Tutorial Handout: Assessing the RBC Model in Dynare

Advanced Macroeconomics – Romer Chapter 5 (Section 5.6-5.10)

Objective

This exercise replicates the methodology in Romer (2019, Ch. 5) using a Real Business Cycle (RBC) model solved in Dynare. You will evaluate how well the model explains business cycle dynamics in a country of your choice using simulated and empirical moments.

- You can complete this tutorial in groups of max. four (4).
- Please email directly to me: hylton.hollander@uct.ac.za by the RBC tutorial session.
- *[Note: your RBC problem set must still be submitted to the TA by the RBC tutorial session as well].*

Instructions

1. Select a country and data

- Choose any country with available quarterly macroeconomic data (e.g., FRED, IMF-IFS, OECD).
- At minimum, collect data on real GDP, consumption, investment, short-term interest rate, wages (if available), and hours worked/employment (if available).
- See matlab example on detrending the data: `rbc_data_clean.m`. Ideally, you want to compare detrending methods.

2. Use or modify an RBC model in Dynare

- Use or start with the template `Hansen_basicrbc_FULL.mod`. A simple extension is to add government purchases as an exogenous AR(1) process in the aggregate resource constraint (you will need to log-linearize this equation again and calibrate G/Y to the data; C/Y will then be the residual as shown in the 'basic' RBC handout).
- You may modify the model or replace it with an alternative RBC specification (e.g., with preference or investment-specific shocks).

3. Parameterisation

- Choose your calibrated values for parameters (i.e., ρ, δ, η, ψ).
- If estimating, use the `estimation()` command in Dynare and discuss your prior choices. (Come talk to me if you want to attempt; template provided on course site; you will only estimate the model using real GDP and the technology shock; you will only estimate the shock size and persistence parameter of the AR(1) process).

4. **Compare empirical and model-implied moments**

   - Report and compare the following for each key variable (as shown in slides):
     - Mean and standard deviation (and standard deviation relative to output)
     - First-order autocorrelation
     - Correlation with output and actual
   - Use `stoch_simul(order=1)` to obtain model moments.

5. **Visual comparison (optional)**

   - Plot actual and simulated time series for at least 4 variables (e.g., GDP, consumption, investment, and hours/employment): match simulation periods (`periods=T`) to the sample period of your data `T`).
   - Optionally include IRFs to technology and/or government shocks (`irf=40`)).

6. **Discussion**

   - Evaluate the model's empirical performance.
   - Highlight successes and limitations relative to Romer's critique of RBC models.

Resources

- Dynare User Guide (also available on course site):
  github.com/hollander03/dsge-training/.../User Guide
- Additional example (optional): RBC code and video walkthrough:
  mutschler.eu/teaching/rbc/
  mutschler.eu/teaching/rbc-video-modeqs/
- Additional models and tools:
  github.com/hollander03/dsge-training
