

1. *Answer the following questions.*

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

Government multiplier

Formula: ΔY over $\Delta G = 5$

$$\Delta G = 5$$

$$\text{To find } \Delta Y = \Delta Y \text{ over } 5 = 5$$

$$\Delta Y = 25$$

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

Tax multiplier

Formula: ΔY over ΔT

$$\Delta T = \text{tax multiplier} = -3$$

$$\Delta Y = -9$$

$$\Delta Y \text{ over } \Delta T = -3$$

$$\Delta T = 3$$

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

Investment multiplier:

Formula: ΔY over ΔI

$$\Delta Y = 10 \quad \Delta I = 2$$

$$10 \text{ over } 2 = 5$$

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

a. **Equilibrium Output Y^***

Formula: $AE = C + I + G$

$Y = AE$ - equilibrium condition

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

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

$$Y^* = C + C_0 + c_1 Y - C_1 T + I + G$$

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

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

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

b. **$\Delta Y / \Delta I$**

$$AE = C + I + G$$

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

$$AE = (C_0 - C_1 T + I + G) + C_1 Y \text{ (this is the slope of AE)}$$

I will inject; $\frac{1}{1 - \text{slope AE}}$

c. **$\Delta Y / \Delta G$**

$$AE = C + I + G$$

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

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

$$AE = (C_0 - C_1 T + I + G) + C_1 Y \text{ (this is the slope of the AE)}$$

G will inject; $1 \text{ over } 1 - \text{slope AE}$

d. $\Delta Y/\Delta T$

$$AE = C + I + G$$

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

$$AE = C_0 + C_1 Y - C_1 T + I + G \text{ (slope of the AE)}$$

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

T is leakage; $-\text{MPC over } 1 - \text{slope AE}$

e. *Balanced-Budget Multiplier (BBM)*

Balanced-budget multiplier

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

f. *Explain what the BBM is.*

Balanced-budget multiplier is the change in aggregate output that happens when the G and T increases by 1 unit

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

$$C = 300 + 0.75(Y_d) \quad I = 50$$

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

a. *Use the $Y = AE$ (standard) approach to find the equilibrium output.*

$Y = AE$ - to find output of the equilibrium

$$AE = C + I + G$$

$$Y = C + I + G$$

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

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

$$Y = 300 + 0.75(Y) - 37.5 + 50 + 50$$

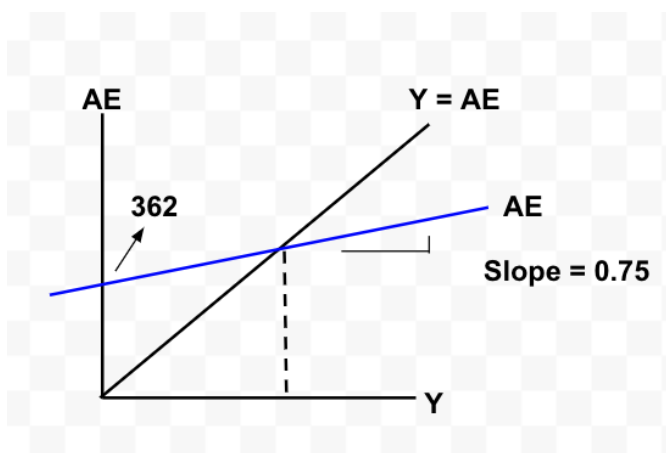
$$Y - 0.75Y = 362.5$$

$$0.25Y = 362.5$$

$$Y^* = 1450$$

$$Y = 362 + 0.75Y$$

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



- c. *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 $Y_d = Y - T = C + S$)

$$G + T = I + G \text{ [leakage = injection]}$$

$$Y - T = C + S \text{ [saving function]}$$

$$Y - C = S + T$$

$$Y - C = I + G$$

$$Y - C = 50 + 50$$

$$Y - C = 100$$

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

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

$$0.25Y = 362.5$$

$$Y^* = 1450$$

d. Draw the saving/investment to show the equilibrium.

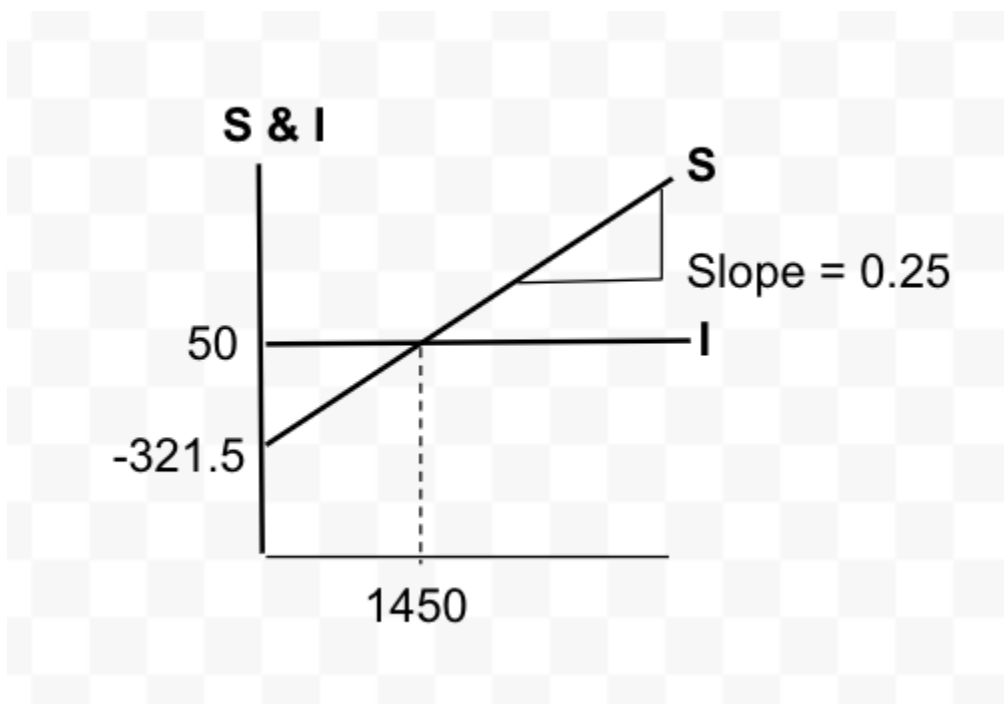
$$Y_d = C + S$$

$$Y - T = C + S$$

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

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

$$S = -321.5 + 0.25Y$$



ent curve

- e. **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.**

$$Y = AE - \text{equilibrium}$$

$$AE = C + I + G$$

$$Y = C + I + G$$

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

$$= 300 + 0.75Y - 74 + 150$$

$$Y = 375 + 0.75Y$$

$$Y = 375 + 0.75Y$$

$$0.25Y = 375$$

$$Y = 1500$$

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

If the government spending and the lump sum tax goes up by 1 unit, income will increase by 1

Therefore, the government will have to increase their spending by 50 and lump-sum tax will also increase by 50. So the equilibrium output will increase 50

The old Y^* was 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

- a. *Equilibrium Output Y^**
- b. $\Delta Y/\Delta I$
- c. $\Delta Y/\Delta G$
- d. $\Delta Y/\Delta T$
- e. **Balanced-Budget Multiplier (BBM)**

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

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

$$I = 75$$

$$G = 75$$

$$T = 50$$

$$X = 50$$

$$M = 50 + 0.1Y$$

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

$$Y = AE$$

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

$$Y = 200 + 0.7(X - 50) + 74 + 75 + (50 - 50 - 0.1Y)$$

$$Y = 0.1Y - 0.7Y = 315$$

$$Y^* = 787.5$$

If $Y = 300$, $Y + C + I$, the aggregate expenditure is more than the aggregate output. Inventories that get unsold, firm increase their production to move to equilibrium at $Y = 787.5$

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

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

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

$$M = 50 + 0.1Y$$

$$AE = 200 + 0.7Y - 35 + 75 + 75 + 50 - 50 + 0.9Y$$

$$AE = 0.6Y + 75$$

$$1 \text{ over } 1 - C1 + M1$$

$$1 \text{ over } 1 - 0.7 + 0.1 = 2.5$$

$$-C \text{ over } 1 - C + M = -0.7 \text{ over } 1 - 0.7 + 0.1 = -1.75$$

$$2.5 - 1.75 = 0.75$$

c. Interpret the value of each of the multipliers.

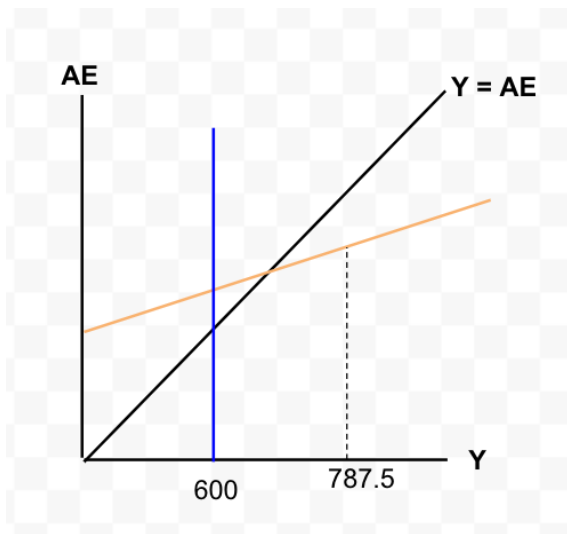
- When investment goes up by 1 unit, the output will increase by 2.5
- When government spending goes up by 1 unit, output will increase by 2.5
- When tax goes up by 1 unit, output will decrease by 1.75 units
- When government and tax goes up equally by 1 unit, output will increase by 0.75

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

d. *What type of output gap is the economy currently experiencing?*

If the unemployment rate falls below the natural rate of unemployment, there will be an inflationary gap. If the economy is going up and growing fast, and are employing way more than they should. The solution to this would be to cut down on government spending.

e. *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)

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

$$G = -187.5 \text{ over } 2.5 = -75$$

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

$$T = -187.5 \text{ over } -1.75 = 107.142$$

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

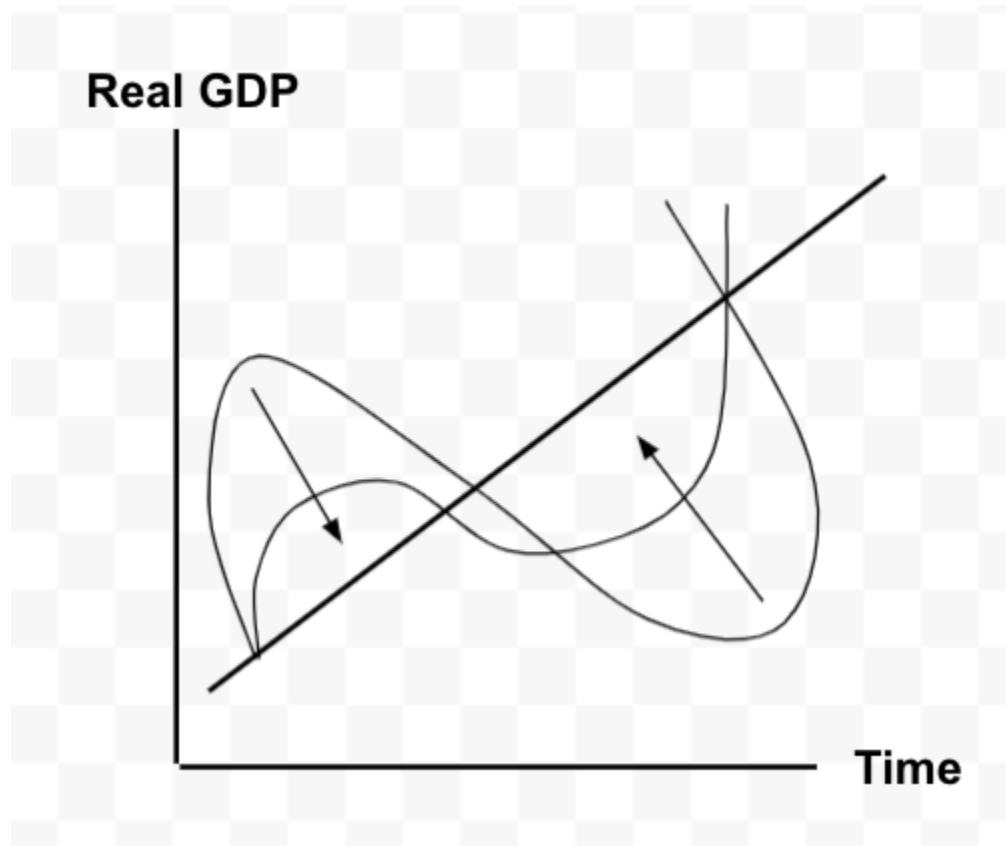
$$I = -187.5 \text{ over } 2.5 = -75$$

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

$$-187.5 \text{ over } 0.75 = -250$$

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 = part of AE to stabilize the GDP input the main aim of automatic stabilizer is to drop the fluctuation of the economy



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

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

Leakage = injection

Saving = investment

$$-200 + 0.5Y = 50$$

$$\frac{1}{2} Y = 250$$

$$Y^* = 500$$

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

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

$$\text{Saving} = -200 + 0.5Y^*$$

$$= -200 + 0.5 (500)$$

$$= -200 + 250$$

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

People are saving more money by 100 so, saving + 100 = new saving

New saving

$$-200 + 0.5Y + 100$$

$$= -100 + 0.5Y$$

$$-100 + 0.5Y = 50$$

$$\frac{1}{2} Y = 150$$

$$Y^* = 300$$

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

$$\text{Saving} = -100 + 0.5Y^*$$

$$= -100 + 0.5 (300)$$

$$= -100 + 150$$

e. Comment on your result.

Paradox of thrift: people saving more which will make the economy slow down which means there's less income going to people.