

Lab 3 Exercise: PCA and Factor Analysis

Cole (2015)¹ argues that there are at least four dimensions to state capacities when it comes to the implementation of human rights treaties: territorial reach, nonmilitary material capabilities, bureaucratic efficacy, and coercive capacity. The indicators used to measure each of these dimensions are listed below, and outlined in more detail in the 2015 paper. Data comes from a variety of sources including, but not limited to, the Correlates of War Project and the World Bank.

Using the “State Capacity.dta” replication dataset provided by Cole (2015), attempt to replicate Table 1 on page 420 of the manuscript. In the course of doing so, consider the specific questions outlined below:

1. How many dimensions (i.e., presumably important/interesting sources of variance) are there in this dataset?
2. Generally speaking, do you find support for Cole’s (2015) characterization of the dimensionality of the dataset? Do your results comport with those presented in the paper?
3. Which technique accounts for more variance in the latent dimensions: PCA or factor analysis?
4. How are the PCA and factor analysis results different? Similar? Which is most appropriate?
5. Retain whatever number of components and estimate whatever number of factor scores you feel is “best.” Now create summated rating scales of the variables that correspond most closely with those components/factors. What is the correlation among all three? Why might we use one over another?

Variable coding/wording for Cole (2015) data (see paper for more info)

- `media2_bank`: radios per capita
- `media4_banks`: TVs per capita
- `media5_banks`: newspapers per capita

¹Cole, Wade M. 2015. “Mind the Gap: State Capacity and the Implementation of Human Rights Treaties.” *International Organization* 69(2): 405-441.

- phone6_banks: phones per capita
- popurban_wdi: percent urban
- odaaid_wdi: official development assistance
- irst_nmc: iron and steel production
- energy_nmc: energy consumption
- milper_pop: military expenditures per 1,000 in the population
- milexp_gdp: military expenditures as a percent of GDP
- corruption_icrg: corruption control
- bureaucratic_quality_icrg: bureaucratic quality
- military_politics_icrg: military in politics