Monetary economics – Homework No 2

Exercise 1

Consider a two-period consumption model. Our representative consumer works only in period 1 and earns a fixed amount W_1, her utility function is $U = \log(C_1) + \beta \log(C_2)$. Given the real interest rate R. Derive her Euler equation and her consumption at 1 and 2.

Exercise 2

Consider a two-period consumption model. Our representative consumer works only in period 1, he can work H_1 hours and earns a fixed real wage equal to w_1. His utility function now depends also on the amount of hours supplies: $U = \log(C_1) + \beta \log(C_2) - \eta \log(H_1)$. Given the real interest rate R, derive his Euler equation, the amount of hours supplied in the period 1 and his consumption at 1 and 2.

Exercise 3

A monopolistic firm estimated that the demand for its product could be considered as linear inside some range. The number of units it sells (Q) depending of the price charged (P) is given by the following equation: $Q = 100/3\ P + 1000/3$. Total costs are instead estimated by the following function: $TC = 1/50\ Q^2 + 16/3\ Q$.

1. Derive: i) the optimal price; ii) the markup applied by the firm to the marginal cost; iii) the price elasticity of demand.
2. Discuss the relationship between the elasticity and the markup.
3. Assume that the firm expects lower marginal cost in the future but, because of price stickiness, it also expects that it will be not able to change the price, how does this expectation affect its current pricing decisions?

Exercise 3

Consider the following New Keynesian model (in log deviations from the steady state):

$$\begin{cases} x = x^e - \sigma\left(i - \pi^e\right) + g \\ \pi = \beta\pi^e + \lambda x + \varepsilon \\ i = \alpha\pi \end{cases}$$

Assume that x and π are target variables, g and ε are shocks, and i is a policy instrument, write the model in its semi–reduced matrix form (i.e., endogenous targets as a function of shocks, their expected values and the instruments).

Exercise 4

Discuss the theoretical differences between the Keynesian IS studied in the IS/LM model and the New Keynesian one.

Exercise 5

Consider the following New Keynesian model (in log deviations from the steady state):

$$\begin{cases} x = x^e - \sigma\left(i - \pi^e - r^N\right) + g \\ \pi = \beta\pi^e + \lambda x + \varepsilon \end{cases}$$

Assume a discretionary policy and white noise shocks, this implies that terms in expectations are zero (as it is expected that in the next period th4 economy will back to the steady state, i.e. to the natural outcomes). Further, assume that the central bank aims to maximize the following welfare function:

$$W = -\frac{1}{2}x^2 - \frac{\alpha}{2}\pi^2 - \frac{\phi}{2}i^2$$

Then answer the following questions:

1. Assume a demand disturbance ($g = \bar{g}$ and $\varepsilon = 0$), derive the optimal policy and related outcomes.
2. Discuss the above results and, in particular, how ϕ impacts on them.
3. Now, assume a supply disturbance ($g = 0$ and $\varepsilon = \bar{\varepsilon}$) and further assume $\phi = 0$, derive the lead against the wind rule.
4. Derive the optimal interest rate and other equilibrium outcomes (inflation an output gap).
5. Discuss the above result assuming a negative supply shock, i.e., $\bar{\varepsilon} < 0$.