— Problem Set 3 —

MA1112: MACROECONOMIC THEORY PART II

Section 2: Monetary Economics

31 January 2012

Antti Ripatti
antti[at]ripatti.net
http://macro.ripatti.net/

Exercise 1

(The weight is around 40 %) Consider the basic New-Keynesian model that is described in the Chapter 3 of the book. We have the New-Keynesian Phillips Curve

$$\pi_t = \beta \,\mathrm{E}_t\, \pi_{t+1} + \kappa \tilde{y}_t \tag{1}$$

and expectation augmented IS curve

$$\tilde{y}_t = \mathrm{E}_t\, \tilde{y}_{t+1} - \frac{1}{\sigma}\left(i_t - \mathrm{E}_t\, \pi_{t+1} - r_t^n\right). \tag{2}$$

The monetary policy is described by the following version of the Taylor rule:

$$i_t = \rho + \phi_\pi \pi_t + \phi_y \tilde{y}_t + v_t, \tag{3}$$

where the monetary policy shock v_t is given by the following AR(1) process

$$v_t = \rho_v v_{t-1} + \varepsilon_t^v \quad \varepsilon_t^v \sim \mathrm{iid}(0, \sigma_v^2).$$

Derive the solutions of $\tilde{y}_t$ and π_t presented in page 51 of the book. The necessary steps are also described in the slides 90-91.

Exercise 2

(The weight is around 60 %) Gali's book's exercise 5.4: As show in Steinsson (2003), in the presence of partial price indexation by firms, the second-order approximation to the household's welfare losses takes the form

$$\frac{1}{2}\,\mathrm{E}_0 \sum_{t=0}^{\infty} \beta^t \left[\alpha_x x_t^2 + (\pi_t - \gamma \pi_{t-1})^2\right],$$

where γ denotes the degree of price indexation to past inflation (similar role as ω in the problem set 2). The equation describing the evolution of inflation is now given by

$$\pi_t - \gamma \pi_{t-1} = \kappa x_t + \beta \, \mathrm{E}_t(\pi_{t+1} - \gamma \pi_t) + u_t,$$

where u_t represents an exogenous i.i.d. cost-push shock.

a) Determine the optimal policy under discretion.

b) Determine the optimal policy under commitment.

c) Discuss how the degree of indexation γ affects the optimal responses to a transitory cost-push shock under the previous two scenarios.

Note, that the problem will be much easier to solve if you make the following change of variable: $\pi_t^\star \equiv \pi_t - \gamma \pi_{t-1}$.