

1. The IS-LM Model is a general equilibrium model, which means

that... *it analyzes two or more markets at the same time* .....

There are... *2* .....markets, which are... *good & service market and money market* .....

The price that clears these markets is... *equilibrium point* .....

The IS curve represents a... *negative* .....relationship between

*interest rate (i)* and... *income (Y)* ..... This is because... *the higher interest rate reduce the*

*output that is produced* .....

The LM curve represents a... *positive* .....relationship between

*interest rate (i)* and... *income (Y)* ..... This is because... *an increase in interest rate cause*

*an increase in income* .....

Each point on the IS curve is an equilibrium in the... *goods* .....market.

Therefore, we have the equilibrium condition: ... *Y = AE* .....

Each point on the LM curve is an equilibrium in the... *money* .....market.

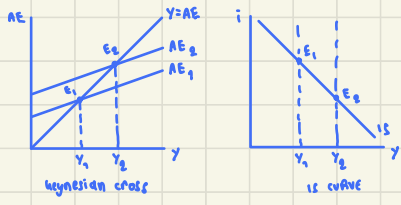
Therefore, we have the equilibrium condition: ... *Md = Ms* .....

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

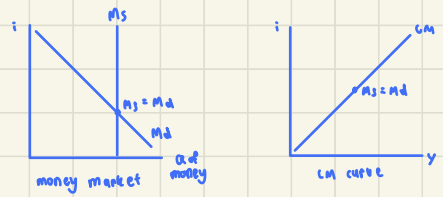
| Variable                  | IS Curve               | LM Curve               |
|---------------------------|------------------------|------------------------|
| $i \uparrow$              | <i>movement</i>        | <i>movement</i>        |
| $G \downarrow$            | <i>shift (left)</i>    | <i>does not affect</i> |
| $T \downarrow$            | <i>shift (right)</i>   | <i>does not affect</i> |
| $G \& T \uparrow$ equally | <i>shift (right)</i>   | <i>does not affect</i> |
| $M \downarrow$            | <i>does not affect</i> | <i>shift (right)</i>   |
| $P \downarrow$            | <i>does not affect</i> | <i>shift (right)</i>   |

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.

• the IS curve is a locus of the equilibriums in the  $Y = AE$  line



• the LM curve is a locus of equilibriums in the money market



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

$$C = C_0 + C_1(Y - T) \quad I = I_0 - I_1 \cdot i \quad G = G_0 \quad T = T_0$$

$$L(i, Y) = L_Y \cdot Y - L_i \cdot i \quad M = M_0 \quad P = P_0$$

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.

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

4.1)  $I_1$  = how sensitive investment is to the interest rate

$L_Y$  = sensitivity of money demand to change in income

$L_i$  = sensitivity of money demand to change in interest rate

4.2)  $I_1$  is negative because it shows the negative relationship between investment and interest rate

$L_i$  is negative because it shows the negative relationship between money demand and interest rate

4.3)  $Y = AE \rightarrow Y = C_1 X + G$

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

$$\text{slope of the IS curve} = -\frac{(1 - C_1)}{I_1}$$

$$i = C_0 + C_1 Y - C_1 T_0 + G_0 + I_0 - Y \left( \frac{1}{I_1} \right)$$

$$i = \left( \frac{1}{I_1} \right) C_0 - C_1 T_0 + G_0 + I_0 + C_1 Y - Y$$

$$i = \frac{C_0 - C_1 T_0 + G_0 + I_0 + Y(C_1 - 1)}{I_1}$$

- 4.5 Derive the LM equation that shows how  $i$  and  $Y$  are related.

(Hint: Start with the equilibrium condition  $M_d = M_s$ . 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.)

$$M_d = M_s \rightarrow L_Y(Y) - L_i(i) = \frac{M_0}{P_0} \quad \therefore \text{slope of LM curve}$$

$$i = \frac{-L_Y(Y) + \frac{M_0}{P_0}}{L_i} = \frac{L_Y}{L_i} \cdot Y + \frac{M_0/P_0}{L_i}$$

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.

$$\bullet -\frac{(C_1 - 1)}{I_1} = X$$

IS: when  $I_1$  increase by 1,  $(1 - C_1)$  would decrease by  $X$ .

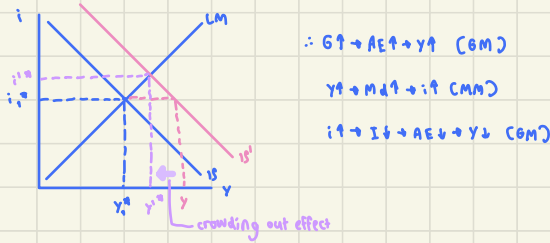
$$\bullet \frac{L_Y}{L_i} = X$$

LM: when  $L_i$  increase by 1,  $L_Y$  would increase by  $X$ .

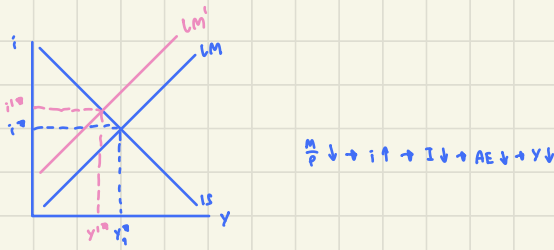
6. What is the Crowding-Out Effect?

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.

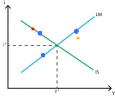
- the crowding out effect is when the increase in government's spending actually decrease investment.



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 ( $Y^*$ ,  $i^*$ ).

8.1) the good & service market is in equilibrium but the money market is not

8.2) MM:  $i \uparrow$

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

MM:  $Y \downarrow \rightarrow Md \downarrow \rightarrow i \downarrow$

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

& continues until it reaches the general equilibrium

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.
- 9.3 Money demand is very sensitive to changes in interest rate.
- 9.4 Money demand is very sensitive to changes in income (Y).

- ① fiscal policy
- ② fiscal policy
- ③ monetary policy
- ④ monetary policy

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

$$C = 100 + 0.5(Y_d) \quad I = 80 - 100(i) \quad G = 40 \quad T = 40$$

$$L(i, Y) = 0.5(Y) - 200(i) \quad M = 400 \quad P = 2$$

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.

① IS equation:  $Y = AE$ ;  $AE = C + I + G$

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

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

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

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

$$\therefore Y = 400 - 200i = \text{IS equation}$$

②  $M_d = M_s \rightarrow 0.5Y - 200i = 200$

$$\frac{0.5Y}{0.5} = \frac{200 + 200i}{0.5}$$

$$\therefore Y = 400 + 400i = \text{LM equation}$$

$$\frac{400 - 200i}{-200 - 400i} = \frac{400 + 400i}{-400 - 400i}$$

$$\frac{-600i}{-600} = 0$$

$$i^* = 0$$