Problem Set 2

October 31, 2018

The problem set requires you to implement BCA using US data. The references are attached in the email.

1. Write a code that derives the log-linearized solution to the prototype growth model with wedges in state-space form with measurement error

$$X_{t+1} = AX_t + B\epsilon_{t+1}$$

$$Y_t = CX_t + \omega_t$$

where $X_t = [\log \hat{k}_t, s_t, 1]$, $s_t = [\log A_t, \log \tau_{l,t}, \log \tau_{x,t}, \log \hat{g}_t]$, $Y_t = [\log \hat{y}_t, \log \hat{x}_t, \log l_t, \log \hat{g}_t]$ and $\omega_t \sim N(0, R)$ is i.i.d. Please use a standard calibration for preference and technology parameters and the only unknown parameters $\{P, Q\}$ which describe the law of motion for the wedges:

$$s_{t+1} = Ps_t + Q\epsilon_{t+1} \tag{1}$$

2. Construct a series for Y_t following Appendix B of the attached file. Use US data on quarterly frequency

3. Estimate P and Q using $Y_t$using Maximum Likelihood and treating $s_t$as latent. You may want to use the Kalman Filter to construct the likelihood function

4. Extract the sequence of wedges such that the prototype model when simulated using Y_t without the measurement error. Plot those across time

5. Now construct the policy rules for the economy that only has the efficiency wedge. Please ensure that the probability distribution of the efficiency wedge is the one implied by (1). Plot the simulated path for Y_t using the policy rules of the economy that only has the efficiency wedge and the extracted sequence of s_t that you derived in step 4. Do the same for the rest of the wedges turning one wedge off at a time.

6. Which wedges are key before and after the 2008 Financial Crisis to explain output?