UNIVERSITY OF CAMBRIDGE

ECT1
ECONOMICS TRIPOS PART I

Tuesday 13 June 2017 9:00-12:00

Paper 2

MACROECONOMICS

Answer **ALL SIX** questions from Section A and **TWO** questions from Section B.
Section A and B will each carry 50% of the total marks for this paper.
Each question within each section will carry equal weight.

Write your **candidate number** (not your name) on the cover of each booklet.

Candidates are asked to note that there may be a reduction in marks for scripts with illegible handwriting.

If you identify an error in this paper, please alert the **Invigilator**, who will notify the **Examiner**. A **general** announcement will be made if the error is validated.

STATIONERY REQUIREMENTS
20 Page booklet x 1
Rough work pads
Tags

SPECIAL REQUIREMENTS TO BE SUPPLIED FOR THIS EXAMINATION
Calculator - students are permitted to bring an approved calculator

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.

SECTION A

1. Suppose that the job separation and finding rates in an economy for any given month are 2% and 18% respectively. What is the natural rate of unemployment? Explain how information about, as well as the number of, job vacancies may affect the natural rate of unemployment.

2. Consider an economy described by the Solow growth model in which aggregate production is given by the Cobb-Douglas production function. What relationship must the saving rate satisfy in order for the economy to be at the golden rule steady state? Explain.

3. Suppose that there is a permanent increase in the long-run real aggregate income of an economy. What is the effect of this on the aggregate price level? What medium-run policy(ies) could the central bank implement to prevent this from happening?

4. Explain what is meant by '*crowding out*' in the context of fiscal policy analysis. In a small open economy that satisfies the Classical dichotomy, what component(s) of expenditure are crowded out by a tax-financed increase in government spending?

5. How do the following factors matter for the position and slope of the aggregate demand curve in inflation-output space?
   (a) Consumers' marginal propensity to save.
   (b) The long-run real interest rate.

6. Suppose that consumer spending in a fixed-price closed economy depends on long-run disposable income, according to the function $C = \gamma\left(\overline{Y}^e - \overline{T}^e\right)$, where $\overline{Y}^e$ and $\overline{T}^e$ are expected values for long-run income and taxation respectively, and $0 < \gamma < 1$. Assuming that the real interest rate is constant, what is the effect on output, in the short run of:
   (a) a temporary increase in government spending by ΔG?
   (b) a permanent increase in government spending by ΔG?

SECTION B

7. Following the EU membership referendum in June 2016, there was a significant drop of the nominal exchange rate of Euros per Pound (€/£). In the last year this exchange rate has been about 10% lower relative to where it was in the year before June 2016.

   (a) Which of the two main price indices, namely the GDP deflator and the CPI, do you expect to see reacting more to this drop in the exchange rate of €/£, and why?
   (b) Inflation in the Eurozone in the last two years has been very low and close to zero. Assuming that purchasing power parity (PPP) holds, how much would the inflation rate in the UK be, following the recent Pound devaluation? To what extent is this prediction realistic? Explain your reasoning.

8. Consider the following production function

$$F(K, L) = \left[\alpha K^{\frac{\sigma-1}{\sigma}} + (1-\alpha) L^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}},$$

   where K is capital stock, L is labour supply, and $0 < \alpha < 1$ and $\sigma > 0$ are parameters.

   (a) Give an interpretation for the parameters α and σ. Does F exhibit increasing, constant or decreasing returns to scale? Let $k = K/L$ and $y = Y/L$. Derive the production function in per worker terms.
   (b) Let $\alpha = 1/2$ and $\sigma = 2$. Suppose that $F(K, L)$ describes the aggregate production in an economy in which labour force is equal to the total constant population L, capital depreciates at a 10% rate per year, and households save 10% of their income per year.
      i. Write the equation for capital accumulation and use it to demonstrate that this economy will have a unique steady state.
      ii. What is the steady state of capital per worker k^*, output per worker y^*, and consumption per worker c^* in this case?
   (c) Continue assuming that $\alpha = 1/2$ and $\sigma = 2$. Will this economy always have a steady state for any savings or depreciation rate? Explain.

9. What is the role of banks in the monetary system? Describe a simple model of money supply and use it to explain to what extent banks and the monetary authority determine money supply in an economy.

10. The economy of Zenland has a large number of firms, each responsible for setting the price of their products. The ideal price for an individual firm to set, p^*, depends on the economy-wide aggregate price level, P, and real

marginal costs, c, as follows:

$$p^* = P + \lambda\left(c - \overline{c}\right),$$

where $\lambda > 0$ is a parameter and $\overline{c}$ is the expected value for c. Marginal costs, in turn, relate to the economy's aggregate output gap $\left(Y - \overline{Y}\right)$ according to the following linear relationship:

$$c = \overline{c} + \gamma\left(Y - \overline{Y}\right),$$

for some parameter $\gamma > 0$. Before observing c, all firms make an initial choice for the price that they plan to set, which they equate to their expected value of p^*.

(a) Let the fraction of firms that revise their price be a parameter $0 < \theta < 1$. Show that the aggregate supply curve is of the linear form:

$$\pi = \pi^e + \alpha\left(Y - \overline{Y}\right),$$

where $\pi = P - P_{-1}$ is the inflation rate, π^e is expected inflation, and the slope α depends on parameters θ, λ and γ.

(b) Now suppose that the fraction of firms revising their price is given by:

$$\frac{\left(c - \overline{c}\right)^2}{\phi + \left(c - \overline{c}\right)^2},$$

where $\phi > 0$ is a parameter.

i. Provide a brief interpretation of this expression.

ii. Derive an expression for the aggregate supply curve in this case, and sketch it in inflation-output space.

(c) Discuss the implications of your result in (b) for the sensitivity of output and inflation to demand shocks.

11. A small open economy with fixed prices and a fixed exhange rate is characterised by the following aggregate relationships:

$$\begin{aligned} C &= 100 + 0.7\left(Y - T\right), \\ I &= 120 - 10r, \\ G &= 150, \\ T &= 150, \\ NX &= 160 - 0.1Y - 50e, \\ e &= \overline{e}, \end{aligned}$$

where Y is aggegrate income, C is consumption, I is investment, G is government spending, T is taxation, NX is net exports, e is the nominal exchange rate and r is the real interest rate. Net exports are assumed to equal the current account balance throughout.

(a) Suppose that capital is perfectly mobile internationally, with a world real interest rate $r^w = 2$. Derive expressions for the equilibrium income and net exports in terms of $\overline{e}$. For what values of $\overline{e}$ does international capital flow out of this economy?

(b) The central bank decides that the income level in (a) is too low. It bans private-sector capital flows, and chooses r to maximise income, subject to a restriction that the official sector cannot borrow internationally.

i. Solve for the value of Y that is chosen, as a function of $\overline{e}$. For what values of $\overline{e}$ will the strategy be successful?

ii. Derive the relationship between the chosen value of r and $\overline{e}$, and explain its form intuitively.

(c) Assess the different policy options that are available in the event that the output level in (b) remains too low.

12. What policy conclusions should be drawn from the observation that monetary policy only affects the economy after 'long and variable lags'?

END OF PAPER