ECON7350: Applied Econometrics
for Macroeconomics and Finance

Tutorial 12: Multivariate Processes - III

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

- Use R to construct an adequate set of VECM models;

- Use R to obtain inference on equilibrium relationships from VECM models;

- Use R to obtain inference on dynamic relationships from identified structural VECMs.

Problems

The data file `term_structure.csv` contains data on four Australian interest rates: the 5 year (i5y) and 3 year (i3y) Treasury Bond (capital market) rates, along with the 180 day (i180d) and 90 day (i90d) Bank Accepted Bill (money market) rates. The data consists of annualized monthly rates for the period June 1992 to August 2010 ($T = 219$).

1. Consider a VAR model of the multivariate process $\{\mathbf{x}_t\}$, where

$$\mathbf{x}_t = (\text{i90d}_t, \text{i180d}_t, \text{i3y}_t, \text{i5y}_t)'.$$

   Construct an adequate set of VAR models specified by the lag length p.

2. Using the adequate set constructed in Question 1, implement Johansen's trace test to obtain inference on possible ranks $r = \text{rank}\,\mathbf{A}(1)$. What does this suggest about possibly expanding the adequate set of VAR models to include restricted VECMs?

3. Construct an adequate set of VECM models specified by the lag length p and rank r.

4. Choose a reasonable lag length p^*, and using a subset of specifications (with $p = p^*$) included in the adequate set of VECM models constructed in Question 3, obtain inference on all possible equilibrium relationships. Please use the identifying restrictions $\boldsymbol{\beta} = (\mathbf{I}_r, \tilde{\boldsymbol{\beta}}')'$, where $\tilde{\boldsymbol{\beta}}$ is $(n - r) \times r$.

5. Compute impulse response functions for 5-year horizons using a Cholesky decomposition for all the specifications in the adequate set of VECM models. Compare these IRFs to those obtained from unrestricted VAR models. Comment on your findings.