ECONOMETRICS II, FALL 2019

Homework 6. Due Wednesday October 16.

1. (24% of 2017 Final) Consider the (SURE) system of equations

$$y_i = X_i\alpha + u_i$$

and

$$w_i = Z_i\gamma + e_i\,,$$

where y_i and w_i are dependent variables, X_i and Z_i are row-vectors of fixed regressors, and u_i and e_i mean zero errors terms with $E\{u_i^2\} = \sigma_u^2$, $E\{e_i^2\} = \sigma_{e^2}$, $E\{u_i e_i\} = \sigma_{ue}$ and $E\{u_i u_j\} = E\{e_i e_j\} = 0$, $i \neq j$.

a) Write down the Feasible (two-stage) GLS estimator for the two equations.
b) Prove that if $X = Z$ the "combined" GLS estimator is identical to estimating the equations one by one using OLS.
c) Write down a Wald test for $\alpha_1 = \gamma_1$.

2. Consider the demand and supply model (or whatever the variables may stand for):

$$y1 = \alpha_1 * y_2 + \alpha_2 x_1 + u_1,$$

and

$$y2 = \alpha_3 * y_1 + \alpha_4 x_4 + \alpha_5 x_5 + u_2.$$

i) Assume you know the Π matrix of the reduced from (this can be estimated consistently), write down and solve the 6 equations for the α's. (I wrote down the solution quickly, but I want you to fill in the details.)
2) If instead

$$y2 = \alpha_3 * y_1 + \alpha_7 * x_1 + \alpha_4 x_4 + u_2,$$

show that one cannot solve the equation uniquely for $(\alpha_3, \alpha_7, \alpha_4)$.

3. Use the program `Econ8331_Sim.m` to estimate a 2SLS estimator for the simultaneous equation model (run the program with, say, 1000 simulations). We removed one line from my program that you have to add. Also, add an OLS estimator of the same equation and show that the results of the OLS estimator are biased.

Change one of the coefficients in the simulation to make the OLS bias worse. Simulate again and show it gets worse.