

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.

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Exercise 3

- ① Consumption function $\rightarrow C = C_0 + C_1 Y$ $C_1 = MPC$
 MPC = proportion of income that we use to consume
 also called amount of consumption depended on income.

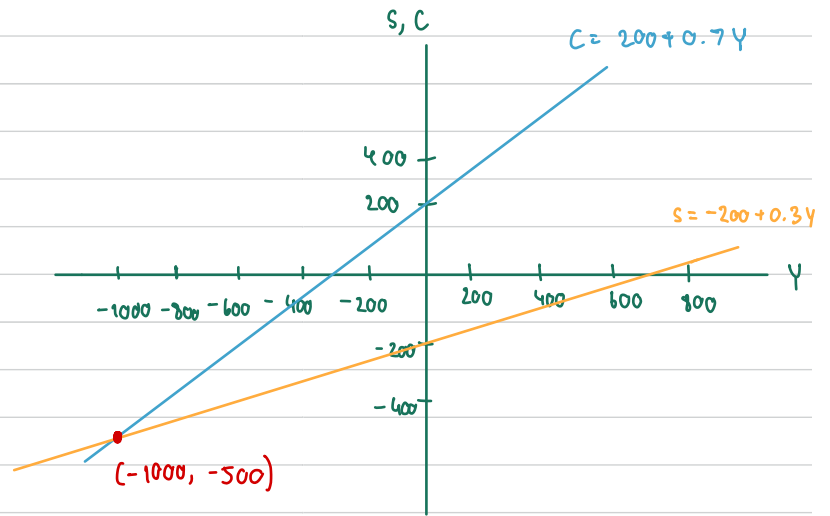
Why $0 < MPC < 1$

Ex. income = 100€, MPC = 0.3

- ② From income = saving + consumption

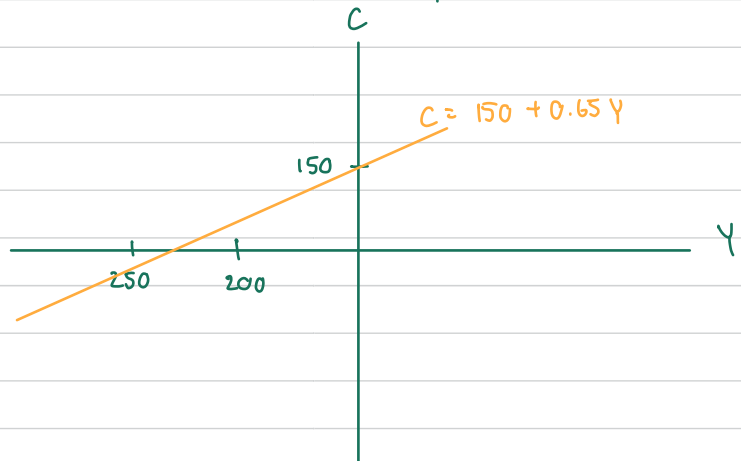
So $MPS + MPC = 1 \rightarrow 0.3 + MPC = 1 \rightarrow MPC = 0.7$

Consumption	Saving
$C = C_0 + C_1 Y$	$Y = S + C \rightarrow S = Y - C$
$C = 200 + C_1 Y$	$S = Y - (200 + 0.7Y)$
$C = 200 + 0.7Y$	$S = -200 + 0.3Y$
$200 + 0.7Y = -200 + 0.3Y$	$C = 200 - 700$
$0.4Y = -400$	$C = -500$
$Y = -1000$	



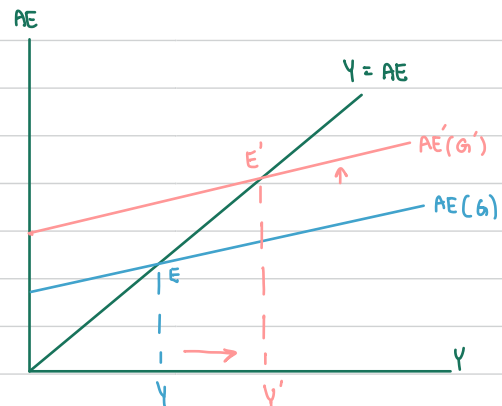
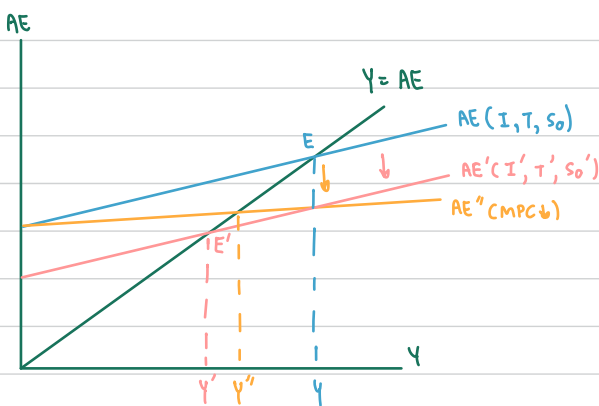
- ③ Saving function formula

$S = Y - (C_0 + C_1 Y)$
 $S = -C_0 + (Y - C_1 Y)$
 $S = -C_0 + (1 - C_1) Y$
 $S = -150 + 0.35 Y$
 $\therefore C_0 = 150, 1 - C_1 = 0.35$
 $C_1 = 0.65$
 Then $C = C_0 + C_1 Y \rightarrow C = 150 + 0.65 Y$



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. $I \downarrow \Rightarrow AE \downarrow \Rightarrow Y^* \downarrow$
- The government decides to build more roads. $G \uparrow \Rightarrow AE \uparrow \Rightarrow Y^* \uparrow$
- The citizens decide to save more at all income levels. $S_0 \uparrow \Rightarrow AE \downarrow \Rightarrow Y^* \downarrow$
- The citizens decide to save larger proportion of income. $MPS \uparrow \Rightarrow MPC \downarrow \Rightarrow AE \downarrow \Rightarrow Y^* \downarrow$
 save more from income \rightarrow consumes less from incomes but not affect C_1 b/c it is autonomous consumption
- The government decides to raise tax. $T \uparrow \Rightarrow AE \downarrow \Rightarrow Y^* \downarrow$

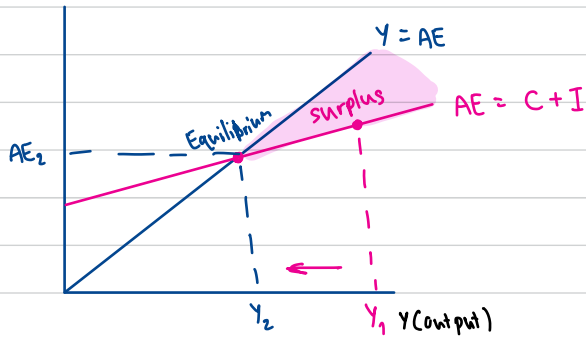


* save more at all income \rightarrow Not depended on $Y \rightarrow S_0 \uparrow$

* save larger proportion of income $\rightarrow MPS \uparrow$ One to $MPC + MPS = 1 \Rightarrow MPS \uparrow + MPC \downarrow = 1$

Consumption = $C_0 + C_1 Y$
 \downarrow
 Consumption \downarrow

⑤ aggregate output is greater than aggregate expenditure means that $Y > AE$ (supply > demand)



In this case, aggregate output is more than aggregate income, inventories will accumulate, so that business need to cut back of production to make Y_1 to Y_2 .

⑥

$$Y = C + S$$

$$S = Y - C$$

$$S = Y - 60 + 0.6Y$$

$$S = 0.4Y - 60$$

$$S = I$$

$$0.4Y - 60 = 20$$

$$0.4Y = 80$$

$$Y^* = 200$$

⑦

$$S = I$$

$$0.4Y - 60 = 20$$

$$0.4Y = 80$$

$$Y^* = 200$$

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

$$= \frac{50}{20}$$

$$= 2.5^*$$

If increase by 20

$$0.4Y - 60 = 40$$

$$0.4Y = 100$$

$$Y^* = 250$$

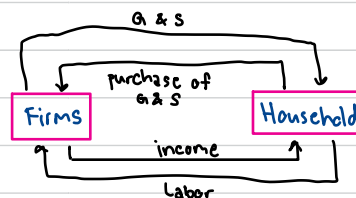
∴ When I increase by 1, output will increase by 2.5 units.
If I increase by 20, output will increase by 50 units.

⑧ When money injected, firm have more money to operate their business. This means firm can buy more machine, hire more labor. Therefore, there are more money in flow of income, labor have more income, and increase output.

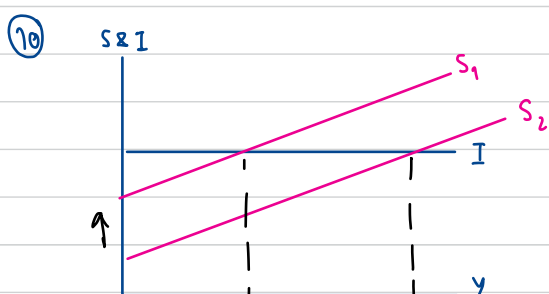
⑨

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

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



when MPC increase, it give higher investment multiplier.



Paradox of Thrift is increasing in autonomous saving leads to decrease in aggregate demand. Therefore, aggregate output decrease.