

## Monetary economics – Homework No 1

### Exercise 1

---

Consider the following model (IS/LM)

$$\begin{cases} y = -\sigma(i - \pi^e) + \alpha(g + A) \\ m - p = y - \beta i \end{cases}$$

Assume  $p=0$ ,  $\beta=1$ ,  $\pi^e=0$ ,  $\alpha=2$ ,  $A=0$ ,  $\sigma=2$ ; further assume  $g=0.55$  and  $m=0.95$ .

1. Compute the equilibrium values of  $y$  and  $i$ , consistent with the above parameters.
2. Now, assume that the policymaker aims to increase the output of the 10% keeping the interest rate constant, compute the change in the public consumption and monetary supply consistent with these targets.

### Exercise 2

---

Use the US inflation and unemployment data in the file (phillips.xls) to estimate the Phillips curve by OLS:

$$\pi = -\alpha u + \beta$$

Once that you have obtained  $\alpha$  and  $\beta$ , find the optimal inflation and unemployment rate that the central bank will implement if it aims to minimize the following loss function

$$L = \pi^2/2 + u^2/2$$

### Exercise 3

---

Consider the following model (AD/AS):

$$\begin{cases} y = \sigma \frac{m-p}{\beta+\sigma} + \beta \frac{\sigma\pi^e + \alpha(g+A)}{\beta+\sigma} \\ p = \delta + \phi \frac{y-y^p}{a} - \gamma + \mu \end{cases}$$

Assume that the policymaker's target variables are output and price ( $y$  and  $p$ ) and that its instrument variables are fiscal and income policy ( $g$  and  $\delta$ ).

1. By using matrices, derive a) the reduced form of the model and b) its semi-reduced form [assume  $\pi^e=0$ ,  $A=0$ ].
2. Is the model controllable (i.e., is the Golden Rule satisfied)?
3. Now assume that the instruments of the policymakers are  $g$  and  $m$  instead of  $g$  and  $\delta$ , demonstrate that the model is no longer controllable and discuss the result.