

**Homework 11. Due Monday December 2.**

Notes. This counts as 25% of the final! Do not write up the solutions together. You are probably better off getting it done not-too-close to Dec 2nd, when we have the exam. I need to grade this and the exam asap after the exam, so there can be no extensions of the due date.

1. Verify formula (3) in Moulton's article for the simple case of  $m=3$  (I may have used  $T$  instead of  $m$  in class). Assume the matrix of regressors is

$$X = \begin{pmatrix} x_1 \\ x_1 \\ x_1 \\ x_2 \\ x_2 \\ x_2 \end{pmatrix},$$

and the error variance matrix is

$$V = \sigma^2 \begin{pmatrix} 1 & \rho & \rho & 0 & 0 & 0 \\ \rho & 1 & \rho & 0 & 0 & 0 \\ \rho & \rho & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & \rho & \rho \\ 0 & 0 & 0 & \rho & 1 & \rho \\ 0 & 0 & 0 & \rho & \rho & 1 \end{pmatrix}.$$

2. a) Use the updated Matlab panel data program posted and run it without fixed effects, but with clustered standard errors, clustered by state, and report the t-statistics calculated from the program.

b) Simplify the code to calculate White standard errors, then run the program, report the t-statistics and compare to a) .

c) Include state fixed effects and repeat questions a) and b).

d) Now assume that the errors are clustered by time (year), rather than by state. Modify the program and run it again. Report the t-statistics. Do this with or without time fixed effects.