Exercise 4
Keynesian Cross and Fiscal Policy

1. Answer the following questions.

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

→ Govt. Mult. $= \frac{\Delta Y}{\Delta G} = 5$

→ $\Delta G = 5$

↳ plug in → $\frac{\Delta Y}{5} = 5$

$\Delta Y = 25$ //

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

→ tax mult. $= \frac{\Delta Y}{\Delta T} = -3$

→ $\Delta Y = -9$

↳ plug in → $\frac{-9}{\Delta T} = -3$

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

$\Delta T = 3$ //

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

→ $\Delta Y = 10$

→ $\Delta I = 2$

→ $\frac{\Delta Y}{\Delta I} = \frac{10}{2} = 5$ //

2. From $Y = C + I + G$ where $C = C0 + C1(Y - T)$, find

2.1 Equilibrium Output Y*

→ $AE = C + I + G$

$Y = AE$ → equilibrium condition

$Y^* = C + I + G$

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

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

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

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

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

2.2 ΔY/ΔI

$AE = C + I + G$
$AE = C_0 + C_1(Y-T) + I + G$
$AE = C_0 + C_1Y - C_1T + I + G$ ← slope of AE
$AE = (C_0 - C_1T + I + G) + C_1Y$
↳ I is an interjection → $\frac{\Delta Y}{\Delta I} = \frac{1}{1 - \text{slope AE}} = \frac{1}{1-C_1}$

do the same thing → linear!

2.3 ΔY/ΔG

$AE = C + I + G$
$AE = C_0 + C_1(Y-T) + I + G$
$AE = C_0 + C_1Y - C_1T + I + G$ ← slope of AE
$AE = (C_0 - C_1T + I + G) + C_1Y$
↳ I is an interjection → $\frac{\Delta Y}{\Delta G} = \frac{1}{1 - \text{slope AE}} = \frac{1}{1-C_1}$

2.4 ΔY/ΔT

↳ T is a leakage → $\frac{\Delta Y}{\Delta T} = \frac{-MPC}{1 - \text{slope AE}}$

$AE = C + I + G$
$AE = C_0 + C_1(Y-T) + I + G$
$AE = C_0 + C_1Y - C_1T + I + G$ ← slope of AE
$AE = (C_0 - C_1T + I + G) + C_1Y$

2.5 Balanced-Budget Multiplier (BBM)

$BBM = \frac{\Delta Y^*}{\Delta G} + \frac{\Delta Y^*}{\Delta T_0} = \frac{1-C_1}{1-C_1}$ } change@ the same rate

2.6 Explain what the BBM is.

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

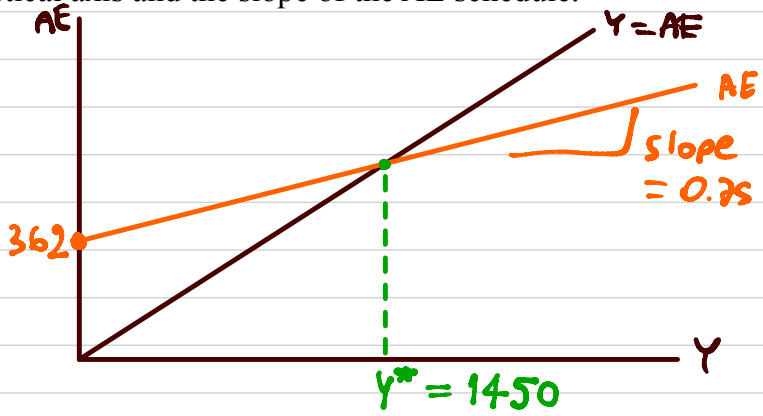
3. Assume a closed economy with government. The country has the following components of aggregate expenditure.

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.

$Y = AE$
$AE = C + I + G$
$Y = C_0 + C_1(Y-T) + I + G$
$Y = 300 + 0.75(Y-50) + 50 + 50$
$Y = 300 + 0.75Y - 37.5 + 50 + 50$
$Y - 0.75Y = 362.5 \rightarrow Y = 0.75Y + 362.5$
$Y^* = \boxed{1450}$

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)

formulas: $S+T=I+G$ → leakage = injection

$Y-T=C+S$ → saving function...

saving func. → $Y-C=S+T$

$Y-C=I+G$

$Y-C=50+50$

$Y-C=100$

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

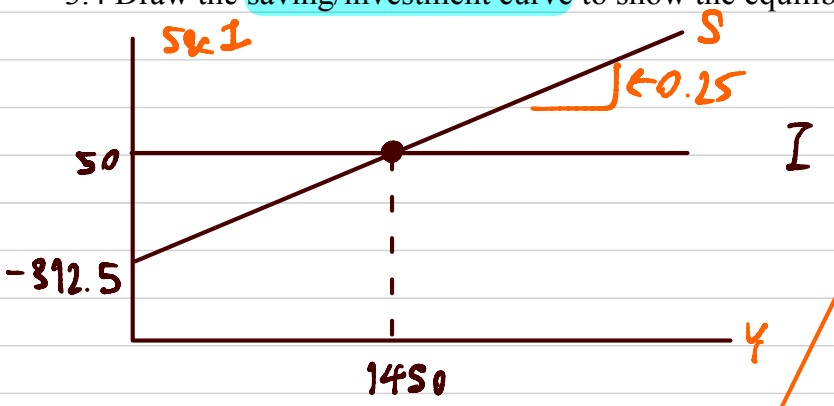
$Y-[300+0.75(Y-50)]=100$

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

$0.25Y=362.5$

$Y^*=1450$

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



→ intercept?:

saving func. → $Yd=C+S$

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

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

$S=-312.5+0.25Y$

int. slope

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.

inc. Gov. spending → 50 + 50 = 100
inc. net taxes → 50 + 50 = 100

$Y = AE$
$AE = C + I + G$
$Y = C + I + G$
$Y = 300 + 0.75(Yd) + 50 + 100$
$Y = 300 + 0.75(Y - 100) + 150$
$Y = 300 + 0.75Y - 75 + 150$
$Y = 375 + 0.75Y$
$0.25Y = 375$
$Y^* = 1500$

↑ new output @ equilibrium

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

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

As the government increases the spending by 50 along with the lump sum tax by 50, the equilibrium output will increase by 50 as well.

$Y^* = 1450 + 50$
$Y^* = 1500$ (New)

(Here, Gov. Spending, lumsum tax increase @ the same rate)

4. From Y = C + I + G + (X – M)
where C = C0 + C1(Y – T) and M = M0 + M1(Y), find
4.1 Equilibrium Output Y*
4.2 ΔY/ΔI
4.3 ΔY/ΔG
4.4 ΔY/ΔT
4.5 Balanced-Budget Multiplier (BBM)

4.1 → $Y = C + I + G + (X - M)$

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

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

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

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

$$Y = \frac{C_0 - C_1T + I + G + X}{1 - C_1 + M_1}$$

4.2 → $\frac{\Delta Y}{\Delta I}$

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

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

↳ $\frac{\Delta Y}{\Delta I} = \frac{1}{1 - \text{slope AE}} = \frac{1}{1 - C_1 + C_1T_1 + M_1}$

4.3 → $\frac{\Delta Y}{\Delta G}$

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

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

↳ $\frac{\Delta Y}{\Delta G} = \frac{1}{1 - \text{slope AE}} = \frac{1}{1 - C_1 + C_1T_1 + M_1}$

4.4 → $\frac{\Delta Y}{\Delta T}$

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

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

$\frac{\Delta Y}{\Delta T} = \frac{-MPC}{1 - \text{slope AE}} = \frac{-C_1}{1 - C_1}$

4.5 Balanced-Budget Multiplier (BBM)

$$BBM = \frac{\Delta Y}{\Delta G} + \frac{\Delta Y}{\Delta T_0} = \frac{1 - C_1}{1 - C_1}$$

} change @ the same rate

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

MPC 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.

5.2 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 → $Y = AE$

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

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

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

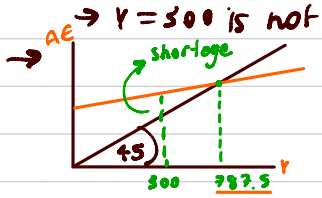
$Y = 200 + 0.7Y - 35 + 75 + 75 - 0.1Y$

$Y + 0.1Y - 0.7Y = 315$

$0.4Y = 315$

$\boxed{Y^* = 787.5}$

→ Y = 300 is not an equilibrium.



→ @ Y = 300, Y < C + I

= AE is more than aggregate output

∴ inventories declined → we need to encourage firms to increase their production → Y = 787.5

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

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

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

$AE = 0.6Y + 315$

G, inv. → $\frac{\Delta Y^*}{\Delta I} = \frac{1}{1 - C_1 + M_1} = \frac{1}{1 - 0.7 + 0.1} = 2.5$

Tax → $\frac{\Delta Y^*}{\Delta T} = \frac{-C}{1 - C_1 + M_1} = \frac{-0.7}{1 - 0.7 + 0.1} = -1.75$

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

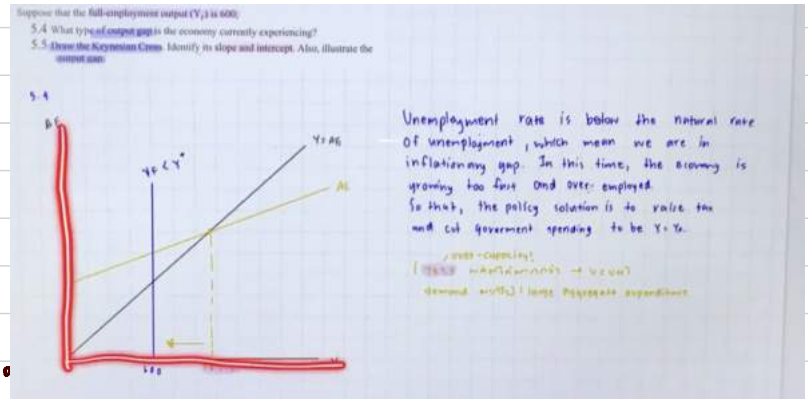
5.3 → $(Y_F) = 600$

$\frac{\Delta Y^*}{\Delta I}$: As Inv. ↑ by 1 unit, Y will ↑ by 2.5 units

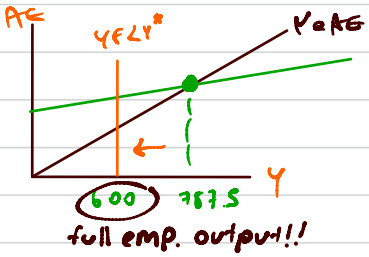
$\frac{\Delta Y^*}{\Delta G}$: As G ↑ by 1 unit, Y will ↑ by 2.5 units

$\frac{\Delta Y^*}{\Delta T}$: As Tax ↑ by 1 unit, Y will ↓ by 1.75 units

BBM : As G, T are increased equally by 1 unit, Y will ↑ by 0.75

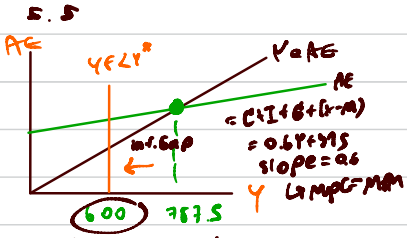


5.4



The output gap which the condo you is experiencing is inflationary gap as the unemployment rate is below the natural rate of unemployment. (The economy is growing too fast and over employed. What needs to be done is to raise tax and cut G. <Y=YF>

5.5



→ output Gap = 187.5

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

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

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

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

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

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

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

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

$= 250$

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.

→ Automatic Stabilizer helps to reduce the fluctuation of the economy.
G can raise tax and import OR reduce tax and import

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.

7.1 → Y^* = ?
Leakage = injection
$S = I$
$-200 + 0.5Y = 50$
$Y^* = 500$

7.2 → equilibrium saving
$S = -200 + 0.5Y^*$
$= -200 + 0.5(500)$
$= -200 + 250$
$S^* = 50$ //

7.3 → inc. autonomous saving by 100
$S = -200 + 0.5Y + 100$ → [New S]
$-100 + 0.5Y$
$\therefore S = I$
$-100 + 0.5Y = 50$
$Y = \frac{150}{0.5}$
$Y^* = 300$

7.4 → New equ. saving
$S = -100 + 0.5(300)$
$S = -100 + 150$
$S^* = 50$

7.5 - When people save more, the economy will slow down and will give less income to the people/ (Y decreases).

- s= -200+0.5Y
- s = -100+ 0.5Y
Saving inc. by 100

Y or output decreases by 200 from 500 to 300 as shown