

Exercise 3

Keynesian Cross and the Multiplier

1. The Keynesian consumption function assumes that $0 < MPC < 1$; what is the basis for such assumption?
2. Assume a CLOSED economy with NO government. Let the autonomous consumption be 200 and MPS be 0.3. Draw and write equations for both saving and consumption functions.
3. Let the saving function be $S = -150 + 0.35Y$. Find and draw the consumption function.
4. How do the followings affect the AE graph (i.e. explain how the graph changes) and the equilibrium output?
 - All firm managers decide to buy fewer machines.
 - The government decides to build more roads.
 - The citizens decide to save more at all income levels.
 - The citizens decide to save larger proportion of income.
 - The government decides to raise tax.
5. In the Keynesian Cross Model, suppose that aggregate output is greater than aggregate expenditure. Explain the adjustment process towards the equilibrium.
6. Let $C = 60 + 0.6Y$ and $I = 20$. Find the equilibrium output with the saving/investment approach.
7. Let $S = -60 + 0.4Y$ and $I = 20$. Find the equilibrium output with the standard approach. Now, suppose I increases by 20. Find the new equilibrium and the investment multiplier.
8. With the multiplier effect, an injection of money (for example, investment) can lead to a greater proportional increase in output. Explain how this can happen.
9. How is the investment multiplier related to MPC? Explain the intuition behind such relationship. (Hint: Question 9)
10. What is the Paradox of Thrift? Explain it with diagram.

1. The Keynesian consumption function assumes that $0 < MPC < 1$; what is the basis for such assumption?

$$C = a + bY \quad ; \quad a = \text{consumption when } y=0$$

$$b = \text{slope } \left(\frac{\Delta C}{\Delta Y} \right) / MPC$$

$$0 < MPC < 1 \quad ; \quad MPC = \text{consumption that depend on income}$$

when income increase 1 unit, consumption will increase less than 1 unit.

2. Assume a CLOSED economy with NO government. Let the autonomous consumption be 200 and MPS be 0.3. Draw and write equations for both saving and consumption functions.

$$C = a + bY$$

$$S = Y - C$$

$$\therefore C = 200 + 0.7Y$$

$$\underline{C = 200 + bY}$$

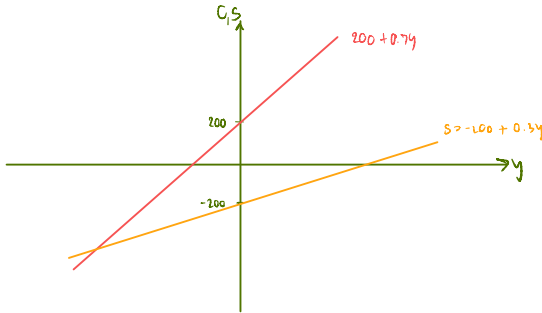
$$\longrightarrow S = Y - 200 + bY$$

$$S = -200 + 0.3Y$$

$$S = -200 + Y(1+b)$$

$$MPS = 0.3 = 1+b$$

$$b = 0.7$$



3. Let the saving function be $S = -150 + 0.35Y$. Find and draw the consumption function.

$$S = -150 + 0.35Y$$

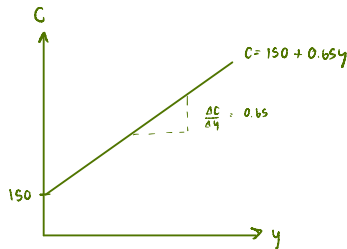
$$\begin{matrix} 1 & 1 \\ | & | \\ a & mps \end{matrix}$$

$$1 = mps + MPC$$

$$MPC = 1 - 0.35 = 0.65$$

$$C = a + bY$$

$$C = 150 + 0.65Y$$



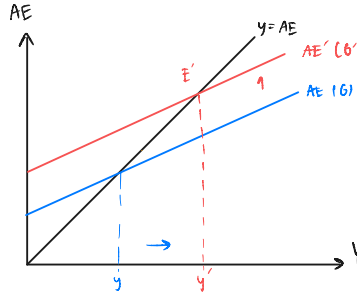
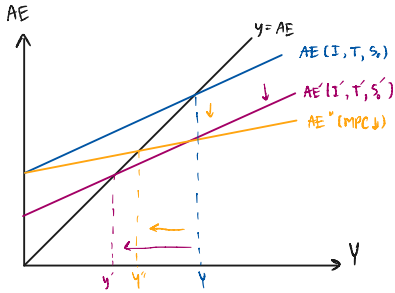
$$AE = C + I + G + X - M$$

4. How do the followings affect the AE graph (i.e. explain how the graph changes) and the equilibrium output?

- All firm managers decide to buy fewer machines. $I \downarrow, AE \downarrow, Y^* \downarrow$
- The government decides to build more roads. $I \uparrow, AE \uparrow, Y^* \uparrow$
- The citizens decide to save ^{save whatever income level} more at all income levels. $S \uparrow, AE \downarrow, Y^* \downarrow$
- The citizens decide to save ^{MPS} larger proportion of income. $MPS \uparrow, AE \downarrow, Y^* \downarrow$
- The government decides to raise tax. $T \uparrow, AE \downarrow, Y^* \downarrow$

* save more at all income — not depend on Y , $s \uparrow$

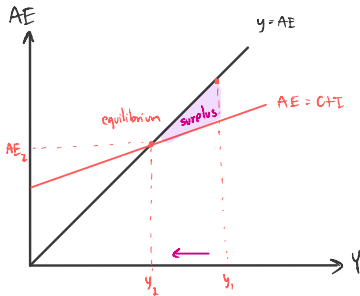
* save large proportion of income \rightarrow MPS — $mPC + MPS = 1$
 \downarrow consumption \downarrow



5. In the Keynesian Cross Model, suppose that aggregate output is greater than aggregate expenditure. Explain the adjustment process towards the equilibrium.

aggregate output > aggregate expenditure

$$y > AE$$



inventories accumulate

\downarrow encourage business

cut back on production

6. Let $C = 60 + 0.6Y$ and $I = 20$. Find the equilibrium output with the saving/investment approach.

$$S = I$$

$$y = C + S$$

$$y = 60 + 0.6y + S$$

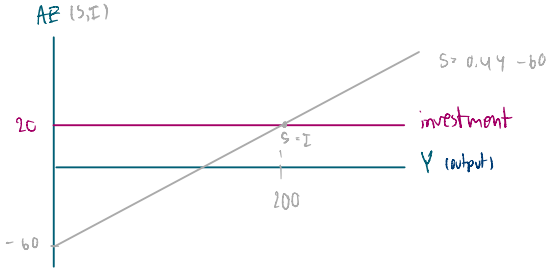
$$S = 0.4Y - 60$$

$$S = I$$

$$0.4Y - 60 = 20$$

$$y = \frac{80}{0.4}$$

$$y^* = 200$$



7. Let $S = -60 + 0.4Y$ and $I = 20$. Find the equilibrium output with the standard approach. Now, suppose I increases by 20. Find the new equilibrium and the investment multiplier.

$$S = I$$

$$-60 + 0.4Y = 20$$

$$Y = \frac{80}{0.4}$$

$$Y^* = 200$$

investment multiplier

$$= \frac{\Delta Y^*}{\Delta I}$$

$$= \frac{250 - 200}{20}$$

$$= 2.5$$

$$\Delta I = 20$$

$$-60 + 0.4Y = 40$$

$$Y_{\text{new}}^* = 250$$

\therefore new equilibrium = 250

investment multiplier = 2.5

(when I increase 1, y^* increase 2.5)

8. With the multiplier effect, an injection of money (for example, investment) can lead to a greater proportional increase in output. Explain how this can happen.

injection of money \rightarrow firm have more money
 \rightarrow more money to flow income \rightarrow increase output

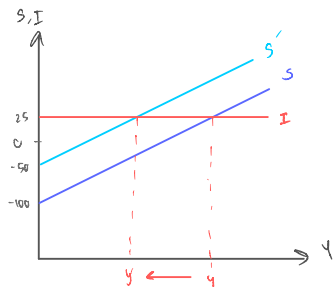
9. How is the investment multiplier related to MPC? Explain the intuition behind such relationship. (Hint: Question 9)

$$\text{investment multiplier} = \frac{\Delta Y}{\Delta I} = \frac{1}{1 - \text{slope of AE}} = \frac{1}{1 - \text{MPC}}$$

if MPC is large, multiplier is large

\hookrightarrow investment \uparrow , output \uparrow a lot

10. What is the Paradox of Thrift? Explain it with diagram.



The paradox of thrift

increase in autonomous saving lead to
 decrease aggregate expenditure, aggregate output

lower income \rightarrow save less