

Exercise 6

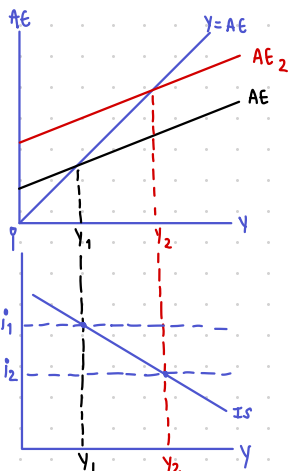
IS-LM Model

1. The IS-LM Model is a general equilibrium model, which means that... a common price that clear two or more market.....
- There are... 2...markets, which are... commodity market and money market
- The price that clears these markets is... interest rate.....
- The IS curve represents a... negative...relationship between interest rate and... output..... This is because higher interest rate discourage investor from investment and decrease output.....
- The LM curve represents a... positive...relationship between interest rate and... output..... This is because higher level of income make people have more demand.....
- Each point on the IS curve is an equilibrium in the commodity 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: ... $M_d = M_s$

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

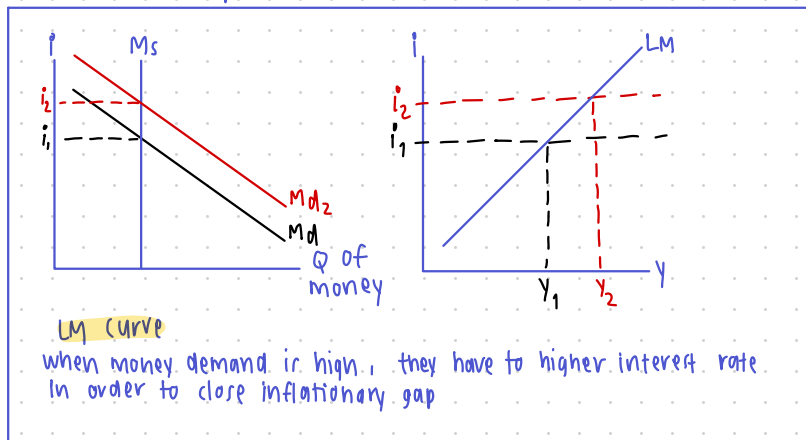
Variable	IS Curve	LM Curve
$i \uparrow$	<u>movement</u>	<u>movement</u>
$G \downarrow$	<u>shift left</u>	<u>—</u>
$T \downarrow$	<u>shift right</u>	<u>—</u>
$G \& T \uparrow$ equally	<u>shift right</u>	<u>—</u>
$M \downarrow$	<u>—</u>	<u>shift left</u>
$P \downarrow$	<u>—</u>	<u>shift right</u>

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.



IS curve

lower interest rate encourage investors to invest more, therefore, aggregate expenditure rises and output increases. In the other hand, if i is high, it will discourage investors and leads to lower output.



LM curve

when money demand is high, they have to higher interest rate. In order to close inflationary gap

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.

4.1) L_Y denotes the sensitivity of M_d to changes in Y
 L_i denotes the sensitivity of M_d to changes in i
 I_1 denotes the sensitivity of investment to changes in interest rate

4.2) I_1 negative because when i increase, it will discourage investment
 L_i negative because when i increase, ppl will demand less money

4.3)

$$Y = AE$$

$$Y = C + I + G$$

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

$$I i = C_0 + C_1 Y - C_1 T_0 + I_0 + G_0 - Y$$

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

4.4 Find the slope of the IS curve.

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

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

$$m = \frac{1}{1 - c_1}$$

$$1 - c_1 = \frac{1}{m}$$

$$i = \frac{C_0 + c_1 Y - c_1 T_0 + I_0 + G_0 - Y}{I_1}$$

$$i = \frac{C_0 - c_1 T_0 + I_0 + G_0 + Y(c_1 - 1)}{I_1}$$

$$i = \frac{C_0 - c_1 T_0 + I_0 + G_0}{I_1} + \frac{Y(c_1 - 1)}{I_1}$$

$$i = \frac{C_0 - c_1 T_0 + I_0 + G_0}{I_1} - \frac{Y(1 - c_1)}{I_1}$$

$$i = \frac{C_0 - c_1 T_0 + I_0 + G_0}{I_1} - \left(\frac{1}{I_1} \cdot \frac{1}{m} \right) Y$$

$$\text{slope} = - \left(\frac{1}{I_1} \cdot \frac{1}{m} \right) \times$$

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.)

$$M_d = M_s$$

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

$$L_y \cdot Y - L_i \cdot i = \frac{M}{P}$$

$$L_i \cdot i = \frac{M}{P} - L_y \cdot Y$$

$$i = \frac{M}{P} \left(\frac{1}{L_i} \right) - \frac{L_y \cdot Y}{L_i} \times$$

4.6 Find the slope of the LM curve.

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

$$\text{slope of LM curve is } \frac{L_y}{L_i}$$

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.

Slope of IS depends on M and I_1 . For M , if multiplier is high, IS curve will be flat. In the same way, if I_1 is high, slope will be flat.

Slope of LM depends on L_y and L_i . If L_y is high, LM curve will be steep, but if L_i is high, LM curve will be flat.

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.

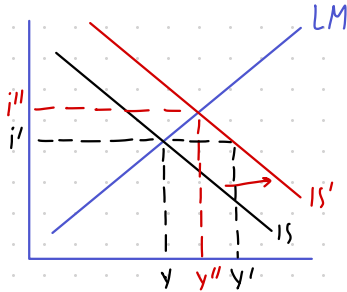
crowding out effect is a problem of fiscal policy when gov. increases its spending or reduce tax

suppose the gov. increases its spending :

$$GM : G \uparrow \rightarrow AE \uparrow \rightarrow Y \uparrow$$

$$MM : Y \uparrow \rightarrow M_d \uparrow \rightarrow i \uparrow$$

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

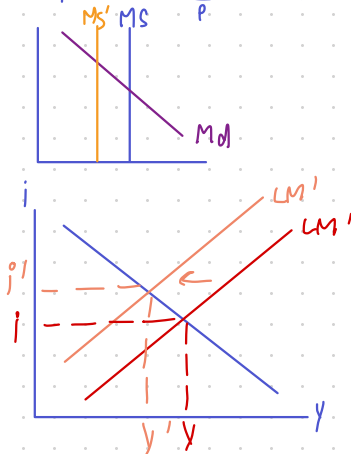


from graphs, gov. increase government spending leads to increase in AE and output. this cause the graph shift to the right. Then it makes an increase in interest rate which will discourage investors. Therefore, Y' will move to Y'' . This is crowding-out effect.

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.

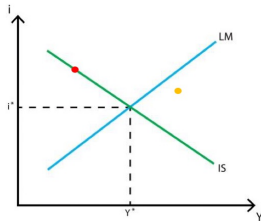
IS equation : $Y = (I + G) / P$
LM equation : $\frac{M}{P} = L(i, Y)$

MM : $M \downarrow \rightarrow \frac{M}{P} \downarrow \rightarrow i \uparrow$
GM : $i \uparrow \rightarrow I \downarrow \rightarrow AE \downarrow \rightarrow Y \downarrow$



from graph, when CB decrease M_s , the curve will shift left, which cause level of interest rate to rise. therefore, investors will invest less lead to a drop in AE. As a result, output decrease from Y to Y' .

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



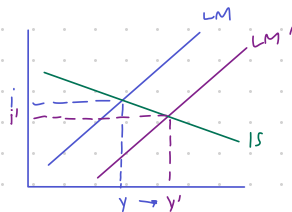
- 8.1 At the **Red** point, which market is in equilibrium, and which is not?
 8.2 Explain how the goods and money markets at the **Orange** point will adjust towards the general equilibrium (Y^* , i^*).

8.1) commodity market is in equilibrium, but money market is not.

8.2) CB increase interest rate and it will discourage investor. Hence, lower AE and Y . This create movement along curve, so the gov. will use contractionary fiscal policy, increase tax, make AE and Y decrease. The IS curve will shift left toward general equilibrium.

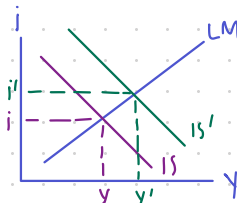
9. The government is worried about the effectiveness of its policies. You are to advise which policy – fiscal or monetary – should be used in each of the following cases.

9.1 Consumers have high MPC.



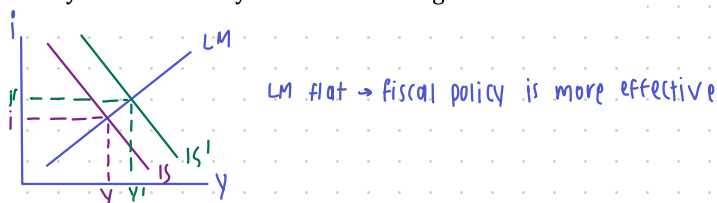
IS flat $\rightarrow$ monetary policy is more effective

9.2 Investment is NOT sensitive to changes in interest rate.

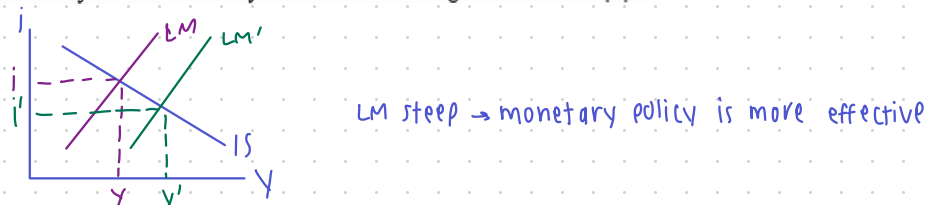


IS steep $\rightarrow$ fiscal policy is more effective

9.3 Money demand is very sensitive to changes in interest rate.



9.4 Money demand is very sensitive to changes in income (Y).



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.

$$\begin{aligned} Y &= AE \\ &= (C + I + G) = C_0 + C_1 Y - C_2 T + I_0 - I_1(i) + G \\ Y &= 100 + 0.5Y - 0.5(40) + 80 - 100i + 40 \\ 100i &= 200 + 0.5Y \\ i &= \frac{200 + 0.5Y}{100} \end{aligned}$$

10.2 Derive the LM equation.

$$\begin{aligned} M_d &= M_s \\ L(Y, i) &= \frac{M}{P} \\ 0.5Y - 200i &= \frac{400}{2} \end{aligned} \quad \left| \quad \begin{aligned} 200i &= 0.5Y - 200 \\ i &= \frac{0.5Y - 200}{200} \end{aligned} \right.$$

10.3 Find the general equilibrium output and interest rate.

$$\begin{aligned} \frac{200 + 0.5Y}{100} &= \frac{0.5Y - 200}{200} & \left| \quad i &= \frac{200 + 0.5(-300)}{100} \right. \\ & & &= \frac{200 - 150}{100} \\ 400 + Y &= 0.5Y - 200 & i^* &= 0.5 \\ 0.5Y &= -600 & & \\ Y^* &= -300 & & \end{aligned}$$