

Macroeconomics A; EI056

Short problems

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1 IS-LM model under perfect information

Question: The economy is described by three relations, that we put in simplified form abstracting from terms that are not central.

The first relation is the IS curve that summarizes the equilibrium of the market for goods where output y is inversely related to the interest rate i , and subject to a goods demand shock u :

$$y = -\alpha i + u \quad (1)$$

The second relation is the demand for money. It links the quantity of money m used by private agents to output y , the interest rate i and a money demand shock v :

$$m = y - ci + v \quad (2)$$

The final relation links the money m used by private agents to the quantity of money issued by the central bank b , the interest rate i and a shock ω to the transmission between central bank money and the quantity used by agents:

$$m = b + hi + \omega \quad (3)$$

You can think of all three relations as written in terms of deviation from a steady state. The shock are of expected value zero and uncorrelated: $Eu = Ev = E\omega = 0$ and $E(uv) = E(u\omega) = E(v\omega) = 0$.

Show that the solution is:

$$\begin{aligned} y &= \frac{1}{\alpha + c + h} [\alpha b + \alpha(\omega - v) + (c + h)u] \\ i &= \frac{1}{\alpha + c + h} [-b - (\omega - v) + u] \\ m &= \frac{1}{\alpha + c + h} [(\alpha + c)b + h(v + u) + (\alpha + c)\omega] \end{aligned}$$

Consider that the central bank can set b after observing the shocks. What is the monetary policy that stabilizes output (i.e. reaches $y = 0$)?

2 Policy under imperfect information

Question: Now consider that the central bank cannot observe which shock is realized. All it knows are the variances, that is $E(u^2)$, $E(v^2)$ and $E(\omega^2)$.

The central bank has to set a rule ex-ante. It has two options:

1. Stabilizes the money quantity that it controls, that is set $b = 0$ no matter what. This is monetary targeting.
2. Stabilizes the interest rate, that is set $i = 0$ no matter what. This is interest rate targeting.

Show that output volatility, $E(y^2)$ is:

$$E(y^2) = \begin{cases} \left(\frac{1}{\alpha+c+h}\right)^2 \left[\alpha^2 (E(\omega^2) + E(v^2)) + (c+h)^2 E(u^2) \right] & \text{under monetary targeting} \\ E(u^2) & \text{under interest rate targeting} \end{cases}$$

What is the best policy? explain the intuition