Exercise 6

IS-LM Model

1. The IS-LM Model is a general equilibrium model, which means that the Eqbm is at the intersection between IS-LM
   There are 2 markets, which are money market, G&S market
   The price that clears these markets is interest rate
   The IS curve represents a negative relationship between i and Y. This is because higher i reduces Y b/c it discourages investment.
   The LM curve represents a positive relationship between i and Y. This is because higher Y → higher demand for money → higher i
   Each point on the IS curve is an equilibrium in the G&S market.
   Therefore, we have the equilibrium condition: Y = AE
   Each point on the LM curve is an equilibrium in the money market.
   Therefore, we have the equilibrium condition: Md = Ms

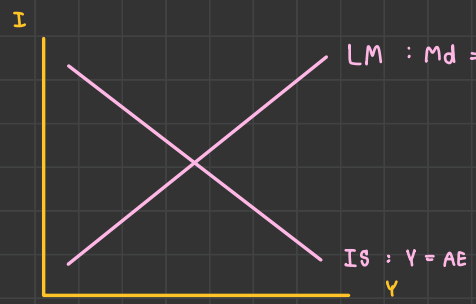
2. Cetaris Paribus (other things equal), how will each variable affect each curve – shift (to which direction?) or movement?

Variable	IS Curve	LM Curve
i↑	movement	shift to ←
G↓	shift to ←	
T↓	shift to →	
G&T↑ equally	shift	
M↓		shift to ←
P↓		shift to →

3. Explain, together with diagrams, how we can derive the IS curve from Keynesian Cross, and how we can derive the LM curve from the money market.

4. Assume a closed economy with the government. The economy has the following parameters:
   $C = C_0 + C_1(Y - T)$ $I = I_0 - I_1 \cdot i$ $G = G_0$ $T = T_0$
   $L(i, Y) = L_Y \cdot Y - L_i \cdot i$ $M = M_0$ $P = P_0$
   Answer the following questions.
   4.1 What are I_1, L_Y, and L_i?
   4.2 Why are I_1 and L_i negative?
   4.3 Derive the IS equation that shows how i and Y are related.

3.) Each point in IS curve is an Eqbm in the G&S market. So, it represent all Eqbm in keynesian cross at different level of interest rate. The condition : Y = AE

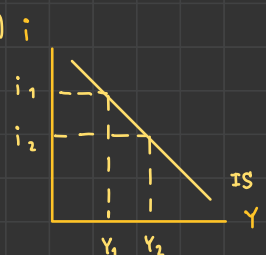


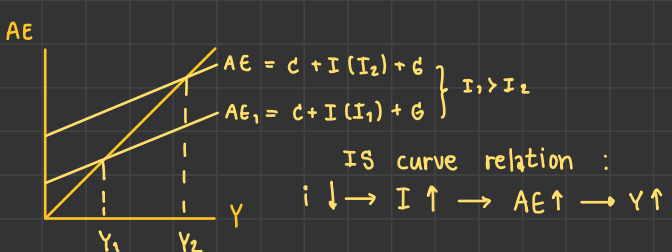
And, each point in LM curve is an Eqbm in the money market. So, it represent all eqbm in money market. The condition : Md = Ms

4.) 4.1) - I_1 is the slope of the investment function.
- L_Y is the sensitivity of Md to change in Y (Slope)
- L_i is the sensitivity of Md to change in i

4.2) - I_1 is the slope that shows negative relationship between i and Y, the sensitivity of investment to change in interest rate. So, larger I_1 implied that investment is sensitive to interest rate.
- L_i is the slope that shows negative relationship between i and Md, the sensitivity of Md to change in interest rate. so, large L_i means Md is sensitive to i.

4.3)





IS curve relation :

$i \downarrow \rightarrow I \uparrow \rightarrow AE \uparrow \rightarrow Y \uparrow$

(Hint: Start with the equilibrium condition Y = AE. Then, substitute relevant variables into the expression. Lastly, rearrange i to the LHS and everything else on the RHS.)

4.4 Find the slope of the IS curve.
(Hint: The coefficient before Y is the slope of IS.)

4.5 Derive the LM equation that shows how i and Y are related.
(Hint: Start with the equilibrium condition Md = Ms. Then, substitute relevant variables into the expression. Lastly, rearrange i to the LHS and everything else on the RHS.)

4.6 Find the slope of the LM curve.
(Hint: The coefficient before Y is the slope of LM.)

Exam

5. From Question 4.4, we can see that the slope of IS curve depends on two factors. Explain how each of these factors affects the slope of the IS curve. We also can see that the slope of LM curve depends on two factors. Explain how each of these factors affects the slope of the LM curve.

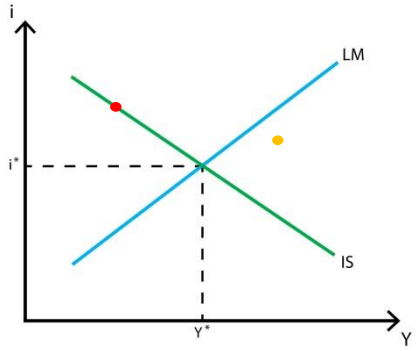
Exam

6. What is the Crowding-Out Effect?
Suppose that the government increases its spending, i.e. expansionary fiscal policy. Use the IS-LM diagram to explain how the economy moves to the new general equilibrium and the crowding-out effect.

slow down econ

7. Suppose the central bank decreases its money supply, i.e. contractionary monetary policy. Use the IS-LM diagram to explain how the economy moves to the new general equilibrium.

8. Use the graph below to answer the following questions.



8.1 At the **Red** point, which market is in equilibrium, and which is not?

8.2 Explain how the goods and money markets at the **Orange** point will adjust towards the general equilibrium (Y*, i*).

4.3) IS curve contains all eqbm in keynesian cross at different level of interest rate.

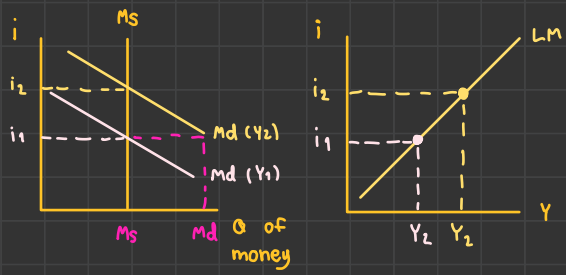
4.4) IS equation : $Y = C + I + G$

$= C_0 + C_1(Y - T_0) + I_0 - I_1(i) + G_0$

$= C_0 + C_1Y - C_1T_0 + I_0 - I_1(i) + G_0$

$\therefore$ Slope of IS curve is C_1

4.5) LM curve contains all eqbm in money market at different level of interest rate



LM relation : $Y \uparrow \longrightarrow Md \uparrow$, $I \uparrow \longrightarrow Md \downarrow$ } $Md = Ms$

4.6) $Md = L(Y, i)$

$= L_Y(Y) - L_i(i)$

$Ms = \frac{M}{P} = \frac{M_0}{P_0}$

$\therefore$ Slope of LM curve is L_Y

5.) ① 2 factors that affect IS curve

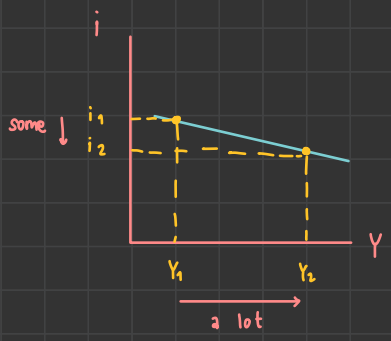
- investment is sensitive to interest rate

$i \downarrow \rightarrow I \uparrow \rightarrow AE \uparrow \rightarrow Y \uparrow$

a lot a lot a lot

bc I = sensitive

∴ some changes in i leads to a lot change in Y

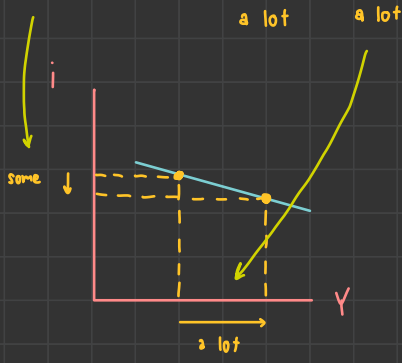


- large investment multiplier (a change in autonomous spending / exogenous variable)

(a change in i can lead to a change in Y*)

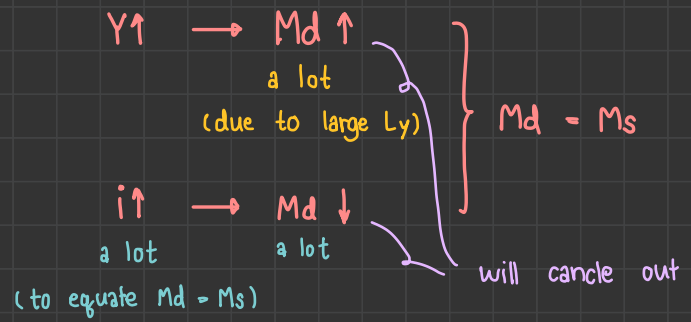
$i \downarrow \rightarrow I \uparrow \rightarrow AE \uparrow \rightarrow Y \uparrow$

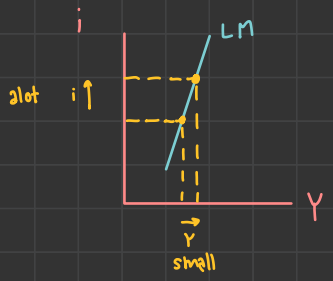
a lot a lot



② 2 factors that affect LM curve : LM is steep

- L_Y is large





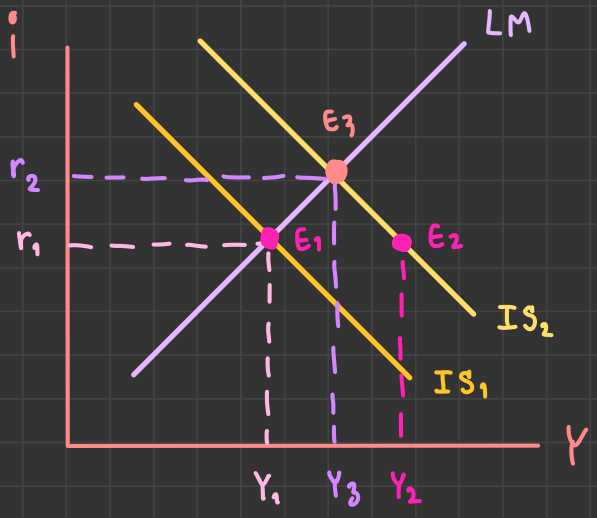
- L_i is small

6.) Crowding-out effect occurs when there is an increasing gov. borrowing ($\uparrow G$) reduces private sector spending (I)

① when $G \uparrow$, $Y \uparrow$ (from $Y_1 \rightarrow Y_2$) at E_2

② However, because of higher i, Investment falls.

$\therefore$ Y_2 decreases to Y_3 (at E_3)

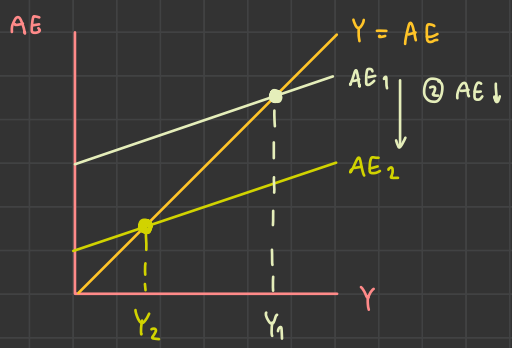


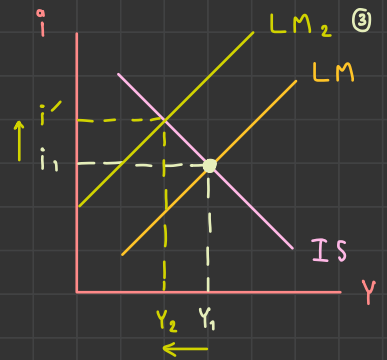
7.) Contractionary Monetary Policy : Ms ↓

① MM . Ms ↓ ⟶ i ↑

② GS : i ↑ ⟶ I ↓ ⟶ AE ↓ ⟶ Y ↓

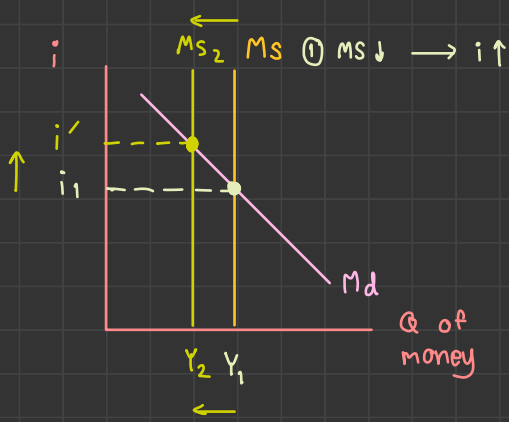
③ new eqbm from Ms ↓ : lower Y and higher i





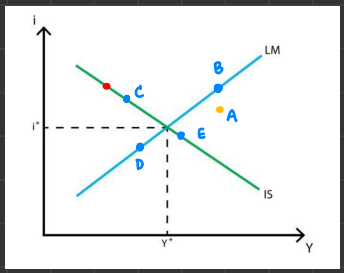
↳ higher i

↳ lower Y



8.) 8.1) G&S market is in eqbm. Money market is not in eqbm.

8.2)



At A, both of GS & MM are not in eqbm.

A → B : i ↑ (MM)

B → C : i ↑ → I ↓ → AE ↓ → Y ↓ (GM)

C → D : Y ↓ → Md ↓ → i ↓ (MM)

D → E : i ↓ → I ↑ → AE ↑ → Y ↑ (GM)

∴ The process continue untill we reach the eqbm.

9. The government is worried about the effectiveness of its policies. You are to advise which policy – fiscal or monetary – should be used in each of the following cases.
   9.1 Consumers have high MPC.
   9.2 Investment is NOT sensitive to changes in interest rate. fis
   9.3 Money demand is very sensitive to changes in interest rate. steep LM (Mone)
   9.4 Money demand is very sensitive to changes in income (Y). flat (fiscal)

10. Assume a closed economy with the government. The economy has the following parameters:

C = 100 + 0.5(Yd)	I = 80 – 100(i)	G = 40	T = 40
L(i, Y) = 0.5(Y) – 200(i)		M = 400	P = 2

Answer the following questions.

   10.1 Derive the IS equation.
   10.2 Derive the LM equation.
   10.3 Find the general equilibrium output and interest rate.

9.) 9.1)

9.2) Fiscal Policy

9.3) Monetary Policy

9.4) Fiscal Policy

10.) 10.1) IS equation : $AE = C(Yd) + I(i) + G$

$= 100 + 0.5(Y - 40) + 80 - 100(i) + 40$

$= 100 + 0.5Y - 20 + 80 - 100i + 40$

$AE = Y = 200 + 0.5Y - 100i$

$Y - 0.5Y = 200 - 100i$

$Y = \frac{200 - 100i}{0.5}$

$Y = 100 - 50i$

10.2) LM equation : $Ms = Md$

$\frac{M}{P} = L(i, Y)$

$20\frac{\$0}{\$} = 0.5(Y) - 200i$

$200i = 0.5Y - 20$

$i = \frac{0.5Y - 20}{200}$

$= 0.0025Y - 0.1$