Topic 4 Exercise

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1. Answer the following questions.
   - 1.1 Suppose Govt Multiplier is 5 and ΔG = 5. Find ΔY.
   - 1.2 Suppose Tax Multiplier is -3 and ΔY = -9. Find ΔT.
   - 1.3 Suppose ΔY = 10 and ΔI = 2. Find Investment Multiplier.

1.1 Govt Multiplier : 5 & ΔG : 5

from Govt multiplier : $\frac{\Delta Y}{\Delta G} \rightarrow 5 = \frac{\Delta Y}{5}$

$\Delta Y = 25$

1.2 from Tax multiplier : $\frac{\Delta Y}{\Delta T}$

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

$\Delta T = 3$

1.3 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 ΔY/ΔI
   - 2.3 ΔY/ΔG
   - 2.4 ΔY/ΔT
   - 2.5 Balanced-Budget Multiplier (BBM)
   - 2.6 Explain what the BBM is.

2.1 $AE = Y = C + I + G$

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

$Y = C_0 + C_1Y - C_1T + I + G$

$Y - C_1Y = C_0 - C_1T + I + G$

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

$Y^* = \frac{1}{1 - C_1}(C_0 - C_1T + I + G)$

2.2 $AE = Y = C + I + G$

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

$AE = Y = (C_0 - C_1T + I + G) + C_1Y$ ↳ slope of AE

as I is injection ; $\frac{\Delta Y}{\Delta I} = \frac{1}{1 - \text{slope of AE}}$

2.3 $AE = Y = C + I + G$

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

$AE = Y = (C_0 - C_1T + I + G) + C_1Y$ ↳ slope of AE

as G is injection ; $\frac{\Delta Y}{\Delta G} = \frac{1}{1 - \text{slope of AE}}$

2.4 $AE = Y = C + I + G$

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

$AE = Y = (C_0 - C_1T + I + G) + C_1Y$ ↳ slope of AE

as T is leakage ; $\frac{\Delta Y}{\Delta T} = \frac{-\text{mpc}}{1 - \text{slope of AE}}$

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

2.6 BBM is a change in aggregate output when both G and T increase by 1 unit.

T C I G (no X & M)

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

C = 300 + 0.75(Yd) I = 50

G = 50 T = 50 (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 Yd= 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.

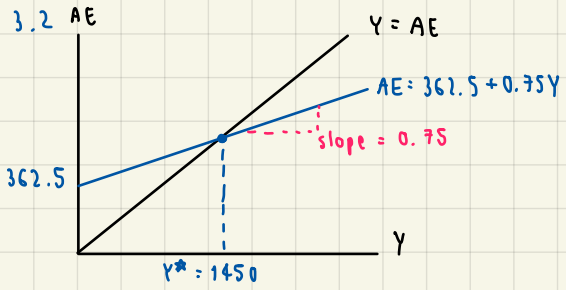
3.1 $AE: Y = 300 + 0.75(Y - 50) + 50 + 50$

$Y = 400 + 0.75Y - 37.5 \rightarrow Y = 362.5 + 0.75Y$

$0.25Y = 362.5$

$Y^* = \frac{362.5}{0.25} = 1450$

3.2



3.3 $S + T = I + G$ – ① [leakage = injection]

$Y - T = C + S$ – ② [saving function]

$Y - C = S + T$

$Y - C = I + G$

$Y - C = 100$

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

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

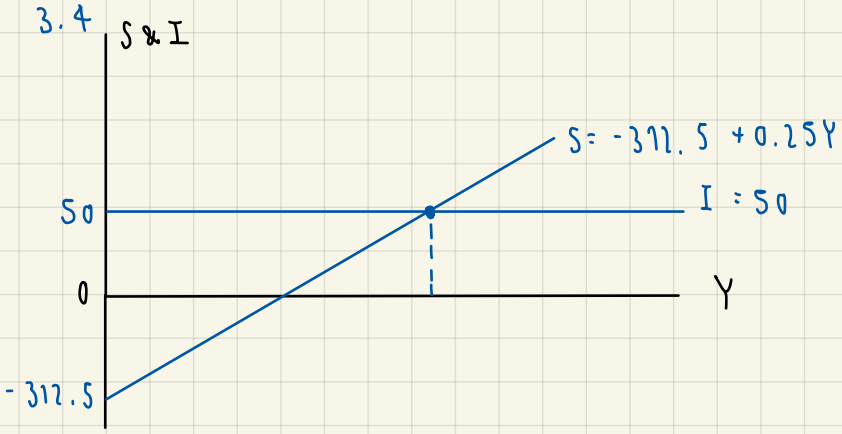
$Y - (300 + 0.75Y - 37.5) = 100$

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

$0.25Y = 362.5$

$Y^* = 1450$

3.4



3.5 G↑ 50 => G' = 100

T↑ 50 => T' = 100

$Y^* = ?$

$AE = Y = C + I + G$

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

$Y = 450 + 0.75Y - 75$

$Y = 375 + 0.75Y$

$0.25Y = 375$

$Y^* = 1500$

3.6 use BBM to find new Y^*

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

∴ If G & T ↑ 1 unit, Y^* ↑ 1 unit

∴ Therefore, in order to build more road, Gov. ↑ G by 50 & T ↑ by 50. So Y^* ↑ 50.

∴ Old Y^* + 50

= 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 Equilibrium Output Y^* $\Rightarrow$ $Y = C + I + G + (X - M)$

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

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

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

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

$$Y^* = \frac{C_0 + I + G + X - M_0}{1 - C_1 - M_1} \quad \#$$

4.2 $$\frac{\Delta Y}{\Delta I} = \frac{1}{1 - \text{slope of AE}} = \frac{1}{1 - MPC} \text{ (for close economy)} = \frac{1}{1 - MPC + MPM} \text{ (for open economy)} \quad \#$$

4.3 $$\frac{\Delta Y}{\Delta G} = \frac{1}{1 - \text{slope of AE}} = \frac{1}{1 - MPC} \text{ (for close economy)} = \frac{1}{1 - MPC + MPM} \text{ (for open economy)} \quad \#$$

4.4 $$\frac{\Delta Y}{\Delta T} = \frac{-MPC}{1 - \text{slope of AE}} = \frac{-MPC}{1 - MPC} \text{ (for close economy)} = \frac{-MPC}{1 - MPC + MPM} \text{ (for open economy)} \quad \#$$

4.5 BBM: $$\frac{\Delta Y}{\Delta G} + \frac{\Delta Y}{\Delta T} \quad \#$$

* Exam

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

C = 200 + 0.7(Yd)	I = 75	G = 75
T = 50	X = 50	M = 50 + 0.1Y

(0.7 = MPC; 0.1 = MPM)

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.

5.1 AE: $Y = C + I + G + X - M$

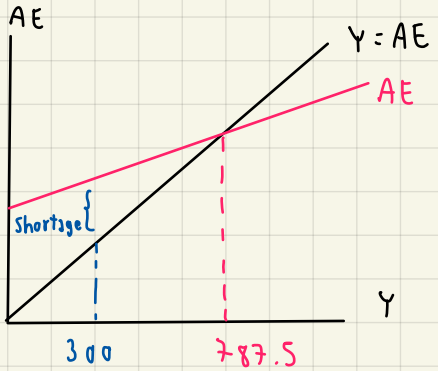
$Y = 200 + 0.7(Y - 50) + 75 + 75 + 50 - 50 - 0.1Y$

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

$Y = 315 + 0.6Y$, slope of AE: MPC - MPM

$Y^* = \frac{315}{0.4} = 787.5$ ∴ 300 is not an eqbm.

adjustment process



In this case, at Y = 300, Y < AE.
Shortage happen, inventories ↓
In order to adjust towards eqbm, business need to produce more.

equilibrium.

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

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

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

$$\frac{\Delta Y^*}{\Delta T} = \frac{-MPC}{1 - MPC + MPM} = \frac{-0.7}{1 - 0.7 + 0.1} = -1.75$$

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

5.3 Interpret the value of each of the multipliers.

I multiplier = 2.5 means when I ↑ 1 unit, Y ↑ 2.5 units

G " = 2.5 " when G ↑ 1 unit, Y ↑ 2.5 units

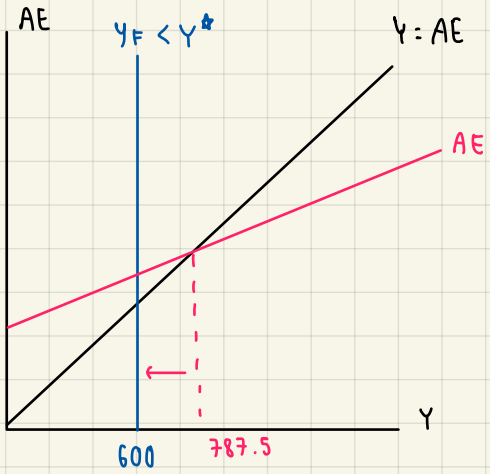
T " = -1.75 " when T ↑ 1 unit, Y ↓ 1.75 units

BBM " = 0.75 " when G & T ↑ 1 unit, Y ↑ 0.75 units

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

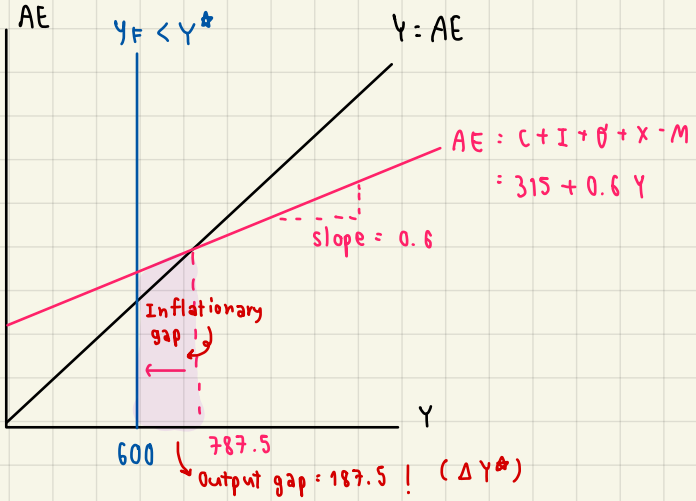
5.4 What type of output gap is the economy currently experiencing?

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



5.4 Inflationary gap because $Y_F < Y^*$
or we can say that unemployment rate < natural unemployment rate.
At this time, economy grow too fast and over-employed.

5.5



$\Delta Y^* = -187.5$ (ต้องลด Y)

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?

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

$\Delta G = \frac{\Delta Y^*}{2.5} = \frac{-187.5}{2.5} = -75$ #

(- means reduce)

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

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

$\Delta T = 107.142$ #

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

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

$\Delta I = -75$ #

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

ΔG & $\Delta T = \frac{-187.5}{0.75}$

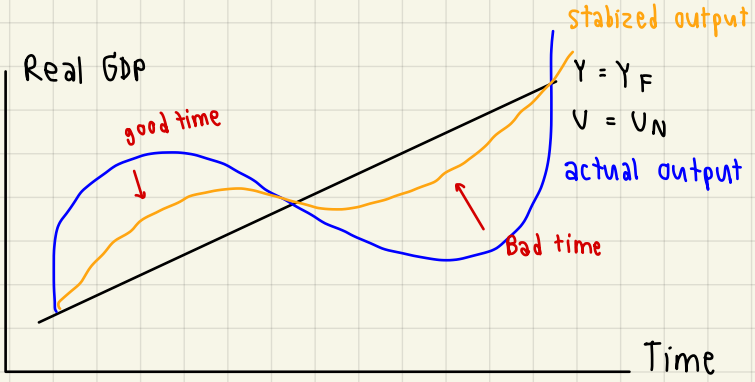
$= -250$

ลดอย่างละ!!

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.

Automatic stabilizer → component in AE to stabilize the GDP
Import / income-tax are automatic stabilizer

Role of automatic stabilizer is reduce the fluctuation of economy



During good time → High Y, AE
↓ So the gov. raise tax and import to reduce income which helps to slow down the economy during peak time.

During bad time → Low Y, AE
↓ So the gov. reduce tax and import to increase income (Y) which helps to boost the economy during the economic recession.

Exam

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. (↑ S_0)

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.

7.1) At eqbm. leakage = injection

saving = investment

$-200 + 0.5Y = 50$

$Y^* = \frac{250}{0.5} = 500$ #

7.2) find eqbm. saving

$S = -200 + 0.5(500)$

$S^* = 50$ #

7.3) new saving $= -200 + 0.5Y + 100$

$= -100 + 0.5Y$

from $S = I$

$-100 + 0.5Y = 50$

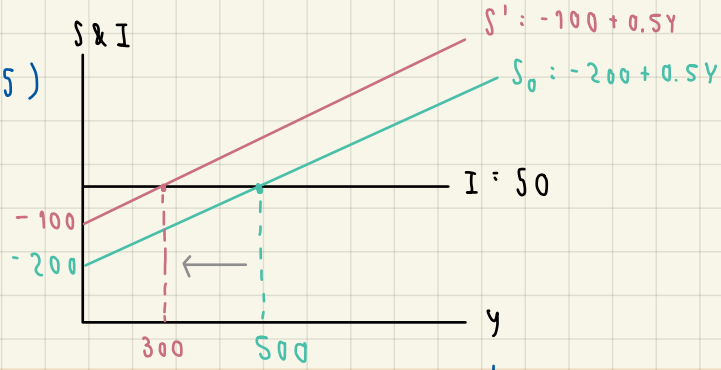
$Y^* = \frac{150}{0.5} = 300$ #

7.4) new eqbm. saving

$S = -100 + 0.5(300)$

$S^* = 50$ #

7.5)



Paradox of thrift: ppl want to ↑ S_0 to S' → leakage → spend less → less income ← econ slow ↓ ↲

(Y ↓ 200 from 500 to 300)