Queen Mary
University of London

*January Examination Period 2024*

*ECN206 Macroeconomics II* *Duration: 2 hours*

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## Answer ALL questions

Calculators are permitted in this examination. Please state on your answer book the name and type of machine used.

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

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**Examiner: Elisabet Kemp Stefansdottir**

**Question 1**

Answer with either True or False and then provide at most three sentences including an explanation with empirical and/or theoretical backing to support your answer.

A) In the Romer growth model, the accumulation of capital is the driving force behind sustained long-term economic growth.

**[10 marks]**

B) In the augmented Solow growth model with exogenous growth in population and productivity the economy eventually settles down to a steady state with no economic growth.

**[10 marks]**

C) In a two period model of household consumption choice where household will save for future consumption, a higher discount factor will reduce savings.

**[10 marks]**

D) When a country's currency depreciates foreigners find that its exports are cheaper and domestic residents find that imports from abroad are more expensive.

**[10 marks]**

E) A current account deficit will reduce the net international investment position of an economy.

**[10 marks]**

**Question 2**

Consider the Solow growth model with population growth. Assume that population grows at rate *n* such that $L_{t+1} = (1+n)L_t$, where $L_t$ is population at time *t*. The following system of equations fully describes the model economy:

$$c_t + i_t = y_t \quad (1)$$

$$(1+n)k_{t+1} = (1-\delta)k_t + i_t \quad (2)$$

$$i_t = s \cdot y_t \quad (3)$$

$$y_t = k_t^{\alpha} \quad (4)$$

Where all variables are written in terms of per capita values, for example output per capita $y_t = Y_t/L_t$.

a) Derive the fundamental law of motion, i.e. the equation describing net investment $\Delta k_{t+1}$ as a function of current capital stock $k_t$.

**[5 marks]**

b) Derive the steady state level of capital and output per capita in this economy.

**[5 marks]**

c) Plot the Solow diagram showing output, investment and the condition for steady state. Make sure to mark your axes, all lines and steady state.

**[5 marks]**

d) Consider the economies of South Korea and China. Assume the two economies have the same depretiation rate, saving rate and population growth rate but that China's current output per capita is only half of South Korea's output per capita. Discuss growth and standards of living in the two economies in the short run and the long run. Use the Solow growth model to guide your discussion.

**[10 marks]**

**Question 3**

Consider a two-period small open economy without production. Suppose that there is a large number of identical households in the economy. They optimally decide how much to consume in each period, $C_t$, as well as bond holdings, $B_1$, in the first period, which pays the interest rate $r_1 = r^*$. We can assume $B_2 = 0$. Household preferences are given by

$$U(C_1, C_2) = \log C_1 + \beta \log C_2$$

where $\beta \in (0,1)$ is the subjective discount factor. Assume that consumption is a composite of tradable goods, $C_t^T$, and non-tradable goods, $C_t^N$, described by the Cobb-Douglas aggregation technologies $C_t = (C_t^T)^{\gamma}(C_t^N)^{1-\gamma}$ where $\gamma \in (0,1)$ is a parameter defining the relative importance of each type of good in utility.
They receive exogenous income endownments in the each period of tradable, $Q_t^T$, and non-tradable, $Q_t^N$, goods. They start period 1 with no debt or assets, $B_0 = 0$. The representative household will try to maximise it's utility subject to its budget constraint each period

$$P_t^T C_t^T + P_t^N C_t^N + P_t^T B_t = (1 + r_{t-1})B_{t-1} + P_t^T Q_t^T + P_t^N Q_t^N$$

Where $P_t^T$ and $P_t^N$ are prices of tradable and non-tradable goods at time *t*. The representative household's optimality conditions are

$$C_1^T = \frac{1}{1+\beta}\left(Q_1^T + \frac{Q_2^T}{1+r^*}\right) \quad (1)$$

$$C_t^N = \frac{1-\gamma}{\gamma}\frac{c_t^T}{p_t} \quad (2)$$

where $p_t = P_t^N / P_t^T$ is the relative price of non-tradable goods.

a) Derive expressions for the current account in period 1, $CA_1$, and trade balance in period 1, $TB_1$.

**[5 marks]**

b) What is the effect of an increase in the world interest rate, $r^*$, on the economy's current account, $CA_1$. Please provide at least 3 sentence explanation on the effect.

**[10 marks]**

c) What is the affect of an increase in the world interest rate, $r^*$, on the relative price of non-tradable goods. Please provide at least 3 sentence explanation on the effect.

**[10 marks]**

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