# Econometrics 2 (Fall 2020)

## Homework 6: Simultaneous Equation Models.

Due Wednesday on Oct. 14, 2020.

This code estimates the model

$$y_1 = \beta_0 + \beta_1 y_2 + \beta_2 x_1 + u_1 \,,$$

$$y_2 = \beta_4 + \beta_5 y_1 + \beta_6 x_1 + \beta_7 x_2 + u_2 \,,$$

$$\begin{bmatrix} u_1 \\ u_2 \end{bmatrix} \sim NID \begin{pmatrix} \sigma_1^2 & \rho \sigma_1 \sigma_2 \\ \rho \sigma_2 \sigma_1 & \sigma_2^2 \end{pmatrix} \,,$$

using two stage least squares. Fill in the missing code below.

## Set the parameters.

There are 1000 simulations with 300 observations per simulation. Set
$\beta_0 = 0, \beta_1 = 0.5, \beta_2 = 0.3, \beta_4 = 0, \beta_5 = 0.3, \beta_6 = 0.2, \beta_7 = 1, \sigma_1 = 1, \sigma_2 = 2$ and $\rho = 0.2$.

## Two Stage Least Squares.

In each simulation, generate the data, $X$, then draw the error terms and construct $Y$. Estimate the model using two stage least squares and record the estimates.

## Empirical results.

The average and standard deviation (in parenthesis) of $\beta_0$ is:

The average and standard deviation (in parenthesis) of $\beta_1$ is:

The average and standard deviation (in parenthesis) of $\beta_2$ is: