ECONOMICS TRIPOS Part IIB

Tuesday 27 May 2008	1.30 to 4.30

Paper 2

ECONOMIC PRINCIPLES AND PROBLEMS II

Answer ***four*** questions only.

Write your number ***not*** *your name on the cover sheet of* ***each*** *booklet*

STATIONERY REQUIREMENTS	SPECIAL REQUIREMENTS
20 Page Booklet	*Approved calculators allowed*
Rough Work Pads	
Tags	

You may not start to read the questions printed on the subsequent pages of this question paper until instructed that you may do so by the Invigilator

1. (a) Using basic national income accounting, derive the identity

$$Savings - Investment = Exports - Imports$$

and explain how the interest rate matters for determining the size of the current account.

   (b) What happens to the current account if the rate of return on assets is greater than the rate of return on liabilities? What implications does this have for adjustment in the balance of payments and sustainability of any given level of the current account?

   (c) It has been argued that the United States may be currently earning more income on its assets than it pays on its liabilities. Why? Is it plausible that the United States earns a higher interest rate on its assets than its liabilities? Explain.

2. (a) With reference to the empirical evidence, assess whether the fiscal policies of the EMU member countries have become less counter-cyclical since the Maastricht Treaty of 1992.

   (b) Compare your answer for part (a) to the experience of the UK over the same period.

3. (a) In the context of a standard exogenous growth model, e.g. the Solow model, and under internationally open capital markets, can the domestic economic growth rate be higher and the total welfare larger than under strict financial autarky?

   (b) Provide reasons why capital may not be allocated efficiently even when there are no international capital controls. Are these reasons sufficient to conclude that open capital markets are not a valid policy objective?

4. (a) What is a business cycle?

   (b) What are the main stylised facts that characterise business cycles?

   (c) Does the Lucas island model of imperfect information provide a satisfactory theory of the business cycle? Explain.

5. What are the short and long run growth effects on an economy of raising the fraction of inputs devoted to domestic R&D? Why and how could other economies be affected by such a policy?

6. Consider the following model with monopolistic competition. There is a continuum of households each of which owns a firm and provides labour for some firm other than its own. Households maximise utility

$$U_i = C_i - \frac{1}{\gamma} L_i^\gamma, \quad \gamma > 1,$$

subject to their budget constraint

$$PC_i = P\Pi_i + WL_i,$$

where C_i, L_i and Π_i are consumption, labour supply and profit of the firm owned by household i respectively, P is the aggregate price index and W is the nominal wage rate. Each firm produces a differentiated good and goods are imperfect substitutes. The demand for the good of firm i is

$$Q_i = Y \left(\frac{P_i}{P}\right)^{-\phi}, \ \phi > 1$$

where Y is average real output, P_i is the price of the good of firm i. The production function for a firm i is $Q_i = L_i$, where Q_i is real output of firm i. The labour market is perfectly competitive. Firms maximise profits, subject to their production function. Aggregate demand is given by $Y = M/P$, where M is money supply.

(a) Assuming that all households and firms are identical, derive the equilibrium real output Y and equilibrium price P in this economy. What happens to these when the parameter ϕ increases? Explain.

(b) What would the equilibrium real output be in the absence of labour markets, i.e. in a variation of the model where households work for their own firm?

(c) Do monetary shocks generate short-run fluctuations of the equilibrium output Y that you derived in part (a)? If yes, explain intuitively how. If no, explain intuitively what further ingredient(s) would be able to generate non-neutral money in this economy.

(TURN OVER)

7. Output gap, y_t, is given by

$$y_t = \theta(\pi_t - \pi_t^e) + \varepsilon_t, \quad \theta > 0$$

where π_t is the inflation rate, π_t^e is the rationally expected inflation rate and ε_t is an iid random variable with variance σ_ε^2. Suppose that the Central Bank can control the inflation rate exactly (or at least in expectation). The loss function for the Central Bank is

$$\pi_t^2 + \delta(y_t - y^*)^2, \quad \delta > 0,$$

where δ is the relative weight that the Central Bank attaches to achieving its target.

(a) Derive the equilibrium process for output and inflation. Comment on your answer.

(b) What is implied for the volatilities of output and inflation?

(c) Suppose now there is uncertainty about the preferences of the Central Bank. In particular, assume that the public has an estimate of δ which is given by

$$\delta' = \delta + \omega$$

where $\omega \sim N(0, \sigma_\omega^2)$. Derive the equilibrium process for output and inflation and their corresponding volatilities in this case. Compare these to your answers in parts (a) and (b), and comment. (*Note that δ' is an unbiased estimator of the true Central Bank preference*).

8. Suppose that the evolution of output gap y_t and inflation rate π_t are described by:

$$\begin{aligned} y_t &= -\alpha r_t + \upsilon_t, \quad \alpha > 0, \\ \pi_t &= \pi_t^e + \lambda y_t + \varepsilon_t, \quad \lambda > 0, \end{aligned}$$

where $r_t = i_t - \pi_t$ is the real interest rate, i_t is the nominal interest rate, π_t^e is the expected inflation rate, and υ_t and ε_t are zero mean random disturbances with variances σ_υ^2 and σ_ε^2 respectively. The Central Bank minimises the quadratic loss function

$$\phi y_t^2 + \pi_t^2\,,\ \phi > 0.$$

Assume that the random shocks are observed by the central bank in the current period and that $\pi_t^e = 0$.

(a) Derive the optimal feedback rule of the central bank.

(b) Derive and sketch the efficient policy frontier. What is the effect of a rise in σ_ϵ^2 and σ_υ^2 on the efficient policy frontier? Comment.

(c) Assume now that the central bank observes the shocks to supply and demand only imperfectly. Describe the consequences that this has for the conduct of policy.

(TURN OVER)

9. Consider the following variation of the Solow growth model in continuous time, with technological progress and population growth. The production technology is given by:

$$F(K, AL) = K^{\alpha}(AL)^{1-\alpha}, \quad \alpha \in (0,1)$$

where K is the capital stock (which depreciates at rate δ), A is a productivity factor that grows at rate g, and L is labour. Population grows at rate n. Households save a constant fraction of income, $0 < s < 1$. The economy is closed, i.e. investment equals savings. For each unit of investment undertaken, only a fraction $\gamma \in (0,1)$ is transformed into capital. Part of the investment $(1-\gamma)$ is expropriated in the form of corruption. Therefore capital accumulates according to:

$$\dot{K} = \gamma I - \delta K.$$

(a) Write the law of motion of capital per effective unit of labour. Show that there is a unique non-zero steady state capital per effective unit of labour.

(b) Log-linearize the growth rate of capital per effective labour and find the speed of convergence near the steady-state. Does the speed of convergence depend on γ? Explain.

(c) Let $\alpha = 0.5$ and suppose that the corruption measure increases from γ to 2γ (i.e. corruption decreases). What happens to output and consumption per capita during the transition? What happens to output per capita in the long run?

10. Consider a growth model with physical and human capital, described by the following expressions:

$$
\begin{aligned}
Y &= [(1-a_k)K]^{\alpha}[(1-a_h)H]^{1-\alpha}, \\
\dot{K} &= sY - \delta_k K, \\
\dot{H} &= (a_k K)^{\gamma}(a_h H)^{\phi}(AL)^{1-\gamma-\phi} - \delta_h H, \\
\dot{L} &= nL, \\
\dot{A} &= gA,
\end{aligned}
$$

where Y is output, K is physical capital, H is human capital, A is knowledge that grows at rate g and L is labour. Population grows at rate n. Labour and knowledge are only useful for the education sector, not as direct inputs to goods production. The parameters satisfy the conditions

$$
\begin{aligned}
0 &< \alpha < 1, \quad 0 < a_k < 1, \quad 0 < a_h < 1, \quad 0 < s < 1, \\
0 &< \delta_k < 1, \quad 0 < \delta_h < 1, \quad \gamma > 0, \quad \phi > 0, \quad \gamma + \phi < 1,
\end{aligned}
$$

where a_k and a_h are the fractions of the stocks of physical and human capital respectively used in the education sector, α is the physical capital share in goods production, s is the savings rate, δ_k and δ_h are the depreciation rates for physical and human capital respectively, and γ and ϕ are the shares of physical and human capital respectively in the education sector.

(a) Let $\tilde{k} = \frac{K}{AL}$ and $\tilde{h} = \frac{H}{AL}$. Derive expressions for $\dot{\tilde{k}}$ and $\dot{\tilde{h}}$. Using these, derive equations that describe the set of combinations of $\tilde{k}$ and $\tilde{h}$ such that $\dot{\tilde{k}} = 0$ and $\dot{\tilde{h}} = 0$. Sketch these in the $(\tilde{h}, \tilde{k})$ space.

(b) Does this economy have a non-zero balanced growth path? If so, is it unique? What is the growth rate of output per capita, physical capital per capita, and human capital per capita in this balanced growth path?

(c) Suppose the economy is initially on a balanced growth path, and that there is a permanent increase in s. Show what happens in your $(\tilde{h}, \tilde{k})$ graph of part (a). How does this change affect the path of output per capita over time?

END OF PAPER