Microeconometrics
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Homework #1

Note: Please use STATA and hand in your a printed copy of your .do file in addition to your output.

Generate 10,000 data points with:

\[ \epsilon_1 \sim N(0, 9), \epsilon_2 \sim N(7, 4), \epsilon_3 \sim N(3, 12), \mu \sim N(0, 5) \]

Generate:

\[ X = \epsilon_1 + \epsilon_2, W = \epsilon_1 + \epsilon_3 \]

Model A: Generate \( Y_1 = 5 + 10X^* - 12W + \mu \)
Model B: Generate \( Y_2 = (4X^* - 5W)^2 + \mu \)

Generate \( X^* = 1 \) is \( X > 0 \) and \( X^* = 0 \) otherwise

2. Estimate the average treatment effect for \( X^* \) using propensity score bins for both model A and model B. Break up the propensity scores into quintiles and then deciles. Report your results. Non-parametrically bootstrap your standard errors with 500 replications.
3. Estimate the average treatment effect for \( X^* \) using propensity score nearest neighbor matching with replacement for both models. Report your results. Non-parametrically bootstrap your standard errors with 500 replications.
4. Discuss your results.
Generate 10,000 data points with:

\[ \epsilon_4 \sim N(0, 5), \epsilon_5 \sim N(0, 5) \]

Generate \( Z \):

\[ Z_1 = 4\epsilon_1 + \epsilon_4, Z_2 = 0.05\epsilon_1 + \epsilon_5 \]

1. Estimate two stage least squares using \( Z_1 \) as an excluded instrument for \( X \) and \( W \) as an included instrument. Report your results. Non-parametrically bootstrap your standard errors with 500 replications. Report the first stage F-statistic.

2. Plot the second stage residuals.

3. Redo steps (1.) and (2.) using \( Z_2 \) as your excluded instrument instead of \( Z_1 \).

4. Discuss your results.