Economics 475: Econometrics

Homework #3

This homework is due on Monday, February 6th.

1. Often students note that autocorrelation is caused by non-random correlation between subsequent observations. Would autocorrelation be eliminated if we randomly re-ordered the observations? Why or why not?

No. Autocorrelation is a population problem—not a sampling problem. Thus a researcher re-ordering their data would simply make detecting autocorrelation more difficult but would not eliminate (or even change) the autocorrelation problem.

2. Consider a population regression model where $Y_t = \beta_0 + \beta_1 X_t + \varepsilon_t$ where $\varepsilon_t = \rho\varepsilon_{t-4} + v_t$ and v_t follows all of the classical assumptions for error terms. Describe a method for estimating this model in an unbiased and efficient manner. Be as specific as possible.

$Y_t = \beta_0 + \beta_1 X_t + \varepsilon_t \qquad \varepsilon_t = \rho\varepsilon_{t-4} + v_t$

$Y_t = \beta_0 + \beta_1 X_t + \varepsilon_t$

$-\rho Y_{t-4} = \rho\beta_0 + \beta_1\rho X_{t-4} + \rho\varepsilon_{t-4}$

$Y_t - \rho Y_{t-4} = \beta_0 - \rho\beta_0 + \beta_1(X_t - \rho X_{t-4}) + v_t$

1. Create New $Y = Y_t - \rho Y_{t-4}$
2. Create New $X = X_t - \rho X_{t-4}$

Regress New Y on New X

3.

a. Clearly state the hypothesis you hope to test in your final project. Be sure to give me enough context to understand this hypothesis.

b. Provide an estimate of the regression you intend to use for your final project. Be sure to define your variables and explain what your estimated coefficients represent. Does your model suffer from autocorrelation?