**HW 4**

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**1. What implicit claim about causality does Obama’s “cycle of crime” theory assert?**

Obama has coined the term “cycle of crime” to describe the phenomenon that harsh sentencing creates more criminals, which reduces the benefits of convictions and criminal sentences. The implicit claim about causality that this statement makes is that the longer someone is in jail (the harsher the sentence), the more likely it is that they will go back to jail.

**2. Your friend’s 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.**

This regression would tell us if there’s a correlation between the length of the prison sentence and recidivism. It would tell us whether or not there is a significant relationship observed between length of prison stay and whether or not the defendant goes back to jail. However, the proposed model does not allow us to make a causal claim. That is what instrumental variables, with random assignment, should allow us to do.

**3. Develop a separate research design**

In learning that defendants are randomly assigned to judge, it appears that we can implement a different research design that would allow us to make a causal claim. We can use an Instrumental variable design where:

Instrumental Variable: Judge’s political affiliation assignment

Treatment (Nudge): Length of prison stay

Outcome: Return to jail (Recidivism)

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

The output of the balance table tells us that severity of crimes are randomly assigned to judge. The mean difference between severity of crime for cases with republican judges and severity of crime for cases with democrat judges is small – the table is balanced.

| Balance Table Comparing Democrat and Republican Judge Cases | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Democrat Judge Unadj. Mean** | **Democrat Judge Unadj. SD** | **Republican Judge Unadj. Mean** | **Republican Judge Unadj. SD** | **Mean Difference Unadj.** | **Mean Threshold (.1)** |
| Severity of Crime | 1.98 | 0.81 | 1.97 | 0.82 | -0.02 | Balanced, <0.1 |

**5. Describe in words the “first stage” of the IV design. Then, create a publication-quality table for the first stage only.**

Stage 1 of the Instrumental Variables design is regressing compliance on nudge. For this design, compliance is time in jail and nudge is whether the judge is democrat or republican. I will also control for severity of crime in the model.

|  |
| --- |
| **First Stage** |
|  |
|  | *Dependent variable:* |
|  |  |
|  | Months in Jail |
|  |  |
| Republican Judge (1) | 3.222\*\*\* |
|  | (0.367) |
|  |  |
| Severity of Crime | 18.149\*\*\* |
|  | (0.226) |
|  |  |
| Constant | -19.470\*\*\* |
|  | (0.520) |
|  |  |
|  |  |
| Observations | 5,000 |
| R2 | 0.565 |
| Adjusted R2 | 0.565 |
| Residual Std. Error | 12.986 (df = 4997) |
| F Statistic | 3,249.549\*\*\* (df = 2; 4997) |
|  |  |
| *Note:* | \*p<0.1; \*\*p<0.05; \*\*\*p<0.01 |

Notes: Net of severity of the crime, when someone is assigned to a Republican judge, then they will spend 3.2219 more months in jail than someone assigned to a Democrat judge, on average.

**6. Interpret the coefficient on your instrument from the first stage**

Net of severity of the crime, when someone is assigned to a Republican judge, then they will spend 3.2219 more months in jail than someone assigned to a Democrat judge, on average.

**7. Calculate the “reduced form.”**

|  |
| --- |
| **Reduced Form** |
|  |
|  | *Dependent variable:* |
|  |  |
|  | Recidivates |
|  |  |
| Republican Judge (1) | 0.143\*\*\* |
|  | (0.012) |
|  |  |
| Severity of Crime | 0.189\*\*\* |
|  | (0.008) |
|  |  |
| Constant | -0.114\*\*\* |
|  | (0.018) |
|  |  |
|  |  |
| Observations | 5,000 |
| R2 | 0.128 |
| Adjusted R2 | 0.127 |
| Residual Std. Error | 0.440 (df = 4997) |
| F Statistic | 366.230\*\*\* (df = 2; 4997) |
|  |  |
| *Note:* | \*p<0.1; \*\*p<0.05; \*\*\*p<0.01 |
|  |  |

Notes: When the judge is republican (as opposed to democrat), people are .14 percentage points more likely to recidivate, controlling for severity of crime.

**8. Calculate the ratio of the reduced form**

0.142664 / 3.2219 = 0.04427946

**9. Now complete the IV regression and make a publication quality table of the second stage. Use the setup below.**

|  |
| --- |
| **IV Regression** |
|  |
|  | *Dependent variable:* |
|  |  |
|  | Recidivates |
|  |  |
| Months in Jail | 0.044\*\*\* |
|  | (0.006) |
|  |  |
| Severity of Crime | -0.615\*\*\* |
|  | (0.105) |
|  |  |
| Constant | 0.748\*\*\* |
|  | (0.105) |
|  |  |
|  |  |
| Observations | 5,000 |
| R2 | -0.944 |
| Adjusted R2 | -0.944 |
| Residual Std. Error | 0.656 (df = 4997) |
|  |  |
| *Note:* | \*p<0.1; \*\*p<0.05; \*\*\*p<0.01 |

**10. State the F-stat in your writeup. It does not need to go into your table (although, in an actual publication it would). Is it above the conventional threshold?**

The Wald test-statistic from the model (R does not output an F-statistic) is 164.3. The statistic is significant (p < .001), and above the threshold we discussed in class of 10.

I also used Stata to derive the F-statistic (See FStat-Calc.do in the repo). According to the output, F(2, 4997) = 164.34, confirming the output from the model ran in R. The code also outputs a weak identification test (Cragg-Donald Wald F statistic), which is 76.868.

Both values are above the conventional threshold of 10.

**11. Compare your answer to question #8 (above) to the IV coefficient in #9.**

The coefficients are the same. Both are 0.044.

**12. Complete these sentences.**

12a. In the research design above (using randomized judges), the always-takers are the defendants who are always given long prison sentences no matter if they are assigned a democrat or republican judge, holding severity of the crime constant.

12b. The never-takers are the defendants who are always given short prison sentences no matter if they are assigned a democrat or republican judge, holding severity of the crime constant.

12c. The compliers are the defendants who are given long prison sentences only if they are assigned to a republican judge, holding severity of the crime constant.

12d. The defiers are the defendants who are given short prison sentences only if they are assigned to a republican judge, holding severity of the crime constant.

*Note: The concept of compliers/defiers in this context is a little confusing to me. Can we review this in class next week? I feel like I am on the right track here, but am not fully correct?*

**13. Comment on the monotonicity assumption and the possibility of “defiers” in this setting.**

The monotonicity assumption says that there should not be defiers in the data. To use instrumental variables, the monotonicity assumption should be met. However, I would argue that there is a possibility of defiers in this setting. It is possible that if a defendant were to be assigned to a democrat judge, they would have gotten a longer sentence (or the opposite: if a defendant were to be assigned to a republican judge, they would have gotten a shorter sentence).

**14. In your dataset, what types of defendants are compliers?**

The compliers are the defendants who were given long sentences when assigned to a republican judge.

**15. Does the cycle of crime hypothesis appear to be true for the compliers?**

Yes - defendants who are given a longer sentence (when assigned to a republican) are more likely to recidivate (beta coefficient = 0.044, p < .001), controlling for the severity of the crime committed.