Econometrics II: Time Series Data
Homework and Reading Assignment #4

October 12, 2021

1 Reading Assignment

- Chapter 6 in Enders

2 Homework Assignment

2.1 Theoretical part

- Assume a simple ARDL (1,1) model as follows:

$$Y_t = \mu + \alpha_1 Y_{t-1} + \beta_0 X_t + \beta_1 X_{t-1} + \varepsilon_t$$

  Please derive an error correction model from the above equation.

2.2 Empirical part

- Choose time series data of your choice for at least 3 variables (preferably monthly/quarterly data without too many structural breaks)
- Assume, you are interested in investigating the following relationship

$$Y_t = \mu + \phi_1 X_{1_t} + \phi_2 X_{2_t} + \varepsilon_t$$

  Please briefly motivate (theoretically), why do you think this relationship should exist in your data?

- 1. Find the order of integration (by performing the unit root test - make sure your unit root tests are not affected by serial correlation issues)
- 2. Perform both Engle-Granger test for cointegration and ARDL bounds test for cointegration. Is there cointegration in your data?
- 3. What are the cointegrating parameters?
- 4. Assume, cointegration exists in your model, perform an error correction model. Please interpret the error correction model (i.e., interpret the coefficient on the error term, interpret the short-run and long-run relationships).
- **Diagnostics:**
  - Perform serial correlation and ARCH test
  - Test the model for the assumption of normality
  - Show parameter stability of your model using `strucchange` package in R. Are your estimates reliable? Remember, `strucchange` package in R only recognises models coded using `lm()` function.

Note: Please include your equations and formulae of your methods (whenever applicable)