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 : 21057678

Student Name : Wong Chun Man

THE HKUST ACADEMIC HONOR CODE

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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 :

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	
1		
2		
3		
4		
5		
6		
7		
8		
Total marks	18	

No. of answer books used : _____

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MC

1) B
2) D
3) A
4) D
5) D

8

Short-Answer Questions

6a) $Y = C + I + G$ (In equilibrium)

$\because G = T$, $Y = c_0 + c_1(Y - T) + b_0 + b_1 Y - b_2 i + t_0 + t_1 Y$

$Y = c_0 + (c_1 + b_1 + t_1) Y - c_1 T + b_0 - b_2 i + t_0$

$Y(1 - c_1 - b_1 - t_1) = c_0 - c_1 T + b_0 - b_2 i + t_0$

~~$Y = c_0 - c_1(t_0 + t_1 Y) + b_0 - b_2 i + t_0$~~

$Y(1 - c_1 - b_1 - t_1 + c_1 t_1) = c_0 - c_1 t_0 + b_0 - b_2 i + t_0$

$$Y = \frac{c_0 - c_1 t_0 + b_0 - b_2 i + t_0}{1 - c_1 - b_1 - t_1 + c_1 t_1}$$

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taxes T is:

$$T = t_0 + t_1 Y$$

$$= t_0 + t_1 \left(\frac{c_0 - c_1 t_0 + b_0 - b_2 \bar{i} + t_0}{1 - c_1 - b_1 - t_1 + c_1 t_1} \right)$$

b) As there is drop in b_0, from equations we solved in part (a), Y and T will both drop, resulting into ~~in balance~~ unbalanced budget. If G remains constant.

6a) $Y = C + I + G$ (equilibrium output, $Z = Y$)

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

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

$$Y = \frac{c_0 - c_1 T + b_0 - b_2 \bar{i} + G}{1 - c_1 - b_1}$$

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taxes T:

$$T = t_0 + t_1 Y$$

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

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

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b) As b_0 decreases, Y decreases ~~by rate of~~ ~~$\frac{\Delta b_0}{1-c_1-b_1}$~~, while tax decreases as well ~~by rate of $t_1\left(\frac{\Delta b_0}{1-c_1-b_1}\right)$~~, we should increase G ~~by Δb_0~~ ~~same amount of change of b_0, such that if $t_1(1-G$~~ ~~$\frac{t_1}{1-c_1-b_1} > 1$~~, because then with the multiplier effect, with every extra dollar spent, government could receive more than 1 dollar of tax, eventually balancing budget again, ~~else government should not increase spending, because it won't have net tax income ($\Delta G - \Delta T$), but I assume this question wants to increase spending~~, so it counteracts the effect of drop in b_0 on output, because the extra spending

of government compensates the drop in b_0.

c) ~~$I = b_0 + b_1 Y - b_2 i$~~

~~as Y remains unchange, b_0 drops, I decreases~~

~~private saving is $Y - C - T$, T increases,~~

~~so private saving decreases.~~

private saving is $Y - C - T$, note that for $G = T$, $|\Delta G| > |\Delta b_0|$, so the net output has increased, then, both ~~Y and T~~ Y, C and T increase, we can rewrite ~~as~~ ~~$Y = c_1(Y-T)$~~ the change as $\Delta \text{Saving private} = \Delta Y - \Delta c_1 (Y-T)$

$$-\Delta T = \Delta(Y - c_1 Y) + \Delta c_1 T - \Delta T$$

$$= \Delta Y (1 - c_1) + T(c_1 - 1)$$

$$= \Delta (Y - T)(1 - c_1)$$

We assume $c_1 + b_1 < 0.5$, and $Y > T$, so private saving increases.

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7a) $Z = C + I + G$

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

$= 0.5 + 0.2(Y - 1) + 0.2 + 0.3Y - 2.5(i + 5\%) + G$

$= 0.5 + 0.5Y - 0.2 + 0.2 - 2.5(i + 5\%) + G$

Note that in equilibrium, $Z = Y$,

so

$0.5Y = 0.5 - 2.5(i + 5\%) + G$

$Y = 1 - 5(i + 5\%) + G$

$5i = 1 - 0.25 + G - Y$

$i = \frac{0.75 + G - Y}{5} = \frac{1.75 - Y}{5}$

2

b) $\frac{1}{c + \theta(1 - c)} H^d = Y \times (0.7 - 4i)$

2

Here, $c = 0.2$, $\theta = 0.25$, and $H^d = H$ in equilibrium,

then, ~~$H = [0.2 + 0.25(0.8)] * Y \cdot (0.7 - 0.2)$~~

$H =$

$H = (0.4)Y \cdot (0.5) = 0.2Y$

We have $Y = 1 - 5(5\% + 5\%) + 1 = 1.5$, so $H = 0.3$

c) Similar, but $\theta = 0.3$

Then

$$H = (0.2 + 0.8 \cdot 0.3) \cdot 0.5Y$$

$$= 0.22Y = 0.22 \cdot 1.5 = 0.33$$

d) Now we have $Y = 1 - 5(5\% + 15\%) + 1 = 1$,

and $H = 0.2Y$ (from part b),

so $H = 0.2$

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8a) $100 \cdot \frac{1}{(1+0.05+0.03)} \cdot \frac{1}{(1+0.05+0.04)}$

$\approx \$84.9473$

b) $100 \cdot \frac{1}{(1+0.05+0.02)(1+0.05+0.03)(1+0.05+0.04)}$

$\approx \$79.3900$

c) $\left(\frac{100}{79.3900}\right)^{\frac{1}{3}} - 1$

$\approx 7.9969\%$

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