Econ 570: Assignment 1

Due: 19 February 2021 at 2 pm Pacific Time

We have discussed the following causal inference methods in class

- Randomized experiments
- Estimation under unconfoundedness using matching and propensity score weighting
- Instrumental variables
- Difference-in-differences
- Synthetic control
- Regression discontinuity

This assignment is about exploring how the estimators perform under different data generating processes (DGPs). Specifically, pick two or three estimators and do the following for each estimator:

- Generate data using two DGPs
    1. DGP1 - does not violate the assumptions under which the estimator works
    2. DGP2 - violates at least one of the assumptions
- For each DGP, describe it and explain how it does/does not satisfy the requirements for identification of the parameters (and which parameters are you identifying?)
- Also, give a real life example of a situation which might be consistent with this DGP
    - Feel free (not required) to illustrate with a DAG
- Run a Monte Carlo simulation. At each replication
    1. Generate a random draw from the DGP

2. Estimate the model
3. Save the estimates

- Report summary statistics of parameter estimates

1. Bias
2. RMSE
3. Size

- Comment on the results. Are the estimates from DGP1 and DGP2 as expected?

Turn in your code. The commentary can be in the form of a markup document or a separate pdf.