* Research Methods Homework 4 Assignment (Nandil Bhatia)

1. Obama’s cycle of crime theory simply states that a causal relationship exists between incarceration of an individual and their future propensity to indulge in criminal activity. The logic behind this argument is that incarceration worsens future economic alternatives of one-time criminals, and the relationships made in jail further nudge the individual towards future crime.
2. Running a simple regression with recidivism as the outcome and primary explanatory variable being the length of the prison sentence will not work. This is because the length of the prison sentence has not been randomized. Hence, there may be self-selection and unobserved covariates are likely to impact the coefficient obtained in this regression of the length of the prison sentence (yielding biased estimates).
   1. For example, the length of the prison sentence may be strongly influenced by prior crime before the sentencing. In such a case, those with a longer sentencing may be anyway more likely to commit crimes after being released. Failure to distinguish between such factors will render this research design inaccurate
   2. Alternatively, the prison sentence decided by judges may depend on other factors, and we as researchers don’t have access to any of these apart from the severity of the crime (i.e., these remain unobserved)
3. The Instrumental Variable design here is demonstrated below:

Future likelihood of undertaking crime (recidivism)

Assignment of individual to Republican Judge

(Dummy – Randomized)

The assignment of an individual to a republican (or democratic) judge is random. This random variation can cause changes in the sentence length as republican judges are believed to give longer sentences. This portion of random variation in sentence length can then be used to predict future likelihood of undertaking crime again (recidivism). The exclusion criteria is also likely to be satisfied, as it is difficult to argue that the judge being appointed by a republican would affected future crime propensity through any other route.

Source for the nudge-sentencing relation:

Cohen, Alma, and Crystal S. Yang. 2019. "Judicial Politics and Sentencing Decisions." *American Economic Journal: Economic Policy*, 11 (1): 160-91.

1. Balance Test – In this case the only covariate that we have is “severity of the crime”. Hence, we check the mean of this variable across both the groups and find that they are similar.

Table 1: Balance table for nudge (assignment of republican judge)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Democrat Judge | Republican Judge | Difference |
| Severity of Crime | 1.979 | 1.966 | 0.014 |

This tells us that judge assignment was randomized with respect to the severity of the crime. Republican judges were unlikely to sentence criminals that carried out severe crimes. Unfortunately, we do not have access to other characteristics about the individual, or else we could have conducted a more elaborate balance test on other counts.

1. The first stage of the IV design is to use the randomized nudge (here, the assignment of a republican judge) to an individual before sentencing to predict the period of sentencing for the individual. Since the assignment of a republican judge is random, and we expect republican judges to give stringent sentences (on average), we can say that we can unearth a random source of variation in the “sentence length” variable. We can also control for other covariates (here severity of the crime) to improve the accuracy of the estimate, though the coefficient value shouldn’t change for the nudge variable if it is randomly assigned anyway.

Table 2: First-Stage Regression

|  |  |
| --- | --- |
|  | DV: Total months spent in jail |
| Republican Judge | 3.2\*\*\* |
|  | (.37) |
| Severity of Crime | 18\*\*\* |
|  | (.23) |
| Constant | -19\*\*\* |
|  | (.52) |
| Observations | 5000 |
| *R*2 | 0.565 |

Standard errors in parentheses: \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

1. The coefficient of the instrument here is positive, significant, and in the expected direction. This implies that, other things remaining constant, republican judges are likely to sentence individuals to 3.2 months of additional time in prison.
2. Reduced form regression – Using the nudge (assignment of republican judge) as the main independent variable with severity of crime as control. The Dependent Variable is future recidivation.

Table 3: Reduced form Regression

|  |  |
| --- | --- |
|  | DV: Recidivates |
| Republican Judge | .14\*\*\* |
|  | (.012) |
| Severity of Crime | .19\*\*\* |
|  | (.0077) |
| Constant | -.11\*\*\* |
|  | (.018) |
| Observations | 5000 |
| *R*2 | 0.128 |

Standard errors in parentheses: \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

1. Ratio = (Coefficient of nudge in reduced form regression)/(Coefficient of nudge in first stage regression)

Ratio = .143/ 3.22

= 0.044

1. The Results from the direct Instrument Variable regression are mentioned below:

Table 4: Instrument Variable Regression

|  |  |
| --- | --- |
|  | DV: Recidivates |
| Total months spent in jail | .044\*\*\* |
|  | (.0058) |
| Severity of Crime | -.62\*\*\* |
|  | (.11) |
| Constant | .75\*\*\* |
|  | (.11) |
| Observations | 5000 |
| *R*2 | -0.944 |

Standard errors in parentheses: \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

1. First stage F-Statistic here is 76.868. Across economics and strategic management Journals, the criteria for first-stage F Stat varies with number of instrumental variables. However, I believe even in a conservative case, this is always less than 20. Hence, our F-Stat is well above the minimum requirement.
2. The coefficient in both the cases is the same (0.044), which was expected since both the approaches have the same underlying mechanism and should always give the same result.
3. The blanks are filled below (highlighted in **Bold**)

* In the research design above (using randomized judges), the always-takers are the **individuals** who are always **going to get a high sentence** no matter **the judge assigned**
* The never-takers are the **individuals** who are always **not going to get a high sentence** no matter **the judge assigned**
* The compliers are the **individuals** who are **going to get a high sentence** only if **they are assigned a republican judge**
* The defiers are the **individuals** who are **going to get a low sentence** only if **they are assigned a republican judge**

1. The monotonicity assumption would state that the instrument variable should have a similar effect on the probability of treatment, i.e., a higher instrument (republican judge) should not lead to lower sentencing for some individuals. The instrument should have the same effect on the treatment variable (i.e., sentence length).
   1. This would imply that there should not be some individuals for whom democratic judges give higher sentencing
   2. There may be multiple ways to check this. However, in the first-stage regression, we can see that the 95% confidence interval for the nudge (republican judge) is between 2.5 and 3.9. This represents a very strong positive effect. Thus, even if some defiers exist, they are unlikely to be very high in number. We can further increase our confidence here if we add more covariates that can predict defiers.
2. The compliers are the individuals who are going to get a high sentence due to the random assignment of a republican judge. Due to the instrument variable design, these are likely to be the marginal cases. These are individuals who may not have received such a large sentence under a democratic judge but ended up receiving a sentence under the republican judge. Thus, controlling for severity of the crime, we can compare individuals in both the republican and democrat appointed judge situations, and see how increase in sentencing led to future recidivation probability.
3. In our model, there seems to be adequate support for the cycle of crime hypothesis. This is because the coefficient of the 2SLS model for sentence length is significant and positive, implying that future likelihood of committing a crime increases when individuals are incarcerated. The first-stage F Value is quite high, and the exclusion criteria seems to be satisfied both qualitatively and through the Hansen Statistic.
   1. Suppose we take an average republican judge to sentence an individual to 3 more months (than a democrat judge) in prison. Then, by our model, this would imply a 13% (0.044 \* 3) increase in the probability to recidivate in the future. This is by no means small, and will only increase as the duration of the sentence continues to increase.