

# ECON7350: Applied Econometrics for Macroeconomics and Finance

## Tutorial 6: Cointegration - I

At the end of this tutorial you should be able to:

- Automate the task of unit root testing in multiple time-series samples in R;
- Implement the Engle-Granger cointegration test in R;
- Interpret the outcome of an Engle-Granger.
- Use the outcome of the Engle-Granger test to infer possible cointegrating relations.

## Problems **Assignment Project Exam Help**

In this tutorial you will test for cointegration using the Engle-Granger method. The data consists of four Australian interest rates: the 5 year (i3y) and 3 year (i3y) Treasury Bond (i.e., Capital Market) rates, along with the 180 day (i180d) and 90 (i90d) day Bank Accepted Bill (i.e., Money Market) rates. The data are annualized monthly rates for the period June 1992—August 2010 ( $T = 219$ ), and are saved in `term_structure.csv`.

1. Analyse the integration properties of each individual process:  $\{i3y_t\}$ ,  $\{i5y_t\}$ ,  $\{i90d_t\}$  and  $\{i180d_t\}$ . Based on the data, what inference can we draw about each of these processes resembling a unit root process?
2. Use the Engle-Granger method to test for a cointegrating relation involving all four processes. Assume the 5 year TB rate is the dependent variable in the initial regression. Hint: Use the `test.coint` function provided by the `aTSA` package.
3. Interpret the inference obtained Questions 1 and 2 in terms of empirical evidence of cointegration in the four interest rates.
4. Repeat Question 2 three more times but each time change the dependent variable. Is the inference regarding cointegration affected?
5. Next, use the data to test the *expectations theory* of the term structure of interest rates (ETT). Specifically, investigate whether the spreads in the Capital Market ( $i5y - i3y$ ) and Money Market ( $i180d - i90d$ ) are stable (and therefore stationary assuming constant variances and auto-covariances).