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**Exercise 3**

**Keynesian Cross and the Multiplier** marginal propensity to consume

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?

1) $C = C_0 + C_1 Y$ ($C_1$: MPC)

MPC is a ratio between change in consumption to change in income. $\frac{\Delta C}{\Delta Y}$

people increase their consumption as their income increases, but not by as much as the increase in income $\Rightarrow 0 < MPC < 1$

2) $C_0$ or a

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.

$MPS + MPC = 1$

autonomous consumption = 200 ($C_0$)

MPS = 0.3 (this means MPC = 0.7)

consumption equation ($C_0$: autonomous, $C_1$: MPC)

$\Rightarrow C = C_0 + C_1 Y$

$C = 200 + 0.7Y$

$MPC = 1 - MPS$

$MPC = 1 - 0.3 = 0.7$

saving equation

$\Rightarrow S = Y - C$

$S = Y - (200 + 0.7Y)$

$= Y - 200 - 0.7Y$

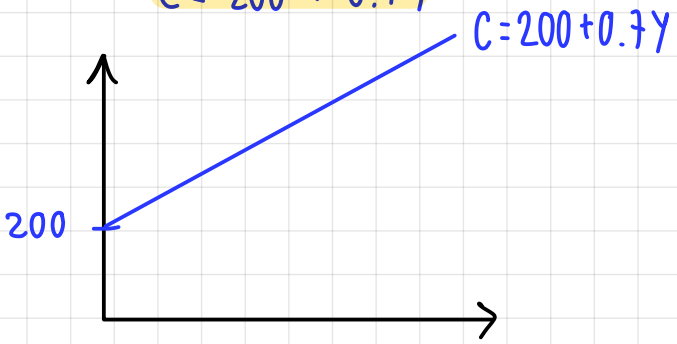
$= -200 + Y - 0.7Y$

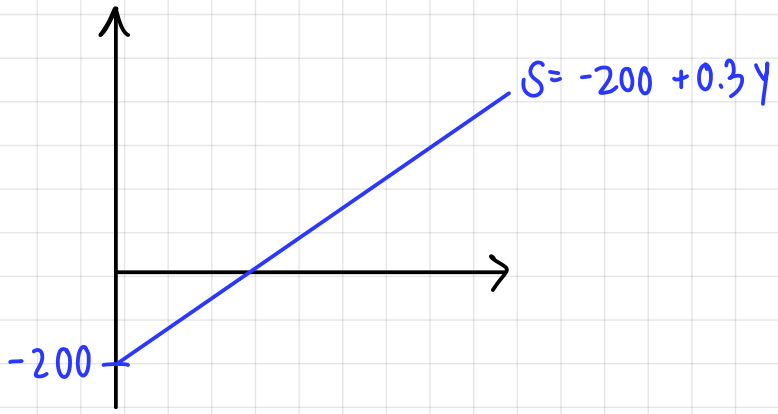
$= -200 + Y(1 - 0.7)$

$S = -200 + 0.3Y$

income = saving + consumption

$Y = S + C$




$S = Y - C$

$C = Y - S$

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

3) $S = -150 + 0.35Y$ (MPS)

MPS = 0.35

$MPC = 1 - MPS = 1 - 0.35 = 0.65$

$-150 + 0.35Y = Y - C$

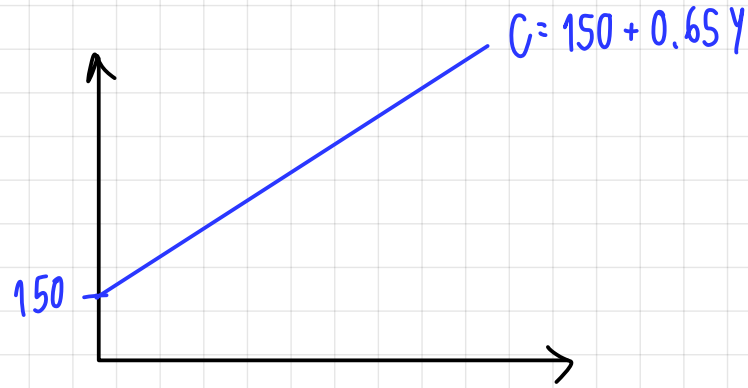
$C = Y + 150 - 0.35Y$

$C = 150 + Y - 0.35Y$

$C = 150 + Y(1 - 0.35)$

$C = 150 + 0.65Y$

($C_0$) ($C_1$ or MPC)



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

4)

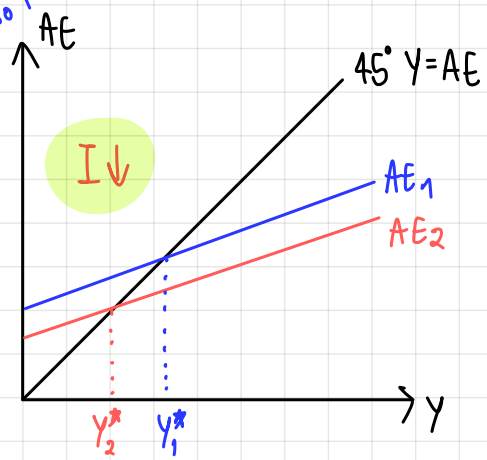
4. How do the followings affect the AE graph (i.e. explain how the graph changes) and the equilibrium output?

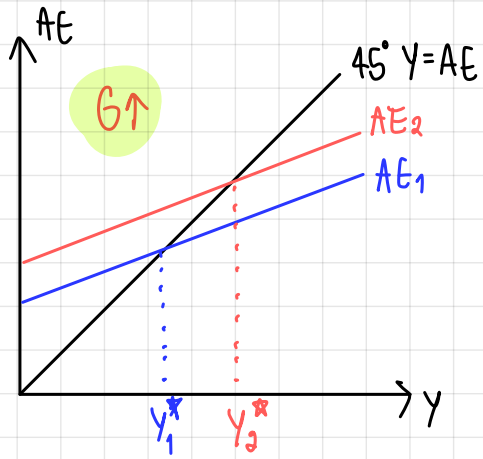
- All firm managers decide to buy fewer machines. $I\downarrow \Rightarrow AE\downarrow \Rightarrow Y^*\downarrow$
- The government decides to build more roads. $G\uparrow \Rightarrow AE\uparrow \Rightarrow Y^*\uparrow$
- The citizens decide to save more at all income levels. $S\uparrow \Rightarrow C\downarrow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

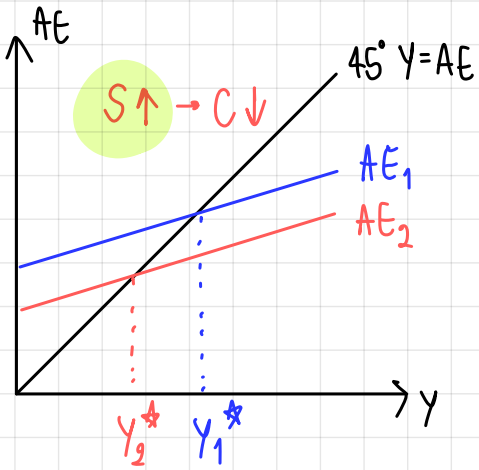
no matter how much income, save ↑ = $S_0\uparrow$ = auto

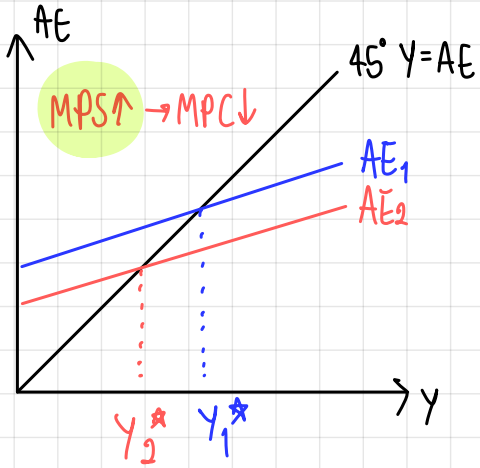
MPS ↑ $S_1$ ...

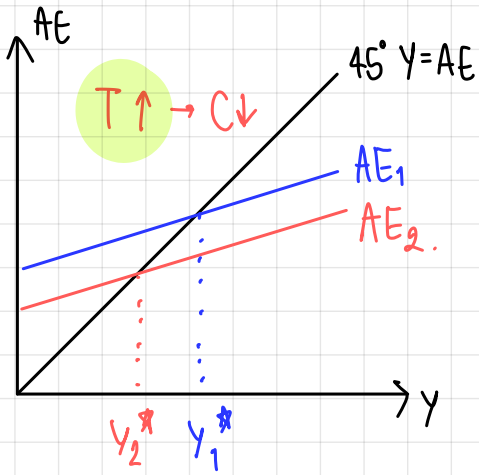
dif bw $S_0$ and MPS how can we know what is $S_0$ & MPS



(produce more than demand)
$Y > AE$

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

output > expenditures it means $Y > AE$, causing surplus. When we have a surplus, the inventories (unsold output) increase. This is a signal to a firm to decrease production. It moves toward equilibrium.

$S = I$

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

Saving = investment
$S = I$ ; leakage = injection

$C = 60 + 0.6Y$
$\rightarrow S = Y - C$
$= Y - (60 + 0.6Y)$
$= Y - 60 - 0.6Y$
$= -60 + Y(1 - 0.6)$
$S = -60 + 0.4Y$

$-60 + 0.4Y = 20$
$0.4Y = 80$
$Y = 80/0.4$
$Y^* = 200$ #

$Y = AE$

7) 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.

ใช้ $S = I$ หา $Y^*$ เลย

$S = -60 + 0.4Y$
$\rightarrow S = Y - C$
$C = Y - S$
$= Y - (-60 + 0.4Y)$
$= Y + 60 - 0.4Y$
$= 60 + Y(1 - 0.4)$
$C = 60 + 0.6Y$

$Y = AE$
$Y = C + I$
$Y = 60 + 0.6Y + 20$
$Y = 80 + 0.6Y$
$Y - 0.6Y = 80$
$Y(1 - 0.6) = 80$
$Y = 80/0.4$
$Y^* = 200$ #

New. I ↑ by 20 so $I = 40$
$Y = AE$
$Y = C + I$
$Y = 60 + 0.6Y + 40$
$Y = 100 + 0.6Y$
$Y - 0.6Y = 100$
$Y(1 - 0.6) = 100$
$Y = 100 / 0.4$
$Y^* = 250$ # new equilibrium

$\frac{1}{1 - \text{Slope of AE (MPC)}}$

or

investment multiplier $= \frac{\Delta Y^*}{\Delta I} = \frac{250 - 200}{40 - 20} = \frac{50}{20} = 2.5$ #

NOTE. multiplier $= \frac{\Delta Y^*}{\Delta AE}$

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

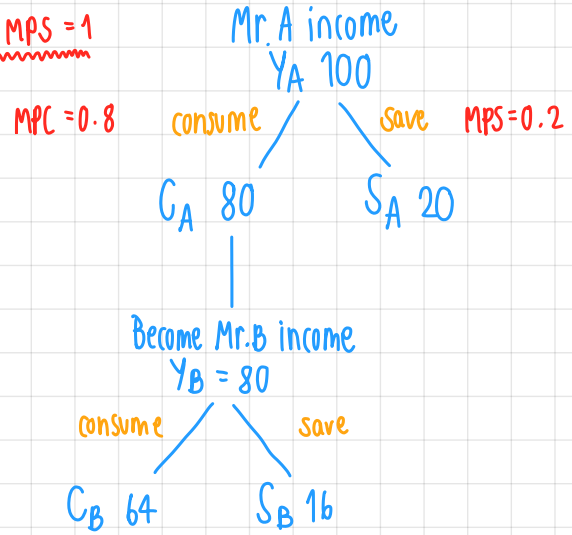
8)

one man's spending = one man's income

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.

The key idea of multiplier effect is that one man's spending = one man's income.

MPC + MPS = 1




So when money injected, people have more money to spend which will increase aggregate demand then it will lead to increase in output

9)

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

Recall that when MPC increases, the investment multiplier increases.

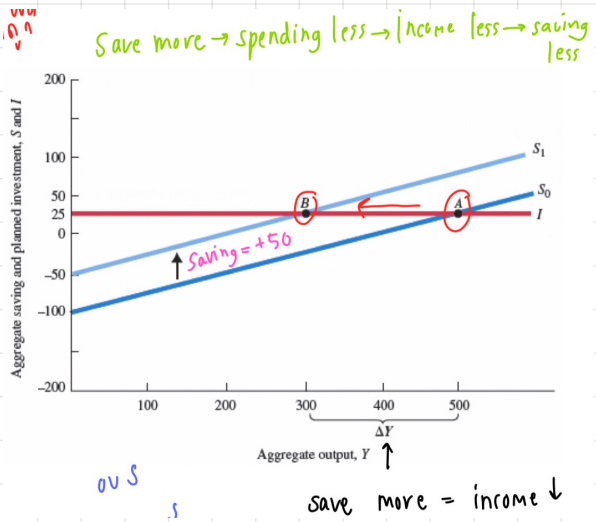
$$\text{investment multiplier} = \frac{\Delta Y}{\Delta I} = \frac{1}{1-MPC}$$

if MPC = 0.5 ; $m = \frac{1}{1-0.5} = 2$

MPC = 0.8 ; $m = \frac{1}{1-0.8} = 5$

10)

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




Paradox of Thrift states that increasing in autonomous saving leads to decrease in aggregate demand (expenditure), causing the aggregate output decreased. (S↑ C↓ AE↓ Y↓)

if you save more money then your spending decreased. This leads to decreasing in output produced, so the income in economy is decreased. The less income you get the less money you can save.