

Exercise 6

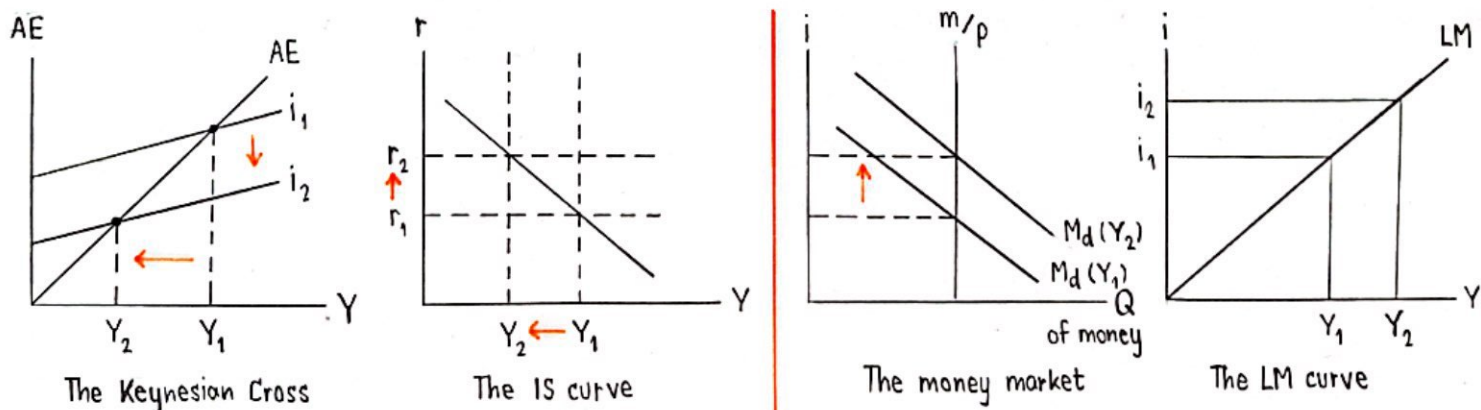
IS-LM Model

- The IS-LM Model is a general equilibrium model, which means that...exists...a common price which clears two or more markets.....
 There are...2....markets, which are...the goods & services market...and...the money market
 The price that clears these markets is...the interest rate.....
 The IS curve represents a...negative.....relationship between
 iand..... YThis is because...higher i ...reduce Y ... (it discourages
 ..investment).....
 The LM curve represents a...positive.....relationship between
 iand..... YThis is becausehigher i
 ..raises Ycommodity.....
 Each point on the IS curve is an equilibrium in the..... $\hat{}$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: $M_d = M_s$

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

Variable	IS Curve	LM Curve
$i \uparrow$	movement	movement
$G \downarrow$	shift left	-
$T \downarrow$	shift right	-
$G \& T \uparrow$ equally	shift right	-
$M \downarrow$	-	shift left
$P \downarrow$	-	shift right

- 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:

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

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

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.

(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 $M_d = M_s$. 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.)

4.1) I_1 is the sensitivity of investment to changes in interest rate

L_Y denotes the sensitivity of M_d to change in Y

L_i denotes the sensitivity of M_d to change in i

4.2) I_1 : When i/r higher, people X borrow money for investment

$\{-I_1 = \frac{dI}{di}\}$ interest rate $\uparrow$ 1 unit, investment $\downarrow I_1$ units

L_i : When i/r higher, people X hold cash (want to earn interest from bonds)

4.3) $Y = AE$

$$Y = C + I + G$$

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

$$I_1 i = C_0 + C_1 Y - C_1 T + I_0 + G_0 - Y$$

$$= (C_1 - 1)Y + C_0 - C_1 T + I_0 + G_0$$

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

$$4.4) \text{ slope} = \frac{-1}{\text{Multiplier}}$$

$$4.5) L(Y, i) = \frac{M}{P}$$

$$L_Y \cdot Y - L_i \cdot i = \frac{M_0}{P_0}$$

$$i = \frac{L_Y}{L_i} (Y) - \frac{1}{L_i} \left(\frac{M_0}{P_0} \right)$$

$$4.6) \text{ slope} = \frac{L_Y}{L_i}$$

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.

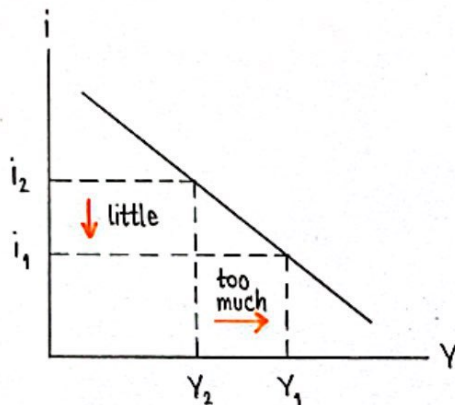
IS ;

- 1) sensitivity of investment to change in interest rate :

If $i \downarrow$, investment will large $\uparrow$ and output will $\uparrow$

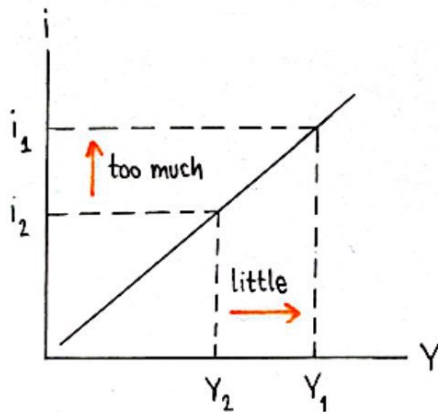
- 2) multiplier :

$i \uparrow \rightarrow I \downarrow \rightarrow Y \downarrow$ (too much)

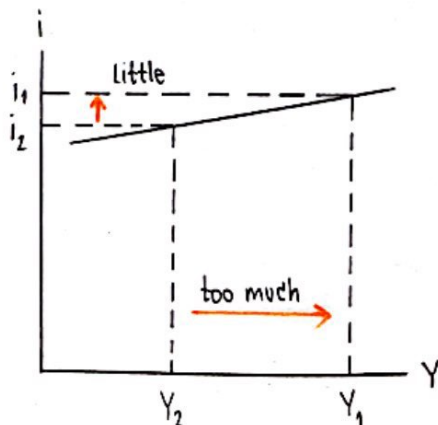


LM ;

- 1) steep : $i \uparrow$ too much $\rightarrow Y \uparrow$ a little



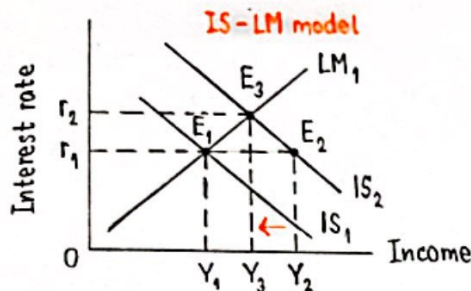
- 2) flat : $i \uparrow$ a little $\rightarrow Y \uparrow$ too much



6. What is the Crowding-Out Effect? (a government increases its borrowing)

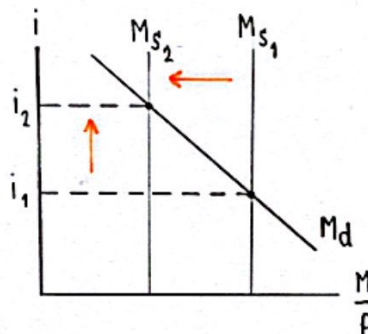
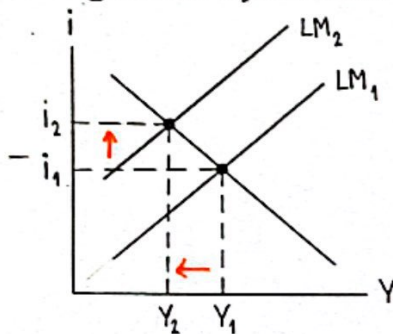
Suppose that the government increases its spending, i.e. expansionary fiscal policy. Use the IS-LM diagram to explain how the economy moves to the new general equilibrium and the crowding-out effect.

⇒ public sector spending (G) reduces / eliminates private sector spending (I)

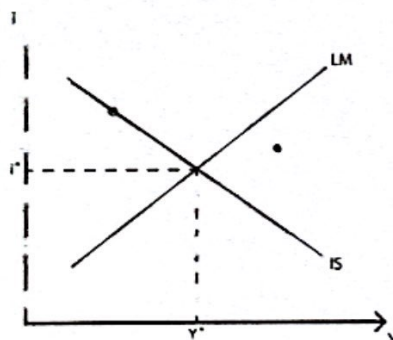


- When $G \uparrow$, Y_1 increases to Y_2 (at E_2)
- However, because of higher i (at E_2), investment falls
- As a result, Y_2 decreases to Y_3

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?

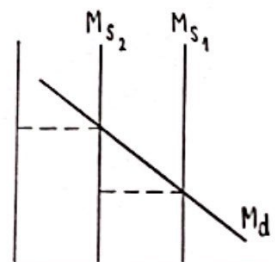
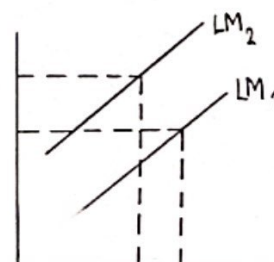
8.2 Explain how the goods and money markets at the Orange point will adjust towards the general equilibrium (Y^*, i^*).

8.1) the goods & services market is in the equilibrium / the money market is not

8.2) below LM curve ▷ in money demand
▷ interest in bond ↑

above LM curve ▷ in goods & services market ($Y > AE$)
▷ firm produces ↓ (↓ investment)

* orange point will shift to the left *



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. monetary policy

9.2 Investment is NOT sensitive to changes in interest rate. fiscal policy

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

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

$$10.1) Y = C + I + G$$

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

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

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

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

$$10.2) L(i, Y) = M/P$$

$$0.5Y - 200i = 400/2$$

$$0.5Y - 200 = 200i$$

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

$$10.3) \frac{200 - 0.5Y}{100} = \frac{0.5Y - 200}{200}$$

$$40,000 - 100Y = 50Y - 20,000$$

$$50Y = 20,000$$

$$\therefore Y^* = 400 \text{ #}$$

$$i = 200 - 0.5(400)$$

$$= 200 - 200 = 0 \text{ #}$$