max. :39.300

      A two-year gap between the average time of crime occurrence and the average

time of crime conviction is observed. A ten-year gap between the average time of

crime conviction and the average time of exoneration is noticed. The years lost to the

wrongful conviction ranges from 0 to 39.3 with a mean of 9.049 and a median 7.0.

      Out of 1900 exnoerees, 90.14% or 1509 served in prison for their alleged

crime while 9.86% or 165 did not. Out of 1509 incarcerated exonerees, 1536 of them

served more than 1 year whereas only 364 were imprisoned for less than 1 year.

Results: <u>Race and Gender</u>

Total 1900 exnoerees can also be categorized by race and gender. Gender is classified as Male and Female. Race are grouped as Asian, Black, Caucasian, Hispanic, Native American and Other. There are two other distinct group called "back" and "caucasian" due to incorrect and lower-case spelling in the original data set.

Exonerees by Race and Gender

According to the mosaic plot above and the statistic output, the numbers of exonerees tend to be heavily race and gender influenced. Male accounts to 90.5% of the total exonerees compared to Female, which only has 9.47%. Black men shared the highest number and percentage, respectively 873 and 45.9%, following by

Caucasian men, respectively 614 and 32.3%. These two categories made up to 78.2% of the total exoneree number, significantly outweighed other groups.

Race Incarcerated	Female	Female%	Male	Male%
Asian	0	0.000	9	0.006
Back	0	0.000	1	0.001
Black	34	0.023	747	0.495
caucasian	1	0.001	0	0.000
Caucasian	68	0.045	465	0.308
Hispanic	8	0.005	163	0.108
Native American	1	0.001	5	0.003
Other	1	0.001	6	0.004

The total incarcerated exoneree number follows the same trend. Based on the table above, Black men, Caucasian men and Hispanic men combined contribute to 91.1% of total incarcerated cases. Asian and Native American Male have the lowest incarceration case under Male group. Asian, Native American and Other, have the lowest incarceration case under Female group.

Asian	Back	Black	caucasian	Caucasian	Hispanic	Native American	Other
0.043	0.003	3.026	0.003	2.375	0.730	0.039	0.030

Average years lost to the wrongful conviction by race are shown as above. Furthermore, Male has an average of 5.66 years to Female, which has only 0.592 years in comparison.

Chi-square test of independence was performed to determine whether there is a significant relationship between race/gender and filing a state/civil right claim for wrongful sentence. The hypothesis and the test result are shown in below.

Ho: Null Hypothesis there is no relationship between race and filing a state claim	Ha: Alternative Hypothesis there is a significant relationship between race and filing a state claim

```
> chisq.test(table(df1$race, df1$filing_state))

      Pearson's Chi-squared test

data:  table(df1$race, df1$filing_state)
X-squared = 53.91, df = 7, p-value = 2.45e-09
```

Ho: Null Hypothesis there is no relationship between race and filing a civil right claim	Ha: Alternative Hypothesis there is a significant relationship between race and filing a civil right claim

```
> chisq.test(table(df2$race, df2$filing_civil))

      Pearson's Chi-squared test

data:  table(df2$race, df2$filing_civil)
X-squared = 19.321, df = 7, p-value = 0.00724
```

Ho: Null Hypothesis there is no relationship between gender and filing a state claim	Ha: Alternative Hypothesis there is a significant relationship between gender and filing a state claim

```
> chisq.test(table(df3$gender, df3$filing_state))

      Pearson's Chi-squared test with Yates' continuity correction

data:  table(df3$gender, df3$filing_state)
X-squared = 30.468, df = 1, p-value = 3.395e-08
```

Ho: Null Hypothesis there is no relationship between gender and filing a civil right claim	Ha: Alternative Hypothesis there is a significant relationship between race and filing a civil right claim

```
> chisq.test(table(df4$gender, df4$filing_civil))

      Pearson's Chi-squared test with Yates' continuity correction

data:  table(df4$gender, df4$filing_civil)
X-squared = 7.6321, df = 1, p-value = 0.005734
```

All Null Hypothesis can be rejected since all the p value are smaller than 0.05. We can state that there is a significant relationship between race/gender and filing a state/civil right claim if wrongfully convicted for a crime.

Results: <u>Type of crimes</u>

Crime	Total Case	Seek state compensation	Seek state compensation%*	Seek civil right compensation	Seek civil right compensation%*
Murder	783	360	21.5	454	23.90
Sexual Assault	296	169	10.09	114	6.00
Drugs	213	22	1.31%	26	1.37
Child abuse	224	90	4.73	72	3.79
Robbery	96	45	2.68	27	1.42
Other	288	92	5.49	97	5.11

*seek state/civil right compensation %: the % of the total 1900 exonerees

Crime	Seek state compensation	State claim granted	State claim Granted %
Murder	360	263	73.05
Sexual Assault	169	148	87.58
Drugs	22	13	59.09
Child abuse	20	61	67.78
Robbery	45	31	68.89
Other	92	53	57.61

*seek claim granted %: the % of the exonerees that seek state compensation

6 Major crimes are categorized for the total 1900 exonerees. Those are Murder, Sexual Assault, Drugs, Child abuse, Robbery and Other.

Based on the table above, it is easy to notice that murder cases have largest percentage of seeking compensations whether it is state or civil rights. Drug-related cases have the lowest percentage of making claims. All crimes, excluding murder case, have larger percentage in seeking state compensation than seeking civil right compensation. Murder case is the only category where exonerees are more willing to seek civil right compensations than seeking state compensation.

Results: <u>Exoneration groups</u>

Exoneration	Total Case	Seek state compensation	Seek state compensation%*	Seek civil right compensation	Seek civil right compensation%*
Through CIU	235	82	4.90	60	3.16
Assisted by IO	0	0	0	0	0
Guilty Pleas	401	97	5.79	100	5.26
DNA	344	248	14.81	192	10.11
Death penalty	116	49	2.58	65	3.42

*seek state/civil right compensation %: the % of the total 1900 exonerees

Exoneration	Seek state compensation	State claim granted	State claim Granted %*
Through CIU	82	64	78.05
Assisted by IO	0	0	0
Guilty Pleas	97	71	73.19
DNA	248	229	92.34
Death penalty	49	34	69.39

*seek claim granted %: the % of the exonerees that seek state compensation

There exoneration process can also be classified as 5 groups. "Through CIU" means that the result of work was completed by Conviction Integrity Unit. "Assisted by IO" means the exoneration was helped by an innocence organization. "Guilty Pleas" indicated that in the exoneration where the defendant pled guilty. "Death penalty" revealed the exoneration was assisted by DNA analysis. "Death penalty" showed that the defendant was sentenced death penalty.

We can easily observe that the defendant who got exonerated by DNA analysis are more willing to file the state and civil right claim while exonerees being sentenced by death penalty are more reserved to file a claim.

The percentage of the state compensation that was awarded to the exoneree is shown in the second table. All 5 types of exoneration have considerably high rate of receiving state award. Exoneration evidenced by DNA analysis have 92.34% of chance prevailing a state claim, which perhaps explained that the majority of exonerees backed by DNA documentation are more willing to file a claim.

Unfortunately, out of 1900 examples, none of them were helped by an Innocence organization.

Results: <u>State and filing claim</u>

State claim by State	Civil right claim by State
| ```
> table(Crime$State, Crime$`State
Claim Made?`)

                         0    1
 Alabama                18    8
 Alaska                  0    0
 Arizona                 0    0
 Arkansas                0    0
 California            114   59
 Colorado                6    1
 Connecticut             7   13
 Delaware                0    0
 District of Columbia    8    8
 Florida                53    8
 Georgia                 0    0
 Guam                    0    0
 Hawaii                  3    0
 Idaho                   0    0
 Illinois               70  114
 Indiana                 0    0
 Iowa                   10    4
 Kansas                  0    0
 Kentucky                0    0
 Louisiana              13   34
 Maine                   2    0
 Maryland               20    4
 Massachusetts          18   33
 Michigan               42   26
 Minnesota               7    4
 Mississippi             2   14
 Missouri               31    8
 Montana                 9    0
 Nebraska                2    7
 Nevada                  0    0
 New Hampshire           1    0
 New Jersey             13   14
 New Mexico              0    0
 New York               59  165
 North Carolina         29   30
 North Dakota            0    0
 Ohio                   15   44
 Oklahoma               25    9
 Oregon                  0    0
 Pennsylvania            0    0
 Puerto Rico             0    0
 Rhode Island            0    0
 South Carolina          0    0
 South Dakota            0    0
 Tennessee              16    2
``` | ```
> table(Crime$State, Crime$`Non-
Statutory Case Filed?`)

                         0    1
 Alabama                22    4
 Alaska                  4    4
 Arizona                14    4
 Arkansas                4    2
 California             77   96
 Colorado                4    3
 Connecticut            12    8
 Delaware                0    2
 District of Columbia   10    6
 Florida                51   10
 Georgia                25    4
 Guam                    1    0
 Hawaii                  2    1
 Idaho                   0    2
 Illinois               37  147
 Indiana                 5   19
 Iowa                   11    3
 Kansas                  3    4
 Kentucky                4    7
 Louisiana              22   25
 Maine                   1    1
 Maryland               20    4
 Massachusetts          24   27
 Michigan               36   32
 Minnesota              11    0
 Mississippi             9    7
 Missouri               22   17
 Montana                 7    2
 Nebraska                3    6
 Nevada                  3    6
 New Hampshire           1    0
 New Jersey             14   13
 New Mexico              5    1
 New York               94  130
 North Carolina         32   27
 North Dakota            2    0
 Ohio                   33   26
 Oklahoma               18   16
 Oregon                 12    4
 Pennsylvania           30   30
 Puerto Rico             2    4
 Rhode Island            4    1
 South Carolina          4    3
 South Dakota            3    1
 Tennessee              12    6
``` |

```
Texas                214  95        Texas                281  28
Utah                   9   5        Utah                  12   2
Vermont                0   1        Vermont                0   0
Virginia              17  29        Virginia              37   9
Washington            29  15        Washington            25  19
West Virginia          4   6        West Virginia          3   7
Wisconsin             30  18        Wisconsin             40   8
Wyoming                0   0        Wyoming                1   2
```

   Top 5 states that have largest number of state claims are New York(165), Illinois(114), Texas(95), California(59), and Ohio(44). Texas is the only state that have stronghold in Republican party and Ohio is considered to be a "swing state". New York, Illinois and California are often referred as the "big Three", the most democratic states in the United State.

   Top 5 states have the least amount state claims(exclude 0 claim) are Vermont(1), Colorado(1), Tennessee(2), Minnesota(4), and Iowa(4)

   Top 5 states that have largest number of civil right claims are: Illinois(147), New York(130), California(96), Michigan(32) and Pennsylvania(30). Except the "big three", Michigan and Pennsylvania are both considered to the "swing state".

   Top 5 state have the least amount civil right claims(exclude 0 claim) are: South Dakota(1), Rhode Island(1), New Mexico(1), Maine(1), and Hawaii(1).

   There is a strong likelihood for exonerees that living in liberal states to file either a state claim or civil right claim for their wrongful conviction.

Results: <u>Relationship between recovery amount and the year lost to conviction</u>

```
> df_recovery_yearlost <- data.frame(recovery, yearlost)
> df_recovery_yearlost <- na.omit(df_recovery_yearlost)
> df_recovery_yearlost <- df_recovery_yearlost %>% filter(recovery >
0)
> df_recovery_yearlost <- df_recovery_yearlost %>% filter(recovery !=
"unknown")
> df_recovery_yearlost <- df_recovery_yearlost %>% filter(recovery !=
"Undisclosed")
> df_recovery_yearlost <- df_recovery_yearlost %>% filter(recovery !=
"see above")
```

```
> df_recovery_yearlost <- df_recovery_yearlost %>% filter(recovery !=
"uknown")

> sample <- sample(c(TRUE, FALSE), nrow(df_recovery_yearlost),
replace = T, prob = c(0.6,.04))
> train <- df_recovery_yearlost[sample, ]
> test <- df_recovery_yearlost[!sample, ]


> model_recovery_yearlost <- lm(recovery1 ~ yearlost1, data = train)
> summary(model_recovery_yearlost)

Call:
lm(formula = recovery1 ~ yearlost1, data = train)

Residuals:
     Min       1Q   Median       3Q      Max
-8406266 -2455193  -746459  1302907 20739319

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   594365     397076   1.497    0.135
yearlost1     268994      26848  10.019   <2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 4317000 on 401 degrees of freedom
Multiple R-squared:  0.2002,  Adjusted R-squared:  0.1982
F-statistic: 100.4 on 1 and 401 DF,  p-value: < 2.2e-16
```

A Linear regression model is built to examine the relationship between the recovery, which as the responsive variable, amount and year lost to the wrongful conviction, which as the explanatory variable.

Base on the model result, the p value is smaller than 2.2e-16, which indicate the relationship between the sate award amount and the year lost during the exoneration process tend to be statistically significant. However, R-squared of 0.2002 indicate a very bad fit of this linear regression model.

Conclusion

Exoneration process can be long-lasting and difficult for many people. It takes 10 year in average for the researched 1900 exonerees to complete the whole process.

The distribution of exonerees and incarcerated exonerese appeared to be heavily race and gender biased. Black and Caucasian as well as Hispanic men contributed to the majority of both groups.

Murder case has the largest possibility of seeking compensations whether it is state or civil right. Drug-related offense has the lowest rate.

Exoneration procedure complimented by DNA analysis have the highest rate of seeking recovery as well as successfully collecting the reward while the defendants who has been sentenced to death have the lowest.

There is a strong likelihood for exonerees that living in liberal states to file either a state claim or civil right claim for their wrongful conviction.

There is a significant relationship between the year lost to the wrongful conviction and the recovery amount being collected by exonerees. However, the relationship isn't necessarily linear in terms of the year lost being an explanatory variable.

Most of the data extracted from the original dataset is categorical data. It is somewhat difficult to perform regression analysis between categorical data even they are transformed into dummy variable. More numerical data should be obtained for further analysis and research.

Appendix