Queen Mary
University of London

January Examination Period 2025

ECN206 Macroeconomics II *Duration: 2 hours*

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Answer ALL questions

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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 – 50 marks in total

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 overlapping generations model, households save an exogenous fraction of disposable income.

[10 marks]

B) In the Solow growth model, optimal economic growth occurs when households save according to the Golden Rule.

[10 marks]

C) Suppose Germany and Switzerland have the same fraction of researchers and their researchers are equally productive at creating new ideas, but Germany's population is larger. According to the Romer growth model, Germany has higher economic growth.

[10 marks]

D) Consider the international investment position of the US and China in the period after 1980 until today. In the last few decades, the US has been a net borrower while China has been a net lender.

[10 marks]

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

[10 marks]

Question 2 – 25 marks in total

Consider the augmented Solow growth model. Assume that population grows at rate *n* such that $L_{t+1} = (1+n)L_t$, where L_t is population at time *t*, and that productivity grows at rate *z* such that $Z_{t+1} = (1+z)Z_t$, where $Z_t$is labour augmenting productivity at time *t.* Households save a fraction *s* of their income and consume C_t. Capital, K_t, takes time to build, it depreciates at the rate δ and firms' investment is denoted I_t. The production function is Cobb-Douglas, $Y_t = K_t^{\alpha} L_t^{1-\alpha}$. The following system of equations fully describes the model economy:

$$\hat{c}_t + \hat{\imath}_t = \hat{y}_t \quad (1)$$

$$(1+n)(1+z)\hat{k}_{t+1} = (1-\delta)\hat{k}_t + \hat{\imath}_t \quad (2)$$

$$\hat{\imath}_t = s \cdot \hat{y}_t \quad (3)$$

$$\hat{y}_t = \hat{k}_t^{\alpha} \quad (4)$$

Where all variables are written in terms of per efficiency unit of labour, for example output per efficiency units of labour is $\hat{y}_t = Y_t/(Z_t L_t)$.

The fundamental law of motion for capital in this model is

$$\Delta\hat{k}_{t+1} = \frac{1}{(1+n)(1+z)}\left(s\hat{k}_t^{\alpha} - (\delta + n + z + nz)\hat{k}_t\right)$$

a) Derive the steady state level of capital, output and consumption per efficiency unit of labour in this economy.

[5 marks]

b) Plot the Solow diagram showing output, investment, and the condition for the steady state. Make sure to mark your axes, all lines and steady state. All variables should be noted in per efficiency units of labour.

[5 marks]

c) Derive an expression for the Golden Rule savings rate.

[5 marks]

d) What is economic growth in the long run according to this model? Consider the economies of South Korea and China. Assume that the two economies have the same depreciation rate, saving rate, and population growth rate; but that China's productivity growth is double that of South Korea's. Using the augmented Solow growth model, discuss long run economic growth in the two economies.

[10 marks]

Question 3 – 25 marks in total

Consider a two-period small open economy without production. Suppose that there are a large number of identical households in the economy. They live for two periods. They receive exogenous income endowments in the first period, Q_1, and in the second period, Q_2, respectively. They start period 1 with no debt or assets, $B_0 = 0$. They optimally decide how much to consume in the first period, C_1, and second period, C_2, 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 discount factor. The representative household will try to maximise its utility subject to its two budget constraints

$$C_1 + B_1 = Q_1$$
$$C_2 = (1 + r_1)B_1 + Q_2$$

We can combine the two budget constraints into the intertemporal budget constraint where $\boldsymbol{W = Q_1 + \frac{Q_2}{1+r^*}}$ represents lifetime-wealth. The representative household's optimal consumption choice is

$$C_1 = \frac{1}{1+\beta} W \quad (1)$$

$$C_2 = \frac{\beta}{1+\beta} W(1 + r^*) \quad (2)$$

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 a 3 sentence explanation on the effect.

[10 marks]

c) Assume that income doubles between periods, $Q_2 = 2Q_1$. Derive an expression for the net international investment position (NIIP) of the economy at the end of period 1. You can assume $r^* = 4\%$ and $\beta = 0.9$. Discussion whether the country is a net borrower or net lender.

[10 marks]

End of Paper