ECON 453
In-Class Exercise 4
September 26, 2023

Please download the file "IC4 Session.gretl", a gretl Session file. This dataset comes from the 2019 World Bank Development Indicators and contains information on variables measured at the country level. This is similar to a dataset we have worked with before but contains only the lower income countries (countries below $15,000 in GDP per capita). The dataset contains basic descriptions of each of the variables.

While working on this exercise, please practice making a model table and using this to compare results across models.

1. Regress **Life Expectancy** on GDP per capita (**GDP_1000s**) Save this model to your session as an icon. Add this model to the model table (this happens in the icon view – right click on Model 1 and choose **Add to Model Table**)

2. Run the same model but add dummy variables for continents. Use Oceania as your reference category. Save this to your session as an icon, then add to your model table.

    a. Summarize briefly what we learn from the continent dummies.

    b. Comment on how the coefficient on GDP per capita changed when you added the continent dummies.

    c. Test whether the model indicates life expectancy is significantly different for low income countries in Europe and North America. In other words, is the coefficient on Europe significantly different from the coefficient on North America? From your regression results window, choose **Tests -> Linear restrictions.** Write out the null hypothesis, the p-value from the test, and the conclusion.

3. Run a regression with life expectancy as the dependent variable and two regressors: GDP_1000s and the Africa dummy variable. Save these results to the session as an icon and add it to your model table.

    a. Compare the results from this model to the ones from the previous model in question 2. Which should be our preferred model?

    b. Sketch a simple graph that shows the relationship between GDP per capita and life expectancy in Africa and GDP and life expectancy in Asia (on the same graph).

4. Restrict the sample to just the countries in Africa. Run the regression with life expectancy as the dependent variable and GDP per capita as the regressor. Save the results to your session as an icon and add it to your model table. Next, restrict the sample to just the countries **not** in Africa. Run the same regression, save these results to the session and add to your model table.
    a. Summarize what we learn about the relationship between economic performance and life expectancy in Africa and whether the relationship differs on other continents. Sketch a simple graph that shows the relationship between GDP per capita and Life Expectancy in Africa and the relationship in Asia (on the same graph).

5. Restore the data to the full sample. Create an interaction term between GDP per capita (GDP_1000s) and the Africa dummy variable. Go to **Add -> Define new variable.** An interaction term is the two variables multiplied by each other. Run a regression with life expectancy as the dependent variable and the regressors of GDP_1000s, Africa, and the interaction term. Save these results to the session and add to your model table.
    a. What is the estimated impact of a $1000 increase in GDP per capita on life expectancy in Africa? In Asia? How does this compare to your estimates in question 4?

6. Run a regression that uses life expectancy as the dependent variable. Your regressors will be GDP_1000s, Immunized_DPT, Africa, and the interaction of the Africa and immunization variables.
    a. Summarize what we learn about the impact of improving immunization rates in Africa and whether this differs from the estimated impact of immunizations on other continents.