Economics 6352: Applied Econometrics
Southern Methodist University

Department of Economics

Midterm II – Answers

1. (a) False. The OLS estimates are consistent. But the standard errors are wrong. White standard errors will not fix the problem unless you use a cluster structure, because you need to take into account the correlation within each cross-sectional observation unit (across t for each i).

   (b) False. The two estimators are numerically identical.

2. (a) The elasticity is positive and significant in the pooled OLS model. The coefficient is insignificant and negative (positive) in the FE (RE) model.

   (b) $\lambda = 1 - \left(\frac{\sigma_u^2}{\sigma_u^2 - T\sigma_a^2} \right)^{\frac{1}{2}}$. It is equal to zero in the OLS model and 1 in the fixed effects model.

   (c) Chow test for structural change across time. We can use a Chow (F) test to test that the regression function differs across time periods. In this test we compare the SSR from the pooled estimates with the sum of the SSR's from the separate cross-sectional regressions. Alternatively, we interact a time dummy with each variable and test for joint significant of the time dummy and all of the interaction terms. Another test can be performed for testing the joint significance of fixed effects. One could test joint significance of these dummies (i.e., $H_o : a_1 = a_2 = \cdots = a_n = 0$), by performing an F-test. This is a simple Chow test with the restrict residual sum of squares being that of the OLS on the pooled model and the unrestricted sum of squares being that from the estimation.

   (d) The most common test to compare fixed versus random effects is a Hauman test. Under the null, the individual effct is indepndent of the regressors (RE is appropriate). The FE estimates are consistent even if the null is false (assuming the other assumptions hold). Therefore the test attempts to see whether or not the difference between the slope coefficients is significantly different between the two estimators. If so, then the null if rejected. If not, we fail to reject the null and use the RE specification for efficiency purposes.

   (e) Many reasons can be used to give evidence that the FE model is incorrect. For example, suppose the functional form of the equation is incorrect. Rejection of the Hauman test will falsesly suggest that the FE model is appropriate here. Another example is the case of an omitted variable. This will also cause biased estimates. Other acceptance answers will also be given credit.

3. (a) Measurment error can cause the estimates to be biased.

   (b) In the absence of a typical IV, lagged independent variables can be used as instrumental variables. Here it is possible to use a lag of public capital as an instrument. However, it should be noted that we lose one cross-section of data with this approach.

   (c) Here the coefficient is positive, but insignificant. In the fixed effects estimate before, the coefficient was negative and insignificant.