ECONOMETRIC METHODS II: TIME SERIES 2012

HOME WORK 4

Instructions

Write up your results and submit electronically (preferably in pdf format) to knimark@crei.cat **and** fernandojose.perez@upf.edu before 24.00 Sunday July 1 together with any MatLab code used in the exercise. You may work in groups of up to three people. Please list all names in group on front page. Use notation as indicated in the questions.

Bayesian Estimation of UC model

Consider the unobserved component model

$$\begin{aligned} \pi_t &= \tau_t + \eta_t : \eta_t \sim N(0, \sigma_\eta^2) \\ \tau_t &= \tau_{t-1} + \varepsilon_t : \varepsilon_t \sim N(0, \sigma_\varepsilon^2) \end{aligned}$$

that decomposes inflation π_t into a permanent component τ_t and a transitory component η_t. For a country that is not the US:

(a) Find the posterior of the parameter vector $\theta = \left\{\sigma_\eta^2, \sigma_\varepsilon^2\right\}$ using the Metropolis-Hastings algorithm. Make sure your MCMC of the posterior has converged. What is the acceptance rate of the chain?

(b) Find the posterior distribution of the filtered estimates of τ_t defined as $\tau_{t|t} \equiv E\left[\tau_t \mid \pi^t, \tau_{0|0}\right]$. Plot the median, and the 5th and 95th percentile.

(c) What is the correlation in the Markov Chain between σ_η^2 and σ_ε^2? Interpret your finding.

(d) Find a long term interest rate r_t (maturity ≥ 5 years) for your chosen country. Find the posterior estimate $\theta = \left\{\sigma_\eta^2, \sigma_\varepsilon^2, d, \sigma_\delta^2\right\}$ for the system

$$\begin{aligned} \pi_t &= \tau_t + \eta_t : \eta_t \sim N(0, \sigma_\eta^2) \\ r_t &= d\tau_t + \delta_t : \delta_t \sim N(0, \sigma_\delta^2) \\ \tau_t &= \tau_{t-1} + \varepsilon_t : \varepsilon_t \sim N(0, \sigma_\varepsilon^2) \end{aligned}$$

where $E(\delta_t \eta_t) = 0$. Compare the new posterior of $\left\{\sigma_\eta^2, \sigma_\varepsilon^2\right\}$ with your answer to (a).

(e) Find the posterior distribution of the filtered estimates of τ_t defined as $\tau_{t|t} \equiv E\left[\tau_t \mid \pi^t, r^t, \tau_{0|0}\right]$. Compare to your estimates from (b).

Date: June 13, 2012.