Homework #4
Temporal dependence, Spatial dependence and Parameter heterogeneity

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April 10, 2021

In the final assignment, I would like you to pull together what we've learned so far, and simultaneously consider three of the main threats to inference when working with TSCS data: temporal dependence, spatial dependence and (cross-national) parameter heterogeneity.

1 Is there Evidence of dependence and/or intercept heterogeneity?

Using the data provided, test for temporal dependence, spatial dependence, and intercept heterogeneity. For the most part, it makes sense to work within the well-developed dynamic panel framework to start, which means focusing on temporal dependence and intercept heterogeneity first, and then turn to spatial dependence. Describe your strategy, and present your results.

2 If you have multiple sources of bias, how would you address them simulataneously?

Almost always, when working with TSCS data, temporal dependence will be present and significant. The key question is "what is the second-order problem?" If it's spatial dependence, then you'll want to think about a work-around for including parameter heterogenity in a spatio-temporal lag model (e.g., adding unit fixed-effects). If the second-order problem is parameter heterogeneity, then you'll want to think about a work-around for accounting for spatial dependence in a hierarchical model (e.g., add spatially filtered eigenvectors). Again, describe your strategy and present the results.