<u>**TAMU: Empirical Models for Time-Series-Cross-Section Data – Homework**</u>

1. Homework questions from Tuesday appear on pages 5 and 6 of lab exercise <u>Intro and Exploring OLS estimates in TSCS</u>, and on page 8 of lab exercise <u>Interactions Using Excel</u>.

2. Homework questions from Wednesday:

    a. Using the Garrett & Mitchell dataset, restricting the sample to **if(year<1980)**, regress **spend** on **unem growthpc depratio left cdem trade lowwage** by fully pooled OLS, by fixed-effects OLS, and by random-effects GLS. Use what you know about the convex-combinatorial relation of these three models / estimation-strategies to explain the differences in those three sets of coefficient estimates.

        i. Test each model against each of the other two using an appropriate Wald, loss-of-fit, or Hausman test.

    b. Still using the Garrett & Mitchell dataset, re-estimate those same three models (by those same estimation strategies), but without restricting the sample. Use what you know about the *weights* in the convex-combinatorial relation of these three models / estimation-strategies to explain the changes in the differences these three sets of coefficient estimates.

        i. Test each model against each of the other two using an appropriate Wald, loss-of-fit, or Hausman test. Use what you know about these tests &/or these models/estimators to explain differences from 2.a.i.

3. Homework questions from Thursday:

    a. Using the Garrett & Mitchell dataset, re-estimate this reduced version of the social-security-transfers model from Thursday's first lab **xtreg sstran L.sstran unem growthpc depratio left trade , fe robust**. Then repeat Troeger's illustration of the implications of under-estimating or omitting the temporal dependence by fixing the coefficient on **L.sstran** to .7 (remember how to do that?) and estimating, then to .35, and finally to 0.

        i. Explain the differences across these 4 sets of coefficient estimates (1 unconstrained & 3 constrained).

        ii. For the (three) temporally dynamic model-estimates, give the estimated LRSS (long-run-steady-state) response of **sstran** to a permanent 1-point increase in **depratio**, the dependency age-ratio (over-65 + under-16)/(16 to 65)), along with a standard error for that estimate. Make a table with those three estimated LRSS responses and fourth the estimated response by the static model to the same counterfactual, each with standard error, and the *t*-statistic and significance level of the test that that estimated response is zero.

        iii. For each of the three dynamic estimates, plot the estimated response of **sstran** over time to a 2.5% per year compounding increase in the **depratio** starting from its sample mean (35) over a 25-year period (i.e., from 35 to 35.875, 36.77, 37.69, …), along with a 90% confidence interval.

    b. Give the formula for, & conduct (referencing the original, unconstrained model from question 3a), the six panel unit-root tests pre-programmed in Stata (**help xtunitroot**) (or however many such tests your version of Stata has). Define each test, and explain insofar as you can what their differences might mean in this application.

    c. What specific endogenous-regressor issue(s) do the Arellano-Bond dynamic-panel-data type instrumental-variables/GMM estimators address? In lecture, we suggested there might be a narrow window of sample dimensions in which the 'disease' to which they are addressed is severe enough, and the 'cure' they attempt to implement is effective, efficient, and safe enough that the strategy would be advisable. What are these sample dimensions roughly, broadly? Explain.

    d. Modify the .do file of the spatial-regression lab to compute estimated AFDC-benefit responses to a 0.25 increase in state partisan-competitiveness (**ipcfold**) in Ohio. (The lab exercise gave estimated responses to a 1-pt **ipcfold** increase in Alabama.

4. Homework questions from Friday:

    a. Compare the fixed-effect (conditional) logit application with Beck-Katz-Tucker's suggested cubic spline from Friday's lab session with the same fixed-effects logit model estimated with Carter-Signorino's suggested polynomial in time instead. Which estimates do you prefer, on what bases?