香港科技大學
THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

EXAMINATION *Answer Book*

Please complete the following :

Course Code : ECON 3123

Course Title : Macroeconomic theory (I)

Date of Examination : 10-10-2025

Student Number : 21166493

Student Name : Zuo Yunqi Joshua

Instructions :

1. Write your answers on the **RIGHT-HAND** page. Use the left-hand page only for rough work. Any work that appears on the left-hand page will **NOT** be marked.
2. Begin **EACH** question on a **NEW** page. Write down the question number at the top of each page.
3. No supplementary sheets may be submitted, unless allowed by the examiner.
4. No part of this answer book is to be taken away from the examination.

Enter the question numbers below in the **SAME ORDER** as you have answered the questions :

Question No.	For use by the examiner Marks	
MC		
6		
7		
8		
Total marks	86	

No. of answer books used : 1

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Declaration of Academic Integrity

I confirm that I have answered the questions using only materials specifically approved for use in this examination, that all the answers are my own work, and that I have not received any assistance during the examination.

Student's Signature :

Checked by Yang Lu

MC

1. ~~B~~
2. D
3. ~~B~~
4. D
5. ~~D~~

8

Q6

(a) In equilibrium, $8 = Y = C + I + G$.

$$Y = c_0 + c_1(Y - T) + b_0 + b_1 Y - b_2 \bar{i} + \bar{G}$$

$$Y = c_0 + c_1(Y - t_0 - t_1 Y) + b_0 + b_1 Y - b_2 \bar{i} + \bar{G}$$

$$Y = c_0 + c_1(1 - t_1)Y - c_1 t_0 + b_0 + b_1 Y - b_2 \bar{i} + \bar{G}$$

$$[1 - b_1 - c_1(1 - t_1)]Y = c_0 - c_1 t_0 + b_0 - b_2 \bar{i} + \bar{G}$$

$$Y = \frac{1}{1 - b_1 - c_1(1 - t_1)}[c_0 - c_1 t_0 + b_0 - b_2 \bar{i} + \bar{G}]$$

Since $T = t_0 + t_1 Y$, the equilibrium tax is given by

$$T = t_0 + \frac{t_1}{1 - b_1 - c_1(1 - t_1)}[c_0 - c_1 t_0 + b_0 - b_2 \bar{i} + \bar{G}]$$

(b) To keep the budget balanced, the government should decrease G so that it equals $T\downarrow$ by $\frac{t_1}{1 - b_1 - c_1(1 - t_1)}$ times. From part (a), we see that $Y = c_0 + c_1(Y - T) + b_0 + b_1 Y - b_2 \bar{i} + \bar{G}$, if $G = T$, then the overall output Y will decrease by $(1 - c_1)$ times of G. Since a drop in b_0 decreases output Y, this adjustment in G strengthens the effect of drop of b_0.

(c) Since private saving $S_p = Y - T - C$,

$$S_p = Y - (t_0 + t_1 Y) - [c_0 + c_1(Y - T)]$$

$$S_p = Y - t_0 - t_1 Y - [c_0 + c_1(Y - t_0 - t_1 Y)]$$

$$S_p = Y - t_0 - t_1 Y - c_0 - c_1(1 - t_1)Y + c_1 t_0$$

$$S_p = (1 - t_1)Y - t_0 - c_0 - c_1(1 - t_1)Y + c_1 t_0$$

$$S_p = (1 - c_1)(1 - t_1)Y - t_0 - c_0 + c_1 t_0$$

This means when $Y\downarrow$ after adjusting G, the equilibrium private saving also $\downarrow$.

Q7

(a) In equilibrium, $Y = C + I + G$, so we have

$$Y = 0.5 + 0.2(Y-T) + 0.2 + 0.3Y - 2.5(i+x) + G$$

Substitute $T=1, G=1, x=5\%$.

$$Y = 0.5 + 0.2(Y-1) + 0.2 + 0.3Y - 2.5(i+0.05) + 1$$

$$Y = 0.5 + 0.2Y - 0.2 + 0.2 + 0.3Y - 2.5i - 0.125 + 1$$

$$0.5Y = 1.375 - 2.5i$$

$$Y = 2.75 - 5i$$

10

(b) when $i = \bar{i} = 5\%$, $Y = 2.75 - 5 \cdot 0.05 = 2.5$

As GDP deflator $= 2$, nominal income $\$Y = 2.5 \cdot 2 = 5$

M^d at equilibrium $= 5 \cdot (0.7 - 4 \cdot 0.05) = 2.5$

Therefore, we require $M^s = M^d = 2.5$

Given $c = 0.2$, $\theta = 0.25$, the money multiplier is given by

$$\frac{1}{c + (1-c)\theta} = 2.5$$

The required monetary base is $H^s = \frac{M^s}{\text{money multiplier}} = 1$

10

(c) Since Y and $i = \bar{i}$ do not change, M^s is still 2.5

The new money multiplier $= \frac{1}{0.2 + 0.8 \cdot 0.3}$, given $\theta = 0.3$.

$= \frac{25}{11}$

The new monetary base will be $H^s = \frac{M^s}{\frac{25}{11}} = 1.1$

5

(d) Change in x affects output Y, hence from (a), with $i = \bar{i} = 5\%$

$$Y = 0.5 + 0.2(Y-1) + 0.2 + 0.3Y - 2.5(i + 0.15) + 1$$

$$0.5Y = 1.125 - 2.5(0.05)$$

$$Y = 2$$

The new nominal income $\$Y = 2 \cdot 2 = 4$

New $M^s = 4 \cdot (0.7 - 4 \cdot 0.05) = 2$

So the new monetary base $H^s = \frac{M^s}{\text{money multiplier}}$, where

money multiplier $= \frac{25}{11}$ from (b)

$$H^s = \frac{2}{\frac{25}{11}} = 0.88$$

5

Q8

(a) Current price of the 2-year bond is given by

$$PV_2 = \frac{100}{(1+i+r)(1+i_1^e)}$$

$$= \frac{100}{(1+4\%+5\%)(1+3\%)}$$

$$= \$89.071 \text{ (cor to 5 sig.fig)}$$

(b) Similarly, current price of 3-year bond is given by

$$PV_3 = \frac{100}{(1+i+r)(1+i_1^e+r)(1+i_2^e)}$$

$$= \frac{100}{(1+4\%+5\%)(1+3\%+5\%)(1+2\%)}$$

$$= \$83.282 \text{ (cor to 5 sig.fig)}$$

(c) To calculate the current yield, we let current yield be i_c

Since $PV_3 = 83.282 = \frac{100}{(1+i_c)^3}$

$$(1+i_c)^3 = \frac{100}{83.28}$$

$$i_c = 6.2878\% \text{ (cor to 5 sig.fig)}$$

The current yield of the bond is 6.2878%