ECON7350: Applied Econometrics for Macroeconomics and Finance

Tutorial 5: Trends and Cycles

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

- construct an adequate set of ADF specifications for unit root testing;
- carry out ADF tests for a unit root and interpret the results;
- construct an adequate set of general ARIMA(p, d, q) models.

Problems

The specification for a general ARIMA(p, d, q) model is

$$\Delta^d y_t = \delta_t + \sum_{j=1}^{p} a_j \Delta^d y_{t-j} + \sum_{j=1}^{q} b_j \epsilon_t + \epsilon_t,$$

where δ_t is a general *deterministic term*.

- If the process has no deterministic terms, then $\delta_t = 0$.
- If the process includes a constant only, then $\delta_t = a_0$.
- If there is a constant and a trend, then $\delta_t = a_0 + \delta t$.

The file `usdata.csv` contains 209 observations on:

- $y_t \equiv$ log real per capita GDP (`GDP`); and
- $r_t \equiv$ the overnight Federal Funds Rate for the US (`FFR`).

1. For y_t:
   (a) Plot the observed time series and comment on potential trends.
   (b) Construct an adequate set of ADF regression models.
   (c) Implement the ADF test for a stochastic trend and draw inference regarding the integration properties of y_t.
   (d) Repeat parts (a)-(c) for the differenced series Δy_t.
   (e) Interpret the overall findings in parts (c) and (d).
   (f) Construct an adequate set of ARIMA(p, d, q) models using information criteria and residuals analysis.
2. Repeat parts (a)-(e) of Question 1 for r_t (you do not need to do part (f)).