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M.Sc.(Economics), M.Sc. Financial Economics

Macroeconomics A - ECOM001

Date: 25 May 2007, 10:00 p.m.
Duration: 2 hours and 15 minutes (This includes 15 minutes reading time)

Answer one question from Section A and two questions from Section B.

You are not permitted to start reading this question paper until instructed to do so by an invigilator.

Complete all rough workings in the answer book(s) and cross through any work that is not to be assessed.

Calculators are permitted in this examination provided they are not programmable. Please state the name and type of calculator on your answer book.

Section A

1. (60 points) Suppose an economy is described by the following equations

$$\begin{aligned} \text{(AS)} \quad & y_t = p_t - E_{t-1}[p_t] + u_t \\ \text{(AD)} \quad & y_t = m_t - p_t + v_t \end{aligned}$$

where y_t, p_t and m_t are the logarithms of output, price and the nominal money stock and u_t and v_t are independent shocks with variances σ_u^2 and σ_v^2 respectively. E_{t-1} denotes expectations conditional on private agents' information set at time $t-1$. Private agents do not observe shocks and their expectation of them is zero. The policymaker does not observe the contemporaneous realization of the shocks, but perfectly observes past ones.

(a) Write down the equilibrium vector for this economy.

(b) Obtain an expression for the equilbrium level of output as a function of the money stock m_t and the shocks u_t and v_t.

(c) What is the variance of output if the policymaker follows the publicly known policy rule $m_t = \bar{m}$ with $\bar{m}$ constant?

(d) Can the government reduce the variability of output using a different policy rule if both u_t and v_t are serially uncorrelated? What if u_t is uncorrelated, but $v_t = \rho v_{t-1} + e_t$ where e_t is a serially uncorrelated error with zero mean and variance $\sigma_e^2 < \sigma_v^2$? Do your results contradict Sargent and Wallace's Policy Ineffectiveness Proposition?

2. (60 points) Consider the Ramsey-Cass-Koopmans model. Households maximize

$$U_0 = \int_0^\infty \frac{C_t^{1-\theta} - 1}{1 - \theta} L_t e^{-\rho t} dt,$$

where C_t denotes consumption per household member, $L_t = e^{nt}$ is the household size and θ and ρ are positive parameters. There is just one household in the economy. Output is produced according to the production function $F(K_t, A_t L_t) = K_t^{0.5}(A_t L_t)^{0.5}$ where K_t is the aggregate capital stock and $A_t = e^{gt}$ the efficiency of labour. Capital does not depreciate.

(a) Write down the Lagrangean for the household problem and derive the Euler equation.

(b) Impose general equilibrium and derive the equations that characterize the evolution of capital and consumption per unit of effective labour.

(c) Assume $\rho = 0.04$, $\theta = 1/3$ and $n = g = 0.03$. Derive the steady state values of capital and consumption per unit of effective labour.

(d) Suppose the economy is initially in steady state equilibrium and that at time t_0 a shock to preferences increases θ permanently. Use a phase diagram to explain how the shock affects the time path of capital per unit of effective labour from time t_0 onwards.

3. (60 points) Consider an economy in which the aggregate supply is given by

$$y_t = \pi_t - E_{t-1}[\pi_t] + v_t$$

where y_t is the logarithm of output, π_t is inflation and v_t is a serially uncorrelated shock with zero mean and variance σ^2. E_{t-1} denotes expectations conditional on private agents' information set at time $t - 1$. The shock is observed by the policymaker but not by the private sector. The government welfare function is given by

$$W^g = -\pi_t^2 - (y_t - \gamma)^2,$$

where $\gamma > 0$ is the target level of output. The order of events is the following. First, at time $t - 1$ the government decides whether to commit on a specific rule or not. Second, the private sector forms its expectations, also at time $t - 1$. Third, at time t the shock v_t is observed by the policymaker who then chooses the rate of inflation.

(a) Write down the equilibrium vector for this economy.

(b) Suppose the government can credibly precommit to the linear rule $\pi_t = \alpha$, where α is a constant parameter. What is the optimal value of α and the associated values of the inflation rate, output and the expected value of the loss function? What are the costs and benefits of this rule, if any?

(c) Suppose that, instead, the government decides to delegate monetary policy to an independent central banker with the same preferences and information set as the government but whose income is a linear function of the rate of inflation (i.e. her pay is performance related). The central banker's welfare function is then

$$W^b = -\pi_t^2 - (y_t - \gamma)^2 + \beta - 2\delta\pi_t$$

where $\beta - 2\delta\pi_t$ is the banker's pay. What are the associated values of inflation and output?

(d) What is the optimal value of δ from the government's point of view and the expected value of the government loss function given the optimal δ? Compare the result with that in (b). What is the economic intuition behind your findings?

Section B

4. (20 points) Using the Solow growth model, discuss dynamic inefficiency. What does dynamic inefficiency imply about the response of steady state aggregate consumption to an increase in the aggregate saving rate?

5. (20 points) Explain under what conditions a government is solvent. Discuss whether government solvency is necessary for Ricardian equivalence to hold.

6. (20 points) Discuss the difference between weak and strong scale effects in endogenous growth models. Highlight relevant empirical evidence supporting or questioning either type of effect.

7. (20 points) How does Real Business Cycle theory explain output fluctuations? Discuss its success or lack thereof in accounting for the observed persistence of output.

End of examination
Dr. G. Fella