

Homework 8

Roshani Bulkunde

April 2023

1. Produce a yearly plot of the recycling rate for NYC and the controls to examine the effect of the recycling pause and the possibility of parallel trends.



Figure 1: Plot of a scatterplot

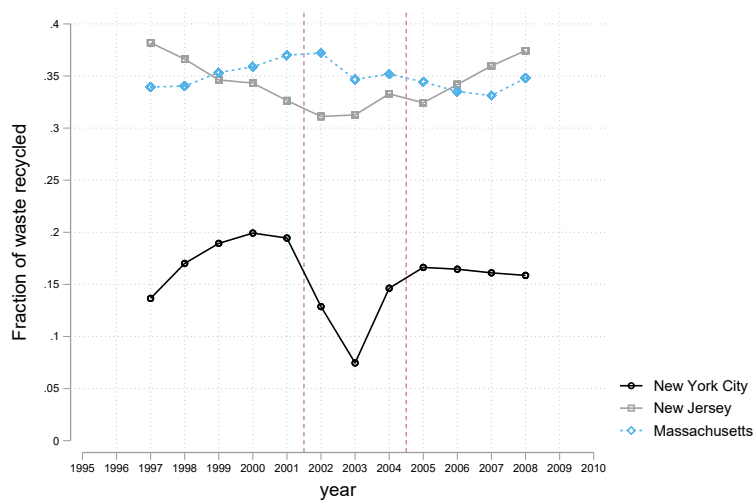


Figure 2: Plot of a scatterplot

2. Estimate the effect of the pause on the recycling rate in NYC using a TWFE regression and the data from 1997-2004. Cluster your standard errors at the region level. Report the average treatment effect estimate and the standard error.

Answer: The average treatment effect estimate is -0.62 and the standard errors are 0.005

3. Use the command `sdid` to estimate the synthetic DID version of the TWFE regression in equation 2. Report the estimated average treatment effect and the synthetic DID plot using the `graph` option.

(1)	
recyclingrate	
interaction	-0.064***
	(0.007)
<i>N</i>	1680
Standard errors in parentheses	
* p<0.10, ** p<0.05, *** p<0.01	

Table 1: estimate the synthetic DID version of the TWFE regression

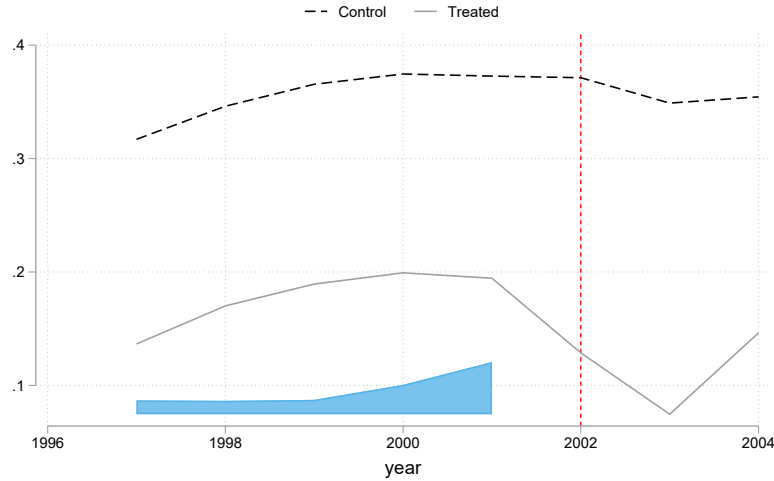


Figure 3: The synthetic DID plot

4. Using the full sample, estimate the following event study regression:

$$Y_{i,t} = \alpha_i + \gamma_t + \sum_i D_i \cdot 1(t = l) \beta_l + \gamma X_{i,t} + \epsilon_{i,t} \quad (1)$$

where D_i is a binary variable equal to one for New York City regions, $1(t = l)$ is an indicator function equal to one for year l , and $X_{i,t}$ are any time-varying controls you would like to include. Do not use a canned event study regression. Use `reg`, `xtreg`, or `reghdfe`. Report your results as a picture of the coefficient estimates of β_l with confidence intervals derived from standard errors clustered at the region level (use `coefplot`). Note that you will need to generate treatment variables to estimate this regression.

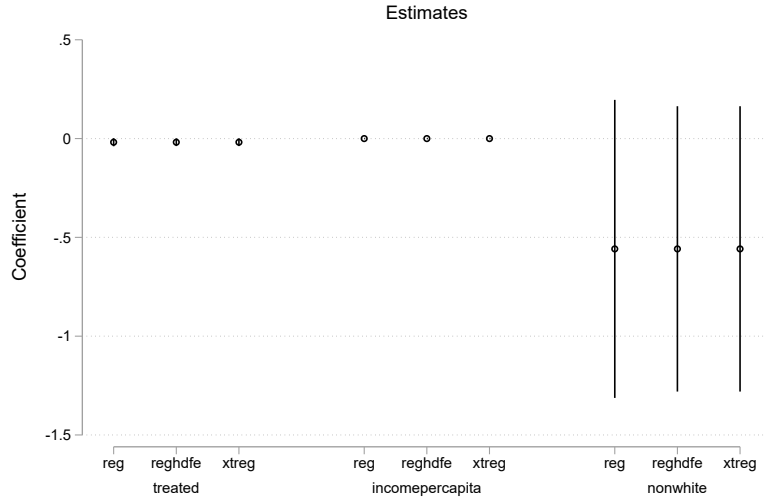


Figure 4: The coefficient estimates of β_l with confidence intervals derived from standard errors clustered at the region level

5. Use the commands `synth` and `synth_runner` to generate synthetic control estimates of the dynamic treatment effects. Generate the synthetic control estimates using whichever matching variables you see as most appropriate. Use placebo inference. Report:

(a) The plot of raw outcomes for treated and control groups over time.

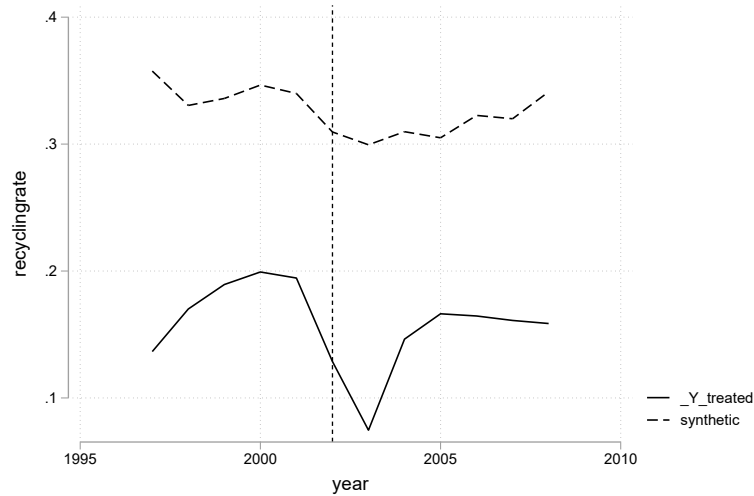


Figure 5: Raw outcomes for treated and control groups over time

- (b) The plot of raw outcomes for the treated group and synthetic control group over time.
- (c) The plot of estimated synthetic control effects and placebo effects over time.

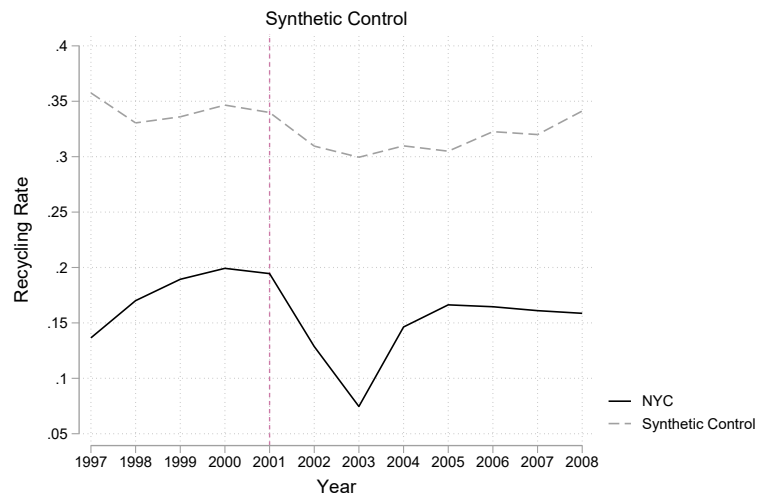


Figure 6: Raw outcomes for the treated group and synthetic control group over time

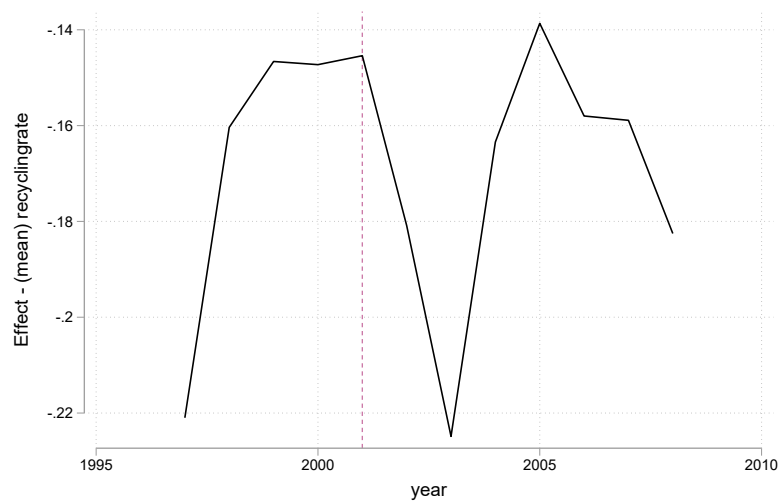


Figure 7: Effect

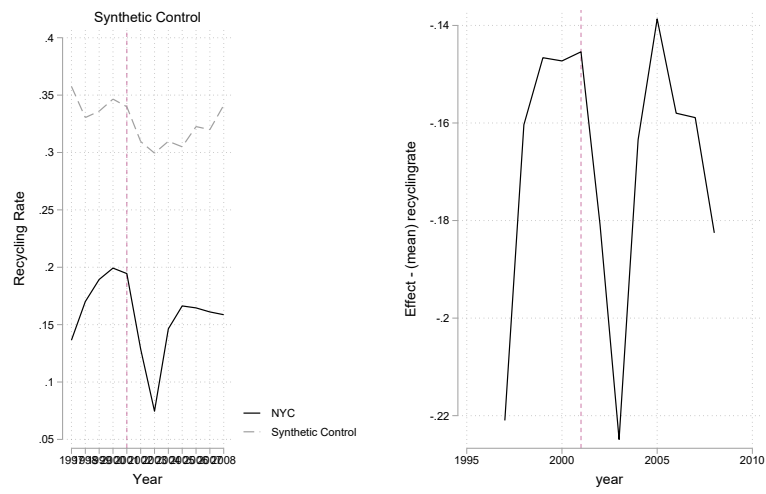


Figure 8: Raw outcomes for treated and control groups over time

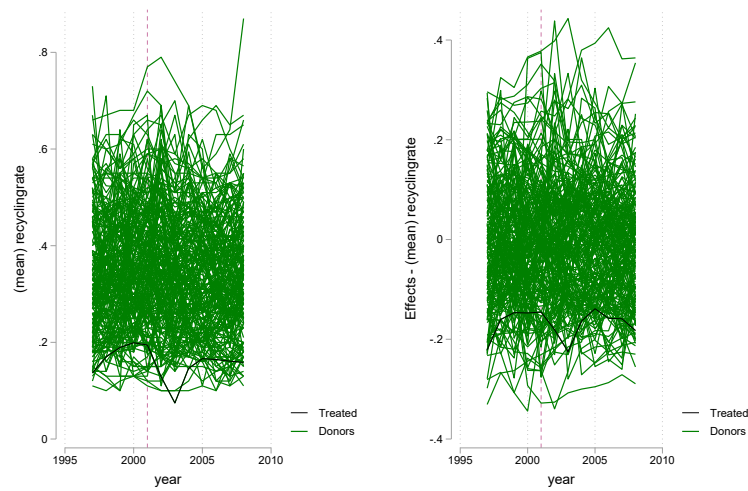


Figure 9: Raw outcomes for treated and control groups over time

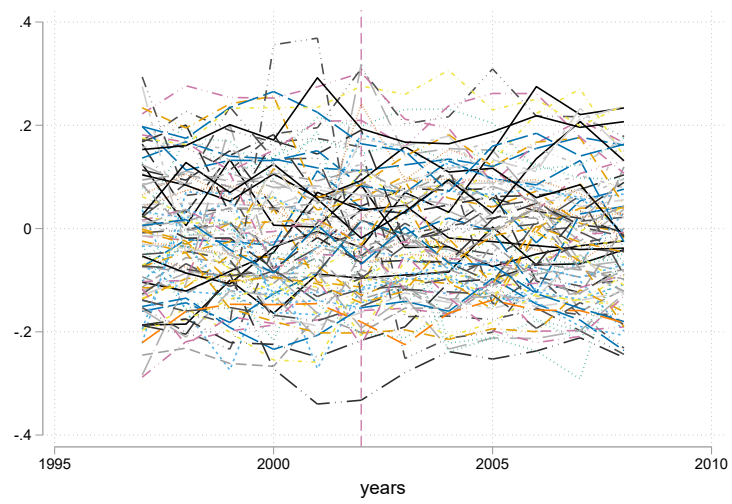


Figure 10: The plot of estimated synthetic control effects and placebo effects over time