

Homework 2: OLS in Matrix Form

Due Date:

Exercise 1: Review of OLS in Matrix Form

The object of this exercise is to make sure that you can produce all of the output of a standard regression program using MATA (STATA's matrix package).

coxappend.dta is a STATA data set that contains data from a 1997 article in the *American Journal of Political Science* by Octavio Amorim Neto and Gary Cox entitled 'Electoral Institutions: Cleavage Structures, and the Number of Parties'. The article is available on the website. You should skim this article so that the variables are meaningful to you.

1. Run a regression of the effective number of ethnic groups (eneth), the natural log of district magnitude (lnml), and the interaction of these two variables (lmleneth) on the effective number of legislative parties (enps). Make sure to include a constant.
2. Now reproduce all of the results shown by STATA from this regression using MATA.
3. Do a test of the hypothesis that the coefficients on eneth and lnml are both 0 using STATA.
4. Now redo this test using MATA.
5. FWL: The true model is:

$$\begin{aligned} \text{LegislativeParties} = \beta_0 &+ \beta_1 \text{EthnicGroups} + \beta_2 \ln(\text{Magnitude}) \\ &+ \beta_3 \text{EthnicGroups} \times \ln(\text{Magnitude}) + \epsilon \end{aligned} \quad (1)$$

Imagine that you omitted $\ln(\text{Magnitude})$. Using MATA, show that the omitted variable formula works.

6. FWL: Using regression (STATA), show that the coefficient on $\ln(\text{Magnitude})$ i.e. β_2 can be obtained by regressing the residuals from a regression of *LegislativeParties* on *EthnicGroups* and *EthnicGroups* \times $\ln(\text{Magnitude})$ on the residuals obtained from regressing $\ln(\text{Magnitude})$ on *EthnicGroups* and *EthnicGroups* \times $\ln(\text{Magnitude})$.