

1. Answer the following questions.

1.1 Suppose Govt Multiplier is 5 and $\Delta G = 5$. Find ΔY .

1.2 Suppose Tax Multiplier is -3 and $\Delta Y = -9$. Find ΔT .

1.3 Suppose $\Delta Y = 10$ and $\Delta I = 2$. Find Investment Multiplier.

$$1.1) \text{ Govt Multiplier} = \frac{\Delta Y}{\Delta G} = 5$$

$$\Delta Y = 5 \times 5 = 25$$

$$1.2) \text{ Tax Multiplier} = \frac{\Delta Y}{\Delta T} = -3$$

$$\Delta T = \frac{-9}{-3} = 3$$

$$1.3) \text{ Investment Multiplier} = \frac{\Delta Y}{\Delta I} = \frac{10}{2} = 5$$

2. From $Y = C + I + G$ where $C = C_0 + C_1(Y - T)$, find

2.1 Equilibrium Output Y^*

2.2 $\Delta Y / \Delta I$

2.3 $\Delta Y / \Delta G$

2.4 $\Delta Y / \Delta T$

2.5 Balanced-Budget Multiplier (BBM)

2.6 Explain what the BBM is.

$$2.1) \text{ AE} = C + I + G$$

$$Y = \text{AE}$$

$$Y^* = C + I + G$$

$$= C_0 + C_1(Y - T) + I + G$$

$$= C_0 + C_1 Y - C_1 T + I + G$$

$$Y(1 - C_1) = C_0 - C_1 T + I + G$$

$$Y = \frac{1}{(1 - C_1)} (C_0 - C_1 T + I + G)$$

$$2.5) \text{ BBM}$$

$$= \frac{\Delta Y^*}{\Delta G} + \frac{\Delta Y^*}{\Delta T} = \frac{1 - C_1}{1 - C_1}$$

2.6) It is how much change in aggregate output

when both G and T increase by 1 unit.

$$2.2) \text{ AE} = C + I + G$$

$$= C_0 + C_1 Y - C_1 T + I + G$$

$$= (C_0 - C_1 T + I + G) + C_1 Y$$

$$\frac{\Delta Y}{\Delta I} = \frac{1}{1 - \text{slope AE}}$$

$$= \frac{1}{1 - C_1}$$

$$2.3) \frac{\Delta Y}{\Delta G} = \frac{1}{1 - \text{slope AE}}$$

$$= \frac{1}{1 - C_1}$$

$$2.4) \frac{\Delta Y}{\Delta T} = \frac{-\text{MPC}}{1 - \text{slope AE}}$$

$$= \frac{-C_1}{1 - C_1}$$

3. Assume a closed economy with government. The country has the following components of aggregate expenditure.

$$C = 300 + 0.75(Y_d)$$

$$I = 50$$

$$G = 50$$

$$T = 50 \text{ (lump-sum tax)}$$

- 3.1 Use the $Y = AE$ (standard) approach to find the equilibrium output.

- 3.2 Draw the Keynesian Cross, and find the intercept on the vertical axis and the slope of the AE schedule.

- 3.3 Use the Leakage = Injection (or saving/investment) approach to find the equilibrium level of output.
(Hint: the equilibrium condition is $S + T = I + G$, with $Y_d = Y - T = C + S$)

- 3.4 Draw the saving/investment curve to show the equilibrium.

- 3.5 Suppose that the government decides to build more roads, raising government spending by 50 units, but this project is to be financed by the increase in net taxes of 50 units. Use the $Y = AE$ (standard) approach to find the new equilibrium output.

- 3.6 Use the Balanced-Budget Multiplier (BBM) derived from Question 2.5 to find the new equilibrium output.

3.1) $Y = AE$

$$Y = C + I + G$$

$$Y = 300 + 0.75(Y - 50) + 50 + 50$$

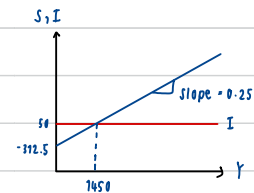
$$Y = 362.5 + 0.75Y$$

$$Y - 0.75Y = 362.5$$

$$0.25Y = 362.5$$

$$Y^* = 1450$$

3.4)



$$Y_q = C + S$$

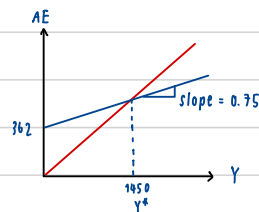
$$Y - T = C + S$$

$$Y - 50 = 300 + 0.75(Y - 50) + S$$

$$S = -300 - 0.75Y + 37.5 + Y - 50$$

$$= -312.5 + 0.25Y$$

3.2)



3.5) $G = 100$ $T = 100$

$$Y = AE$$

$$= C + I + G$$

$$Y = 300 + 0.75(Y - 100) + 50 + 100$$

$$Y = 375 + 0.75Y$$

$$0.25Y = 375$$

$$Y = 1500$$

3.3) Leakage = Injection

$$S + T = I + G \quad \text{--- (1)}$$

Saving function

$$Y - T = C + S \quad \text{--- (2)}$$

$$S + T = Y - C$$

$$Y - C = I + G$$

$$Y - C = 50 + 50$$

$$Y - C = 100$$

$$Y - (300 + 0.75Y_q) = 100$$

$$Y - (300 + 0.75(Y - 50)) = 100$$

$$Y - (300 + 0.75Y - 37.5) = 100$$

$$0.25Y = 362.5$$

$$Y^* = 1450$$

3.6) $BBM = \frac{\Delta Y^*}{\Delta G_0} + \frac{\Delta Y^*}{\Delta T_0} = \frac{1 - C_1}{1 - C_1} = 1$

When the government spending and lump-sum tax increase by 1, income will increase 1.

Therefore, the equilibrium output will increase 50.

$$\therefore 1450 + 50 = 1500$$

4. From $Y = C + I + G + (X - M)$
where $C = C_0 + C_1(Y - T)$ and $M = M_0 + M_1(Y)$, find

4.1 Equilibrium Output Y^*

4.2 $\Delta Y / \Delta I$

4.3 $\Delta Y / \Delta G$

4.4 $\Delta Y / \Delta T$

4.5 Balanced-Budget Multiplier (BBM)

$$4.1) \quad Y = C_0 + C_1(Y - T) + I + G + (X - (M_0 + M_1(Y)))$$

$$Y = C_0 + C_1 Y - C_1 T + I + G + X - M_0 - M_1 Y$$

$$Y(1 - C_1 + M_1) = C_0 - C_1 T + I + G + X - M_0$$

$$Y = \frac{1}{1 - C_1 + M_1} (C_0 - C_1 T + I + G + X - M_0)$$

$$4.2) \quad Y = (C_0 - C_1 T + I + G + X - M_0) + (C_1 Y - M_1 Y)$$

$$\frac{\Delta Y}{\Delta I} = \frac{1}{1 - \text{slope AE}}$$

$$= \frac{1}{1 - C_1 + M_1}$$

$$4.3) \quad \frac{\Delta Y}{\Delta G} = \frac{1}{1 - \text{slope AE}}$$

$$= \frac{1}{1 - C_1 + M_1}$$

$$4.4) \quad \frac{\Delta Y}{\Delta T} = \frac{-MPC}{1 - \text{slope AE}}$$

$$= \frac{-C}{1 - C_1 + M_1}$$

$$4.5) \quad \frac{\Delta Y}{\Delta G} + \frac{\Delta Y}{\Delta T} = \frac{1 - C_1}{1 - C_1 + M_1}$$

5. Assume an open economy with government. The country has the following components of aggregate expenditure.

$$C = 200 + 0.7(Y_d)$$

$$I = 75$$

$$G =$$

75

$$T = 50$$

$$X = 50$$

$$M = 50 + 0.1Y$$

- 5.1 Use the $Y = AE$ approach to find the equilibrium. Is $Y = 300$ an equilibrium? If it is not, explain the adjustment process towards equilibrium.

- 5.2 Based on what you have derived in Question 4, calculate the investment, government spending, tax, and balanced-budget multipliers.

- 5.3 Interpret the value of each of the multipliers.

Suppose that the full-employment output (Y_f) is 600;

- 5.4 What type of output gap is the economy currently experiencing?

- 5.5 Draw the Keynesian Cross. Identify its slope and intercept. Also, illustrate the output gap.

Now, government wants to correct the output gap by moving the economy to the full-employment level, and is considering different policies.

(Hint: use the multipliers from Question 5.2 to answer the following questions)

- 5.6 If the government wants to adjust **only its spending (G)**, how much G should be changed?

- 5.7 If the government wants to adjust **only its net taxes (T)**, how much T should be changed?

- 5.8 If the government wants to boost **only investment (I)**, how much I should be changed?

- 5.9 If the government wants to implement a balanced-budget policy, what should the government do with G and T?

$$5.1) \quad Y = AE$$

$$= C + I + G + (X - M)$$

$$= 200 + 0.7(Y - 50) + 75 + 75 + (50 - 50 - 0.1Y)$$

$$Y = 315 + 0.6Y$$

$$0.4Y = 315$$

$$Y = 787.5$$

No, Y is less than Y^* . It means that the country produce G&S less than DAE.

The inventory is decreases. Therefore, the production should be increase.

$$5.2) \quad AE = C + I + G + (X - M)$$

$$= 200 + 0.7Y - 35 + 75 + 75 + 50 - 50 + 0.1Y$$

$$AE = 0.6Y + 75$$

$$\frac{\Delta Y^*}{\Delta I} = \frac{1}{1 - c_1 + m_1} = \frac{1}{1 - 0.7 + 0.1} = 2.5$$

$$\frac{\Delta Y^*}{\Delta G} = \frac{1}{1 - c_1 + m_1} = \frac{1}{1 - 0.7 + 0.1} = 2.5$$

$$\frac{\Delta Y^*}{\Delta T} = \frac{-c}{1 - c_1 + m_1} = \frac{-0.7}{1 - 0.7 + 0.1} = -1.75$$

$$BBM = \frac{\Delta Y^*}{\Delta G} + \frac{\Delta Y^*}{\Delta T} = 2.5 - 1.75 = 0.75$$

5.3) When investment increase by 1 unit, output will increase by 2.5.

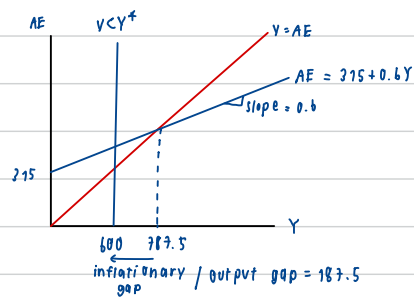
When government spending increase by 1 unit, output will increase by 2.5.

When tax increase by 1 unit, output will increase by 1.75.

When government spending and tax are increase by 1 unit, output will increase by 0.75.

5.4) Inflationary gap

5.5)



$$5.6) \quad \frac{\Delta Y^*}{\Delta G} = 2.5$$

$$\Delta G = \frac{-187.5}{2.5} = -75$$

$$5.7) \quad \frac{\Delta Y^*}{\Delta T} = -1.75$$

$$\Delta T = \frac{-187.5}{-1.75} = 107.142$$

$$5.8) \quad \frac{\Delta Y^*}{\Delta I} = 2.5$$

$$\Delta I = \frac{-187.5}{2.5} = -75$$

$$5.9) \quad \frac{\Delta Y^*}{\Delta G} + \frac{\Delta Y^*}{\Delta T} = 0.75$$

$$\frac{-187.5}{0.75} = \Delta G \& \Delta T$$

$$\Delta G \& \Delta T = -250$$

6. Explain the role of Import as an automatic stabilizer. If the government wants to further stabilize the economy, is there anything that the government can do with its tax system? Explain.

The purpose of an automatic stabilizer is to decrease economic fluctuations.

When the economy is bad, government need to reduce taxes and imports to raise people's income so they can spend more money, which would help the economy grow.

When the economy is good, government need to raise taxes and imports that will reduce income. Therefore, individuals will spend less in order to slow down the economy.

7. Let $S = -200 + 0.5Y$ and $I = 50$, be the saving function and investment.

7.1 Use the saving/investment approach to find the equilibrium output.

7.2 Find the equilibrium saving. (Hint: substitute Y^* into S)

Suppose people decide to save more, increasing autonomous saving by 100.

7.3 Use the saving/investment approach to find the new equilibrium output.

7.4 Find the new equilibrium saving. (Hint: substitute new Y^* into S)

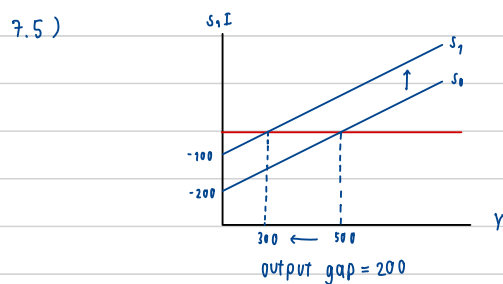
7.5 Comment on your result.

$$\begin{aligned} 7.1) \quad S &= I \\ -200 + 0.5Y &= 50 \\ \frac{1}{2}Y &= 250 \\ Y^* &= 500 \end{aligned}$$

$$\begin{aligned} 7.2) \quad S^* &= -200 + 0.5Y^* \\ &= -200 + 0.5(500) \\ &= -200 + 250 \\ &= 50 \end{aligned}$$

$$\begin{aligned} 7.3) \quad S &= -200 + 0.5Y + 100 \\ &= -100 + 0.5Y \\ S &= I \\ -100 + 0.5Y &= 50 \\ \frac{1}{2}Y &= 150 \\ Y^* &= 300 \end{aligned}$$

$$\begin{aligned} 7.4) \quad S &= -100 + 0.5Y^* \\ &= -100 + 0.5(300) \\ &= -100 + 150 \\ &= 50 \end{aligned}$$



$S \uparrow \Rightarrow$ the economy slow down $\Rightarrow Y \downarrow$

The saving is increase by 100 & The output is decrease by 200.