

Problem Set I

Gov 51, Spring 2024

February 8, 2024

For this part of the problem set, we will go through instrumental variables, its assumptions and Wald estimator. Make sure to cite your sources if you have gotten help for this question.

1 Assumptions

Can you please list the major assumptions for instrumental variables and interpret them in a few sentences?

2 Type of observations

Write down four types of observations in a IV study. And list their behavior implications on the potential outcome: $Y(Z_i, T_i(Z_i))$. Make sure you explain briefly of your proof.

3 Wald Estimator

What is Encouragement term? What is Intention to Treat (ITT) term? What is Wald Estimator?

4 Bonus question

Assume we only have compliers and never takers (one-sided compliance). Prove that LATE (Wald Estimatro) is equal to ATT:

$$E(Y_i(1) - Y_i(0)|T_i = 1)$$

To make things easier, we also assume instrumental variable is randomized, so that:

$$E(Y_i(T_i)|Z_i = 1) = E(Y_i(T_i)|Z_i = 0)$$