Leopold von Thadden Monetary Theory and Policy Summer Term 2013

Problem Set 6

Extensions of the MIU model (Lecture 5): Simulations with Matlab

Problem 1: Productivity shocks

Assume that productivity follows the law of motion

$$z_t = \rho_z z_{t-1} + e_t, \tag{1}$$

where $\rho_z \in (0,1)$ and $e_t \sim \text{iid } (0, \sigma_e^2)$. Consider the following cases:

- a) Deterministic case: no realizations of e_t , but some fixed starting value z_1 .
- **b)** Single temporary shock e_1 .
- c) Sequence of temporary shocks e_t .

Problem 2: New Keynesian Model

Suppose we have the system:

$$\begin{cases}
 i_t = \rho i_{i-1} + v_t \\
 x_t = E_t x_{t+1} - \frac{1}{\sigma} (i_t - E_t \pi_{t+1}) + u_t \\
 \pi_t = \beta E_t \pi_{t+1} + k x_t + e_t
 \end{cases}$$
(2)

Show that the system can be written in the form:

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & \frac{1}{\sigma} \\ 0 & 0 & \beta \end{bmatrix} \begin{bmatrix} i_t \\ Ex_{t+1} \\ E\pi_{t+1} \end{bmatrix} = \begin{bmatrix} \rho & 0 & 0 \\ \frac{\rho}{\sigma} & 1 & 0 \\ 0 & -k & 1 \end{bmatrix} \begin{bmatrix} i_{t-1} \\ x_t \\ \pi_t \end{bmatrix} + \begin{bmatrix} v_t \\ \frac{v_t}{\sigma} - u_t \\ -e_t \end{bmatrix}.$$
 (3)

Problem 3: Examples from the extended MIU model

Consider the system of linearized equations (1-8 hat), (9-10), (15-16 hat) as summarized in Lecture 5 (p. 37-38) and in line with the exposition in Chapter 2 of the course book: *Carl Walsh, Monetary Theory and Policy, MIT Press, 3rd edition, 2010.* The code is available at the following link: *http://people.ucsc.edu/~walshc/mtp3e/.* Let us explore the effects of changes to some of the parameters of the model, like:

a) Variations in b vs. Φ (Strength of the (non-) superneutrality of money).

b) Variations in ρ_u (Strength of the anticipation channel of money growth shocks).