

Department of International and European Economic Studies - AUEB
MSc Program
Course: Macroeconomics, Fall Semester
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Thursday, January 22, 2004 (09.00-12.00)

FINAL EXAM

Answer any two (2) of the following questions (all have the same weight). GOOD LUCK!

Question 1

A. Consider the linear (AS-IS-LM) macroeconomic model:

$$y_t = \gamma(p_t - E_{t-1}p_t) + \bar{y}$$

$$y_t = c(i_t - (E_{t-1}p_{t+1} - p_t))$$

$$m_t - p_t = y_t + bi_t$$

where y is output, \bar{y} is natural output, p is the price level, i is the nominal interest rate, and m is the money stock, where $m_t = m_{t-1} + u_t$ and u is a stochastic shock with zero mean. Also, $\gamma > 0, b < 0, c > 0$ are parameters. E_{t-1} denotes the rational expectations operator conditional on expectations available at time $t-1$.

- (a) Discuss, very briefly and in simple words, what rational expectations mean.
- (b) Solve for the current price level.
- (c) Solve for current output. Is it affected by monetary policy? Explain.

B. Assume that the utility function of the representative household is given by:

$$U(C) = \ln(C)$$

where C denotes consumption. Also, assume that the wealth of the representative household evolves according to:

$$\dot{B} = w_t L_t + r_t B_t - C_t$$

where B_t is wealth, w_t is the wage rate, L_t is labour, and r_t is the interest rate (note: there is no population growth).

- (a) Write down the problem of the representative household.
- (b) Solve for consumption and explain the first order conditions.

Question 2

A. Assume that there are $i = 1, 2, \dots, I$ agents, where $z^i = c^i + \theta^i z^i$ is i 's budget constraint. Here, z^i is an exogenous endowment, c^i is private consumption and $0 \leq \theta^i \leq 1$ is a tax rate.

Each agent maximizes $u^i(c^i, N)$, where $N \equiv \frac{\sum \theta^i z^i}{I}$ denotes a public good. Assume $u(c, N) = \log c + \nu \log N$, where $\nu > 0$.

- Solve for a decentralized (Nash) equilibrium in tax contributions to the public good. Show that the Nash tax rate decreases with the size of population I and is inefficiently low. (Hint: solve for symmetric equilibria.)
- Discuss the intuition in (a).
- Discuss mechanisms to improve efficiency relative to (a).

B. Explain the following:

- What is the central difference between the exogenous and the endogenous growth approach?
- Is there a difference in the transition path of the economy in the two approaches? Why (or why not)?
- Discuss the intuition in (a).

Use a specific example for comparison and to justify your reply.

Question 3

A. Consider a deterministic economy where in each time-period t real output follows $y_t = \bar{y} - (w_t - p_t)$, where \bar{y} is the log of the natural level of real output, w_t is the log of the nominal wage rate, and p_t is the log of the price level. In each time-period, wage-setters choose a nominal wage that sets expected output equal to its natural level, so that $w_t = E_{t-1} p_t$. The monetary authority chooses price inflation, $\pi_t \equiv p_t - p_{t-1}$, to minimize $(y_t - \tilde{y})^2 + \chi \pi_t^2$, where \tilde{y} is an output target, $\tilde{y} - \bar{y} \equiv \kappa > 0$ and $\chi > 0$.

- Explain what drives the game.
- Solve for equilibrium y_t and π_t in the one-shot game. Explain your results.
- Define the general conditions under which the problem of time inconsistency arises.
- Show that the monetary authorities would be better-off if they cheat, but this cannot be an equilibrium. Explain your results.

B. Write down the problem of a representative firm that faces internal adjustment costs (you can use discrete or continuous time). Then:

- Derive the first order conditions for profit maximization
- Explain the solution in term of the shadow price of capital
- Discuss the economic intuition in (a) and (b).