**Assignment #4.**

***Question 1****: What implicit claim about causality does Obama's "cycle of crime" theory assert?*

Answer:

President Obama's assertion suggests that the experience of incarceration and the resulting societal and personal challenges (like employment difficulties due to failing background checks and networking with criminals in prison) lead to an increase in the likelihood of recidivism, thus perpetuating a cycle of crime.

The causality can be depicted as:

Experience of Incarceration 🡪 Societal/Personal Challenges 🡪 Increase in the likelihood of Recidivism.

***Question 2****: Your friend has an ingenious idea. He/she has detailed case data about criminal sentencing in a large jurisdiction for everyone charged with a felony. The data includes the length of the prison sentence (in days), and whether the person was convicted of a second crime after he/she was out ("recidivism"). This seems to be what the "cycle of crime" theory is talking about.*

*The proposed research design is: Run a regression whose outcome is recidivism and whose main*

*explanatory variable is the length of the prison sentence. React your friend's research design*.

Answer:

This design makes an implied causal assertion that longer prison terms and harsher sentencing may raise recidivism rates and feed a "cycle of crime" in which people are caught in a never-ending cycle of crime, incarceration, and criminal activity.

* The friend’s research design aims to investigate this claim by analyzing the correlation between the length of prison sentences and the incidence of recidivism.
* Now this research design is straightforward but comes with many drawbacks.
* Unobserved factors that also influence recidivism, such as the seriousness of the offense, the offender's prior criminal history, or socioeconomic status, may be connected with the sentence's duration.
* Longer sentences may be imposed on those who have a higher likelihood of reoffending; hence, the length of the sentence is a result rather than an origin of the offender's criminal tendency.
* The regression does not take into account significant variables that can affect recidivism, such as the kind of crime committed, the individual's social surroundings, or the standard of post-release support.
* The results may be skewed if the recidivism data is inaccurate.

To improve this research design, we can consider the following:

* Using an instrumental variable (IV) approach to address endogeneity, if a suitable instrument is available.
* Controlling for as many confounding variables as possible to mitigate omitted variable bias.
* Looking into alternative statistical techniques like difference-in-differences or propensity score matching in the event that natural experiments or policy modifications exist that might act as quasi-experimental settings.

***Question 3:*** *Data Enclosed. Developing a separate research design, adopting the IV approach.*

***Question 4:*** *Perform a balance test. Does the judge's party really seem to be randomly assigned?*

Answer:

**Balance Table:**

Here, the treatment is being assigned to republican Judge. The control is not being assigned to a Republican Judge. The covariates are

1. *Severity of Crime*

2. *Months in Jail*

*Table 01: Balance Table*.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variables** | **Control** | | **Treatment** | **Difference** |
| *Severity of Crime* | 1.98 | | 1.97 | 0.014 |
| *Months in Jail* | 16.45 | | 19.43 | **-2.98\*\*\*** |
| Observations | 5000 | | 5000 |  |
| Standard errors in parentheses | |
| \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 | |

Interpretations:

1. Overall, the balance table reveals notable differences between the Republican and Non-Republican Judges, in terms of Months spent in jail.
2. The balance table failed. The treatment and control groups are observably dissimilar. *The control and treatment groups are significantly different in terms Months spent in jail (The differences in terms of both these are significant at 1% level*.

**Hence the Judges party is NOT randomly assigned.**

***Question 5 and 6****: First Stage of the IV Design, also interpret the coefficients.*

Answer:

The first stage of the IV design is as follows:

1. We take “*month in jail”* to be the variable we want to make causal statements about. This is the outcome variable in our first stage design.
2. We take “*Republican Judge”,* the instrument as the main explanatory variable in the first stage regression.
3. We control for “*severity of crime”* as a variable that might explain “*month in jai”* besides the main explanatory variable “*Republican Judge.*

First Stage Regression Table:

|  |  |
| --- | --- |
| **First Stage OLS** | *Month in jail* |
| *Republican Judge* | 3.222\*\*\* |
|  | (0.367) |
| *Severity of Crime* | 18.15\*\*\* |
|  | (0.226) |
| Constant | -19.47\*\*\* |
|  | (0.520) |
|  |  |
| Observations | 5,000 |
| R-squared | 0.565 |
| Standard errors in parentheses |  |
| \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 |  |

Interpretations:

1. The coefficient for "*Republican Judge*" is 3.222, with a p-value less than 0.001. This indicates that, controlling for the severity of the crime, being assigned a Republican judge is associated with an increase of approximately 3.22 months in jail on average, and this result is statistically significant.
2. The coefficient for "*Severity of Crime*" is 18.15, also with a p-value less than 0.001, suggesting that as the severity of the crime increases, the length of the jail sentence increases by approximately 18.15 months on average, which is also statistically significant.
3. The R-squared value is 0.565, meaning that about 56.5% of the variability in "*Months in jail*" is explained by the model.

**Question 7**: Calculate the "reduced form."

Answer:

For the reduced form, or second stage:

1. The outcome variable is “*Recidivates”*
2. The main explanatory variable is the instrument “*Republican Judge”.*
3. We also control for “*Severity of Crime”*

Reduced Form Regression Table:

|  |  |
| --- | --- |
| **Reduced Form** | *Recidivates* |
|  |  |
| *Republican Judge* | 0.143\*\*\* |
|  | (0.0124) |
| *Severity of Crime* | 0.189\*\*\* |
|  | (0.00766) |
| Constant | -0.114\*\*\* |
|  | (0.0176) |
|  |  |
| Observations | 5,000 |
| R-squared | 0.128 |
| Standard errors in parentheses |  |
| \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 |  |

Interpretations:

1. The coefficient for "Republican Judge" is 0.143, with a p-value less than 0.001. This indicates that, controlling for the severity of the crime, being assigned a Republican judge is associated with a higher likelihood of recidivism by approximately 14.3 percentage points, and this result is statistically significant.
2. The coefficient for "Severity Of Crime" is 0.189, also with a p-value less than 0.001, suggesting that as the severity of the crime increases, the likelihood of recidivism increases by approximately 18.9 percentage points, which is also statistically significant.
3. The R-squared value is 0.128, meaning that approximately 12.8% of the variability in recidivism is explained by the model.

***Question 8****: Calculate the ratio of the reduced form*

Answer:

The ratio is: 0.143/3.222 = **0.044**.

***Question 9:*** *Now complete the IV regression and make a publication quality table of the second stage.*

Answer:

Instrumental Variable Regression Table:

|  |  |
| --- | --- |
| **IVREG2** |  |
| *Month in Jail* | 0.0443\*\*\* |
|  | (0.00576) |
| *Severity of Crime* | -0.615\*\*\* |
|  | (0.105) |
| Constant | 0.748\*\*\* |
|  | (0.105) |
|  |  |
| Observations | 5,000 |
| **F-stat** | **164.34** |
| P value | 0 |
| R-squared | -0.944 |
| Standard errors in parentheses | |
| \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 | |

The F-Stat of the model is 164.34 (p-value = 0.000). This is above the conventional threshold of the F-stat (10).

***Question 11****: Complete these sentences.*

Answers:

1. In the research design above (using randomized judges), the always-takers are the **defendants** who are always **sentenced to jail** no matter the **judge's party affiliation**.
2. The never-takers are the **defendants** who are always **not sentenced to jail** no matter **judge's party affiliation**.
3. The compliers are the **defendants** who are **sentenced to jail** only if **assigned a Republican judge**.
4. The defiers are the **defendants** who are **sentenced to jail** only if **not assigned a Republican judge**

***Question 12****: Comment on the monotonicity assumption and the possibility of "defiers" in this setting.*

Answer:

In the context of an instrumental variable (IV) analysis, the monotonicity assumption makes the assumption that, in response to the instrument, the potential treatment status of every unit would move in the same direction or not at all, i.e., a rise in the instrument's value would not reduce the likelihood of any unit receiving the treatment.

If judges are randomized and their political affiliation (e.g., Republican vs. non-Republican) is the instrument, then the monotonicity assumption would suggest that there are no "defiers." A "defier" would be a defendant in this context who, if assigned to a judge who is more likely to impose a particular treatment (such as a harsher sentence), would have a lower probability of receiving that treatment and vice versa. Since this defies logic, we would typically anticipate that there wouldn't be any defiers in such a situation.

Under the monotonicity assumption, no defendant would receive a harsher sentence from a non-Republican judge than they would from a Republican judge, for instance, if Republican judges are assumed to impose harsher sentences. Republican judges would not sentence a defendant to a shorter term than non-Republican judges.

***Question 13****: In your dataset, what types of defendants are compliers?*

Answer:

If we assume that Republican judges tend to give harsher sentences, then Compliers would be defendants who receive a harsher sentence only if they are assigned to a Republican judge. If assigned to a non-Republican judge, they would receive a lighter sentence or perhaps no jail time at all. These are the individuals for whom the 'treatment' (in this case, the assignment of a Republican judge) actually has an effect.

***Question 14****: Does the cycle of crime hypothesis appear to be true for the compliers?*

Answer:

The above analysis suggests that for defendants who would only receive a longer sentence if assigned a Republican judge (the compliers), longer sentences are associated with a higher likelihood of recidivism, lending support to the "cycle of crime" hypothesis within this subgroup.