ECO 7427:
Econometric Methods II

Assignment #4

Due: Friday March 22, 2024

Problem 1: (Sharp) Regression Discontinuity

Take any dataset with covariate X and outcome Y that are related in some way. For instance, you can use the data on birth weight and smoking from here: http://www.stata.com/texts/eacsap/, or any other relevant dataset. Alternatively, feel free to simulate your own data. In any case, please provide an explanation of your dataset.

Construct a placebo treatment by applying a rule such that $D_i = 1$ when $X_i \geq x_0$ for some x_0. That is, modify the outcome variable Y_i for those units with $X_i \geq x_0$ by adding a constant treatment effect, for example, add one standard deviation of the outcome plus some noise (with mean zero). Include an explanation of what you ended up doing.

1.1) Plot the outcome by forcing variable (the standard graph showing the discontinuity)

1.2) Plot the density of the forcing variable

1.3) Estimate the effect using a local linear regression

1.4) Estimate the effect using a local polynomial (of order 2 and 3) regression

You can use the implementation software available at https://cattaneo.princeton.edu/software to answer 1.1 to 1.4. However, for questions 1.3 and 1.4, you also need to estimate them "manually" using the local regression specification on slide 31 (LN7a RD). For this, consider a uniform kernel (i.e., perform OLS). Describe your results and compare them. Do your estimates match the actual treatment you implemented?