Method HW4

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Q1. Cycle of crime

The theory suggests that harsh sentences cause recidivism.

Q2. Simple regression

Do I know who the convicts are? What have they done? What's the motivation and outcome? If not, then the regression estimator on *length* of the sentence is likely to be biased in explaining recidivism since it will be correlated with the residual.

Q3. Import data

Q4. Balance table

According to the table below, the IV does not pass the balance test. Both the input (*months in jail*) and the response (*recidivism*) variables are significantly different in distribution between judges from different political parties.

	Control	Treatment	Difference	t
Severity.Of.Crime	1.98	1.97	0.01	(0.59)
Months.In.Jail	16.45	19.43	-2.98***	(-5.35)
Recidivates	0.26	0.40	-0.14***	(-10.63)

Q5. First stage

First stage regression looks like:

$$month.in.jail_i = \beta_0 + \beta_1 \cdot republican.judge_i + \beta_3 X_i + \epsilon_i$$

where X includes model controls - severity of the crime in this context. I run both the regressions of treating crime severity as discrete and as categorical

variables. I think this way we can somehow control the non-linearity of the severity effect on recidivism. Results are reported below in table 1.

Table 1: First stage regression of recidivism on jail time and judge party.

	(1) First.Stage	(2) First.Stage-FE
Republican.Judge=1	3.2***	3.1***
	(.37)	(.36)
Severity.Of.Crime	18***	
	(.25)	
Observations	5000	5000
Adjusted R^2	0.565	0.587

Robust standard error in parentheses.
* $p < .10$, ** $p < .05$, *** $p < .01$

Q6. Interpreting first stage

Judges' political affiliation affects the length of jail time. In particular, convicts facing republican judges on average spend 3.1-3.2 months longer. This judge effect is robust to heteroskedasitic convicts variations and significant at 1 percent level.

This judge effect does not seem to be sensitive to the linearity of severity of crimes, as shown in the cross model (i.e. (1) vs (2)) t-test statistics below.

```
. test [discrete_severity_mean]1.republicanjudge = [categorical_severity_mean]1.republicanjudge

 ( 1)  [discrete_severity_mean]1.republicanjudge - [categorical_severity_mean]1.republicanjudge = 0

           chi2(  1) =    2.33
         Prob > chi2 =    0.1270
```

Q7. Second stage

The second stage regression looks like:

$$Pr(recidivism)_i = \alpha_0 + \alpha_1 \cdot republican.judge_i + \alpha_3 X_i + \epsilon_i$$

where X includes crime severity.

Q8. Compute the 2SLS estimator

$$\hat{\theta}_{2SLS} = \frac{\hat{\alpha_1}}{\hat{\beta_1}} \approx 0.0443$$

Q9. ivreg2

My results are reported in table 2.

Q10. F-stats

For all the models, the degree of freedom of the numerator in the F-statistic is 2 since I have only one input and one control variable. As reported in table 5 below, all my models pass the F-tests at 1 percent level.

Table 2: IV regression of recidivism on jail time and judge party.

	(1) First.Stage	(2) Second.Stage	(3) IV
Republican.Judge=1	3.2***	.14***	
	(.37)	(.012)	
Months.In.Jail			.044***
			(.0058)
Observations	5000	5000	5000
F	2,589	361	122

Robust standard error in parentheses.

* $p < .10$, ** $p < .05$, *** $p < .01$

Q11. Comparison

As shown in table 2, the IV estimator is exactly the same as $\hat{\theta}_{2SLS}$.

Q12. Complete sentences

- In the research design above (using randomized judges), the always-takers are the *convicts* who are always *receiving longer sentence* no matter *who is the judge*.
- The never-takers are the *convicts* who are always *receiving shorter sentence* no matter *who is the judge*.
- The compliers are the *convicts* who are *receiving longer sentence* only if *the judge is republican*.
- The defiers are the *convicts* who are *receiving shorter sentence* only if *the judge is republican*.

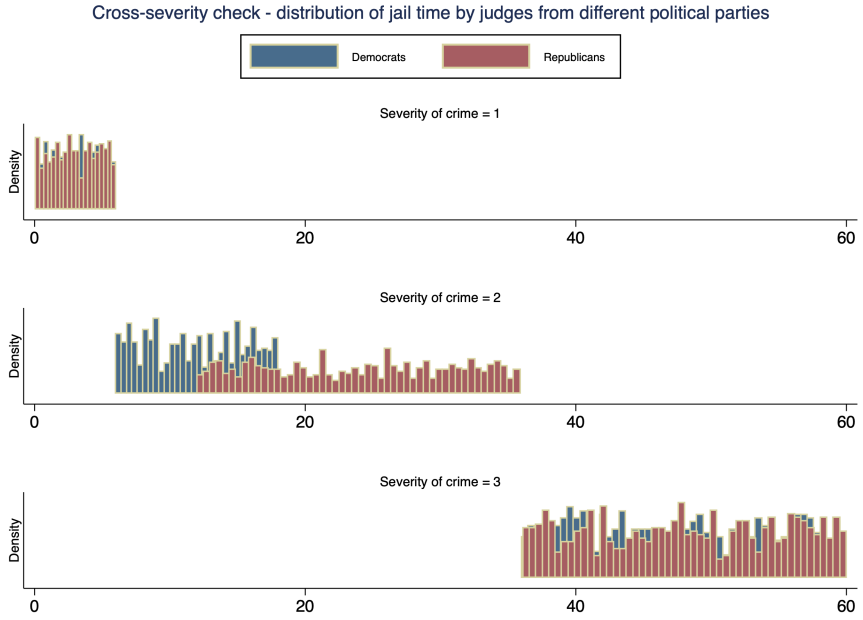
Q13. Monotonicity

I consider two cases: within and severity classes. First, within each severity class, strong monotonicity requires republican judges to give strictly longer sentences. The within-group t-test table below suggests this may not be the case. For example, for a defendant of severity class 1, it is unclear whether facing a democrat judge is necessarily better than a republican one in the odds of getting less sentence.

	Severity.1	Severity.2	Severity.3
Months.In.Jail	0.05	-9.67***	0.58

I also consider monotonicity cross severity classes. The hypothesis is that the sentences given by republican judges towards severer crimes should never be less harsh than those given by democrat judges towards less severe crimes. The figure below seems to agree on this weaker version of monotonicity.

To sum up, I think defiers may exist in my data. If they do, higher chance is that they are getting convicted for severer crimes. But statistically these potential defiers impose a minor problem if I do not demand a strict and within severity class monotonicity.



Q14. Compliers

Again, use the monotonicity figure above, my safe-bet compliers are those in the moderate crime class. My reasoning is the hope of retrieving the effect on

the margin, or the LATE. Meanwhile, the less severe convicts are likely always to be takers (mean jail length equals 3 months), while the more severe ones are potentially never takers since they get longer sentence regardless of who is the judge (mean jail length equals 48 months).

Q15. Cycle of crime LATE

To retrieve the LATE, I fit the IV model again to the subdata of compliers discussed in Q14. 1,702 data points are left conditional on moderate severity of crime. The resulted final LATE estimator is both more precise and slightly stronger. As a result, the 'cycle of crime' hypothesis is locally confirmed. Table 3 reports the estimated results.

Table 3: IV regression of recidivism on jail time and judge party.

	(1)	(2)	(3)	(4)
	First.Stage	Second.Stage	IV	IV-LATE
Republican.Judge=1	3.2***	.14***		
	(.37)	(.012)		
Months.In.Jail			.044***	.046***
			(.0058)	(.0018)
Observations	5000	5000	5000	1702
F	2,589	361	122	690

Robust standard error in parentheses.

* $p < .10$, ** $p < .05$, *** $p < .01$