

## Homework 5: Confidence Intervals

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.

Because we are using simulation/random draw methods in this lecture, please be sure to set your seed in your homework. Please set the seed to `set.seed(4534)` in your homework assignment. That means we will get the same answers when we perform random sampling, bootstrapping, and other simulation methods.

For confidence intervals, we will be using a subset of the V-Dem country data (1945-) for a few western european countries. If you need the codebook for the variable names, please use the V-Dem codebook that I have already uploaded into the bblearn shell.

1. First, I want you to generate the means of minimalist democracy level (`v2x_polyarchy`) for each country in the data. Create a table that shows these sample means. Which country has the highest level of average democracy in the sample?
2. Now add the 90% confidence intervals, calculated via the traditional theory method using the student t distribution, for those sample means and add them to the table you created in question one.
3. Now, create a new table. Calculate the 95% confidence intervals using the percentile method for each country around the previous estimate of the mean using the bootstrap method, with 1000 sample means, and report them in the table. (Remember to set your seed after loading packages to 4534)  
the sample?
4. At the 95% level of confidence can we tell the difference between the average democracy level post-war of Great Britain and Portugal? Present a graph of the bootstrapped distribution using the percentile method of Portugal's minimalist democracy means with a shaded 95% confidence interval in green along with the shaded confidence interval (but not bootstrapped data) for Great Britain in red.

5. Using all of the provided western european country subset, run a bivariate regression predicting minimalist democracy (v2x\_polyarchy) with an index measuring women's empowerment (v2x\_gender). Report the coefficients of the model and the 99% confidence interval around those estimates using the traditional/theory based method in a small table. Does the 99% confidence interval of women's empowerment overlap zero? Does the intercept? What would it mean in words if one did?