

Economics 205B
Winter 2008

Advanced Macroeconomic Theory: Exercises 4

Due: March 10

1. Consider the following basic new Keynesian model:

$$\pi_t = \beta E_t \pi_{t+1} + \kappa x_t + e_t. \quad (1)$$

$$x_t = E_t x_{t+1} - \left(\frac{1}{\sigma}\right) (i_t - E_t \pi_{t+1}) + u_t. \quad (2)$$

Assume

$$\dot{i}_t = \rho_i \dot{i}_{t-1} + a_1 x_t + a_2 \pi_t + v_t. \quad (3)$$

and assume further that e , u , and v are serially and mutually uncorrelated disturbances. Simulate the response of inflation and the output gap to serially uncorrelated cost, demand, and policy shocks for $\sigma = 1$, $\omega = 0.5$, $a_1 = 0.5/4$, $a_2 = 1.5$, $\kappa = (1 - \omega)(1 - \omega\beta)/\omega$, and $\rho_i = 0.5$. How are the model dynamics affected by ρ_i ?

2. Assume the model consists of (1), (2), and (3) but now assume

$$e_t = \rho_e e_{t-1} + \varepsilon_t.$$

- (a) Write the model in the form

$$\begin{bmatrix} z_{1t+1} \\ E_t z_{2t+1} \end{bmatrix} = M \begin{bmatrix} z_{1t} \\ z_{2t} \end{bmatrix} + \begin{bmatrix} \phi_{t+1} \\ 0 \end{bmatrix}$$

where z_1 is the vector of predetermined variables and z_2 is the vector of non-predetermined variables.

- (b) For $\sigma = 1$, $\omega = 0.5$, $a_1 = 0.5/4$, $a_2 = 1.5$, and $\kappa = (1 - \omega)(1 - \omega\beta)/\omega$, simulate the response of the output gap and inflation to ε_t for different combinations of ρ_e and ρ_i when each takes on the values .25, .5, and .75 (a total of nine combinations). How is the response to cost shocks affected by ρ_e and ρ_i ? Does the source of persistence (via shock persistence or policy inertia) matter? Explain.

3. Suppose households display external habit persistence.

- (a) Derive the linearized expectations IS curve for this economy.
- (b) Combine this IS relationship with (1) and (3) and assume the cost shock is serially uncorrelated. Simulate the response of the output gap and inflation to ε_t for different combinations of b (the habit persistence parameter) and ρ_i when each takes on the values .25, .5, and .75 (a total of nine combinations). How is the response to cost shocks affected by b and ρ_i ? Does the source of persistence (via policy inertia or habit persistence) matter? Explain.

4. Consider the following version of the Shapiro-Stiglitz model. Let ρ be the discount factor, b the exogenous probability of job loss, q the probability a shirking worker is caught, w the real wage, \bar{e} is the cost of effort if the worker doesn't shirk, and u the value of leisure time. Each of N firms employ L workers in equilibrium, and the total, fixed supply of labor is \bar{L} .
- (a) Write down the equations that determine the steady-state value of being employed and working, of being employed and shirking, and being unemployed.
 - (b) Derive the no shirking condition and explain intuitively how the wage the firm must offer is affected by q and u .
 - (c) Suppose the opportunity cost of time as measured by u is related to the individual's w (i.e., high wage workers have higher value alternatives). Specifically, let $u = \gamma w$. How does the no shirking condition and the wage the firm must offer depend on γ ? Explain.