

1. Answer the following questions.

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

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

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

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

$$\frac{\Delta Y}{5} = 5$$

$$\Delta Y = 25$$

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

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

$$-3 = \Delta T$$

$$1.3) \frac{\Delta Y}{\Delta I} = \frac{10}{2}$$

$$= 5$$

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.

$$2.1 \quad Y^* = C_0 + C_1(Y - T) + I + G$$

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

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

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

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

$$2.2) \frac{\Delta Y}{\Delta I} = \frac{1}{1 - C_1}$$

$$2.3) \frac{\Delta Y}{\Delta G} = \frac{1}{1 - C_1}$$

$$2.4) \frac{\Delta Y}{\Delta T} = \frac{-C_1}{1 - C_1}$$

$$2.5) \text{BBM} = \frac{\Delta Y}{\Delta G} + \frac{\Delta Y}{\Delta T} = \frac{1 - C_1}{1 - C_1} = 1$$

2.6) BBM is balance budget multiplier which shows amount of  $y$  increase when gov spending and tax increase at the same amount.

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 2.4 to find the new equilibrium output.

3.1)

$$AE = C + I + G$$

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

$$y = 400 + 0.75y - 37.5$$

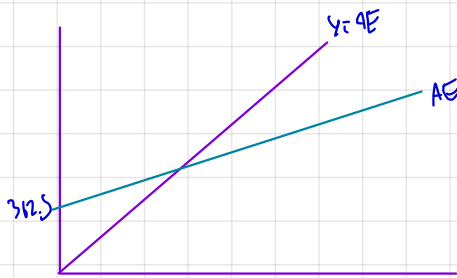
$$0.25y = 362.5$$

$$y^* = 1450$$

3.2)

$$AE = 362.5 + 0.75y$$

$$\text{intercept} = 362.5 \quad \text{slope} = 0.75$$



3.3

$$S + T = I + G$$

$$S + 50 = 100$$

$$S = 50$$

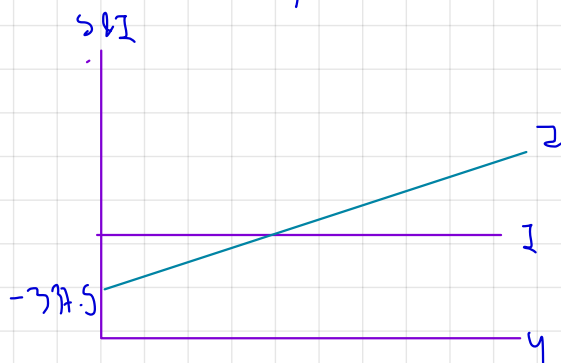
$$y_d = y - 50 = 300 + 0.75(y - 50) + 50$$

$$y = 400 + 0.75y - 37.5$$

$$0.25y = 362.5$$

$$y^* = 1450$$

3.4



$$S = y - T - C$$

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

$$S = y - 300 + 0.75y - 37.5$$

$$S = -337.5 + 0.75y$$

$$3.5 \quad AE = 300 + 0.75(Y - 100) + 50 + 160$$

$$Y = 450 + 0.75Y - 75$$

$$0.25Y = 375$$

$$Y = 1500$$

$$3.6 \quad BBM = \frac{1 - C_1}{1 - C_1}$$

$$= \frac{1 - 0.75}{1 - 0.75}$$

$$= 1$$

when  $G$  &  $T \uparrow 1 \rightarrow Y \uparrow 1$   
 when  $G$  &  $T \uparrow 50 \rightarrow Y \uparrow 50$   
 $\therefore$  new eqm = 1550

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)

$$4.1) \quad Y^* = C_0 + C_1(Y - T) + I + G + X - (M_0 + M_1Y)$$

$$= C_0 + C_1Y - C_1T + I + G + X - M_0 - M_1Y$$

$$Y - (C_1Y + M_1Y) = C_0 - C_1T + I + G + X - M_0$$

$$Y(1 - C_1 - M_1) = C_0 - C_1T + I + G + X - M_0$$

$$Y = \left( \frac{1}{1 - C_1 - M_1} \right) (C_0 - C_1T + I + G + X - M_0)$$

$$4.2) \quad \frac{\Delta Y}{\Delta I} = \frac{1}{1 - C_1 - M_1}$$

$$4.3) \quad \frac{\Delta Y}{\Delta G} = \frac{1}{1 - C_1 - M_1}$$

$$4.4) \quad \frac{\Delta Y}{\Delta T} = \frac{-C_1}{1 - C_1 - M_1}$$

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

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

$$C = 200 + 0.7(Y_d) - 75$$

$$I = 75$$

$$G =$$

$$T = 50$$

$$X = 50$$

$$M = 50 + 0.1Y$$

- 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.

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

$$= 350 + 0.7y - 35 - 0.1y$$

$$0.4y = 315$$

$$y^* = 787.5$$

$\therefore y = 300$  is not an eqm.

to adjust toward  $y > 787.5$ , we need to produce more because of shortage.

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

$$\text{investment} = \frac{\Delta y}{\Delta I} = \frac{1}{1 - c_1 + m_1}$$

$$= \frac{1}{1 - 0.7 + 0.1}$$

$$= \frac{1}{0.4} = 2.5$$

when  $I \uparrow 1 \rightarrow y \uparrow 2.5$

$$\text{gov spending} = \frac{\Delta y}{\Delta G} = \frac{1}{1 - c_1 + m_1} = 2.5$$

when  $G \uparrow 1 \rightarrow y \uparrow 2.5$

$$\text{tax} = \frac{\Delta y}{\Delta T} = \frac{-c_1}{1 - c_1 + m_1} = \frac{-0.7}{0.4} = -1.75$$

when  $T \uparrow 1 \rightarrow y \downarrow -1.75$

$$\text{BBM} = \frac{\Delta y}{\Delta G} + \frac{\Delta y}{\Delta T} = \frac{1 - c_1}{1 - c_1 + m_1} = \frac{1 - 0.7}{0.4} = 0.75$$

when  $G \& T \uparrow 1 \rightarrow y \uparrow 0.75$

- 5.3 Interpret the value of each of the multipliers. Suppose that the full-employment output ( $Y_F$ ) is 600;

$$\frac{\Delta y}{\Delta I} = 2.5$$

$$\Delta y = 100 \quad \Delta I = 1500$$

$$\frac{\Delta y}{\Delta G} = 2.5$$

$$\Delta y = 600 \quad \Delta G = 1500$$

$$\frac{\Delta y}{\Delta T} = -1.75$$

$$\Delta y = 600 \quad \Delta T = -1050$$

$$\text{BBM} = 0.75$$

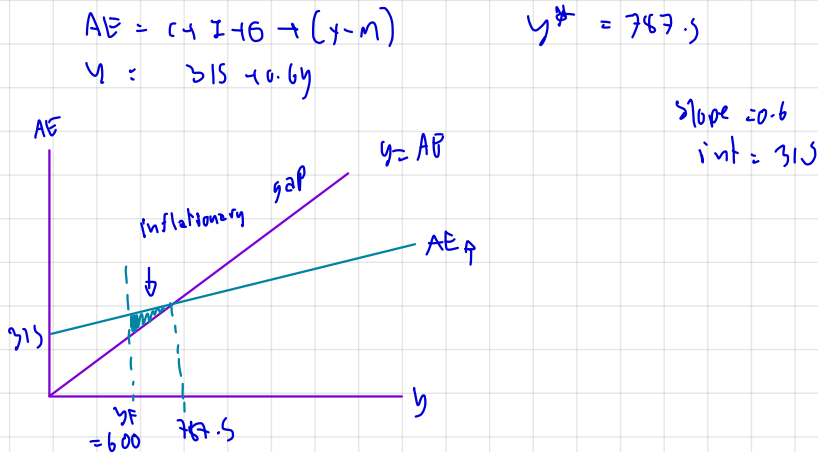
$$\Delta y = 600 \quad \Delta G \& \Delta T = 450$$

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

$$y^* = 747.5 \quad y_F = 600$$

when  $y^* > y_F$ , it is inflationary gap which economy is growing too fast and pop are over-employed

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?

$$\frac{\Delta y}{\Delta G} = 2.5$$

from  $y = 747.5$  to  $y_F = 600 \rightarrow \Delta y = 147.5$

$$\frac{-147.5}{\Delta G} = 2.5$$

$$-147.5 = 2.5 \Delta G$$

$\therefore G$  should be decrease 75 when y decrease 147.5

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

$$\frac{\Delta y}{\Delta T} = -1.75$$

$$\Delta y = -147.5$$

$$\frac{-147.5}{\Delta T} = -1.75$$

$$107.14 = \Delta T$$

$\therefore$  Tax should be increase by 107.14

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

$$\frac{\Delta y}{\Delta T} = 2.5$$

$$\Delta y = -197.5$$

$$\frac{-197.5}{\Delta I} = 2.5$$

$$-75 = \Delta I$$

$\therefore$  investment should be  
decrease by 75

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

$$BBM = 0.75$$

$$\frac{\Delta y}{\Delta G} = 0.75$$

$$\frac{-197.5}{\Delta G} = 0.75$$

$$\Delta G = -250$$

$$\Delta T = -250$$

$\therefore$  gov should decrease  
gov spending and tax  
by 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 role of an automatic stabilizer is to reduce fluctuation of output in business cycles which preventing output too high in expansion and too low in recession.
- The government can stabilize the economy by decreasing tax when economy is in recession.

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.

$$\begin{aligned}y &= AE \\C + S &= C + I \\S &= I \\-200 + 0.5y &= 50 \\0.5y &= 250 \\y^* &= 500\end{aligned}$$

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

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

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

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

$$\begin{aligned}S &= -100 + 0.5y \\S &= I \\-100 + 0.5y &= 50 \\0.5y &= 150 \\y^* &= 300\end{aligned}$$

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

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

7.5 Comment on your result.

eqm. saving is equal even though autonomous savings is increasing by 100. From the Paradox Thrift, when people started to save more money, it leads to slow down in economy.

