ECONOMETRICS II, FALL 2024

Homework 8. Due Wednesday October 30th.

1. Monte Carlo study. Simulate a linear model for a variable y with one exogenous regressor x and one endogenous regressor w (a linear function of one or more instruments z and an error term in the x-equation correlated with the error term in the $y-$equation. Make the instruments weak (the coefficient to the instrument is small relative to the error variance). Try to use one instrument in generating the endogenous regressor or more instruments that are more weak.

Estimate the coefficients using OLS, standard IV, and LIML. Plot (or show percentiles for) the distributions of the coefficients to the endogenous regressor. Calculate the F-test for significance of the first stage and report them percentiles.

Using one instrument only, use the method of Moreira Porter Lee McCrary (AER 2022), to test for second stage significance. Do this for weak or strong instruments and compare to significance of standard t-statistics.

2. Use the posted bootstrap program to estimate a linear regression model.
1) Try samples N=10, 20, 50, 100 and run the program a few times. In this model, at what sample size does it look as if the bootstrap estimator of standard errors of the slope parameters is OK (similar to the parametric estimator).
2) Try and vary the number of bootstrap replications. How many replications seems to be needed for the estimator to work?
3) Try and simulate the model with error terms that are Cauchy distributed (use the ratio of standard normals). Those are pretty crazy and the parametric standard errors may be off. Keep N=100 and do a small Monte Carlo study (maybe 50 iterations, start with a low number and see what your computer can handle in not-too-long time) and report: a) the average parametric standard errors; b) the average bootstrap standard errors; c) the standard error of the estimated parameters across you Monte Carlo iterations (that is the true standard error, at least if the number of iterations is not too low). Is the bootstrap standard errors of the parametric OLS standard errors better for the model with Cauchy errors?