Applied Time-Series Econometrics
Homework 1

Due to Monday 10^{th} of February at 16h

Exercise 1

Given the AR(2) process $y_t = 1 + 1.3y_{t-1} - 0.4y_{t-2} + u_t, t \in \mathbb{Z}$, with $u_t \sim \mathcal{N}(0,1)$

a Is y_t stationary?

b Determine $E[y_t]$ and the auto-covariance structure. Is the process covariance-stationary?

c Simulate the IRF in the computer and report the graph

d Simulate one series of this process for T=500 and plot the sample autocorrelation ($\rho_j = \gamma_j/\gamma_0$) and the sample partial autocorrelation. How does it compare with the theoretical ones? Are they equal? Why?

Exercise 2

Given the MA(2) process $y_t = 1 + u_t - 1.3u_{t-1} + 0.4u_{t-2}, t \in \mathbb{Z}$, with $u_t \sim \mathcal{N}(0,1)$

a Is y_t invertible?

b Determine $E[y_t]$ and the auto-covariance structure. Is the process covariance-stationary?

c Simulate the IRF in the computer and report the graph

d Simulate one series of this process for T=500 and plot the sample autocorrelation and the sample partial autocorrelation. How does it compare with the theoretical ones? Are they equal? Why?

Exercise 3

From Fred, download monthly data on unemployment rate from 1950 to 2015.

a Plot the autocorrelation function and the partial autocorrelation for 24 lags for the first part of the data. Include reference lines for the values $\pm 2/\sqrt{T}$

b What is the model $ARMA(p,q)$ which best fits the data? Suggest values for p and/or q.