Homework 8: Transformations

Answer the following questions in a .pdf or .docx, explaining all of your answers and putting any tables and figures in the document as necessary. When data is called for to answer applied questions, I will provide it in bblearn. Turn in your R code that created all of the tables and figures separately, and be sure that it runs from source in such a way that it loads the data and performs all the tests without me fiddling with it. Make sure to document your R source code using # comments if you want partial credit.

For transformations, I will be asking to you perform and interpret regressions using traditional theory-based techniques. Please include full tables with information I request in a proper regression table in your .docx or .pdf. For today, we will perform some regressions using Bailey's exercise 1 .dta on political instability taken from a paper by Iqbal and Zorn.

1. First, fit and report a multivariate regression predicting an index of political instability (Instab, high more unstable) using the lag of democracy (Democracy level at t-1, high more democratic), lag of GDP/capita (GDPlag, GDP/cap at t-1, high richer), and a Cold War dichotomous variable (1 = cold war observation). Show p-values and the 95% confidence interval around parameter estimates. Does this model suggest that democracy in the year prior drives political instability in the following year at the 95% confidence level? Plot the predictions for instability with 95% confidence intervals throughout the range of the democracy variable (0-100). What about GDP/capita? Plot those predictions through the range of GDP capita as well.

2. Graph the distribution of the lag of GDP/capita using a histogram. Now take the natural log of lagged GDP/capita and graph that. Discuss the differences in the graphs.

3. Now, run and report a linear-log regression model logging the lag of GDP/capita, with otherwise the same specification as question 1. Are the results different? Approximately interpret the coefficient for lagged GDP/capita in words.

4. Now, plot predictions for the linear model you ran in question 3 with instability on the Y axis and GDP/capita on the X axis, with GDP/cap predictions graphed in its original units and not logged (the default presentation in the plot_model command). Compare the results to your graph in question 2. What is different? Why?

5. Finally, we want to see if it there is a non-linear quadratic relationship between democracy and political instability. Perhaps highly democratic countries see more instability because of their freedoms while highly autocratic countries also see more instability

because of a lack of freedom. Run the specification in question 1 adding a quadratic polynomial for democracy. Report the regression table and then graph of the relationship between democracy on the X axis and instability on the Y axis. What relationship do we find? Do we find any evidence for the hypothesis I advanced?