

Name: _____

ECON 453
In-Class Exercise 2
September 5, 2023

Please download the file "In-Class 2.gretl", a gretl "session" file. This is very similar to the dataset we worked with in class on Thursday August 31st, with a few minor adjustments. The data here come from the World Bank Development Indicators (<https://data.worldbank.org/indicator>) and are measured for a set of 177 countries in the year 2019. Please open the session file (**Files -> Session files -> Open session**).

1. Let's examine the relationship between agriculture and the economy in a country. Run a regression (**Model -> Ordinary Least Squares**) using GDP per capita (in 1000s) as the dependent variable and the percentage of GDP that comes from agriculture (**Ag_pct**) as the regressor.
 - a. Report your estimated equation. Provide a numerical interpretation of the coefficient. Does this make sense to you?
 - b. Briefly discuss the significance of the Ag_pct variable, as well as the overall explanatory power of your model.
 - c. What does your model predict the GDP per capita (in 1000s) should be for the U.S. (country 171)? For Ethiopia (country 54)? How far off are these predictions (find the residuals)?
2. The model in question 1 produces some unusual results. Try running 2 separate regressions, one with the bottom 50% of countries (in terms of GDP per capita) and one with the top 50% of countries. (**Sample -> Restrict, based on criterion**).
 - a. Report the estimated equation, number of observations, and R^2 value for each of your regressions, then briefly summarize what we have learned.
 - b. Predict the values for Ethiopia and the U.S. Are your predictions better or worse now?

3. Let's try adding a quadratic term to our equation. Create a squared version of the "Ag_pct" variable (highlight the Ag_pct variable, then choose **Add -> Squares of selected variables**). Run a regression with GDP_1000s as the dependent variable and both Ag_pct and sq_Ag_pct as regressors.
 - a. Report your estimated equation. Use this equation to predict the GDP per capita for Ethiopia. Sketch a simple drawing of the estimated relationship.
 - b. Is this version of our model an improvement over the model in question 1?
4. Next, let's try a different form of non-linear estimation. We are going to use the natural logarithm of GDP per capita. To create this variable, select GDP_1000s from the main gretl window, then **Add -> Logs of selected variables**. Run a regression with l_GDP_1000s as the dependent variable (this is the logged version of GDP_1000s) and Ag_pct as a regressor.
 - a. Provide a numeric interpretation of the coefficient on Ag_pct.
 - b. Compare the explanatory power of this model with those from the previous models and discuss briefly.
5. Run another simple linear regression using the variables available in the dataset. Report the estimated equation, interpret the coefficient, and summarize what you learned.