

CHAPTER 3 - The Goods Market

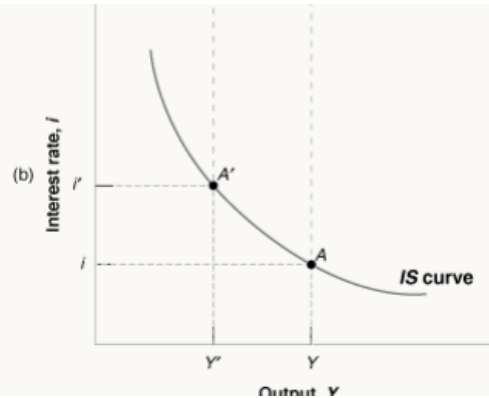
The Determination of Equilibrium Output

- The demand for goods and services can be written as

$$Y = C(Y - T) + I(i) + G$$

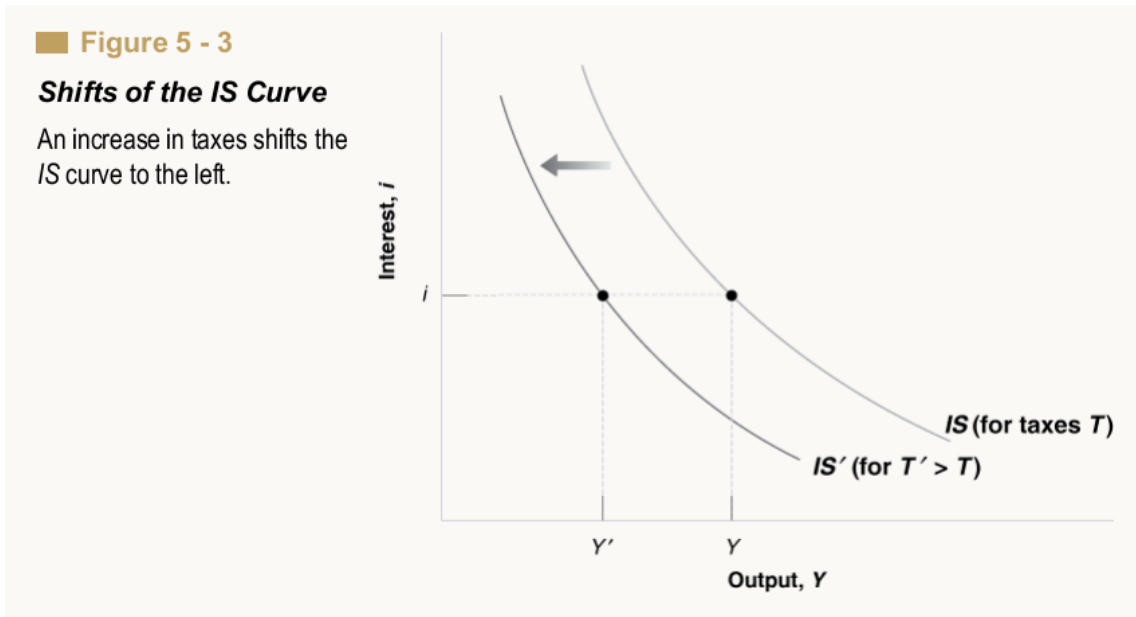
- Previous equation implies that an increase in the interest rate leads to a decrease in the demand for output

(b) Equilibrium in the goods market implies that an increase in the interest rate leads to a decrease in output. The IS curve is therefore downward sloping.



Shifts of the IS Curve

- Changes that decrease (increase) the demand for goods, given the interest rate, shift the IS curve to the left (right)



CHAPTER 4 - Financial Markets

The Demand for Money

- The proportions of money and bonds you wish to hold depend mainly on two variables:
 - Your level of transactions
 - The interest rate

$$M^d = \$Y L(i)$$

(—)

where $\$Y$ = nominal income

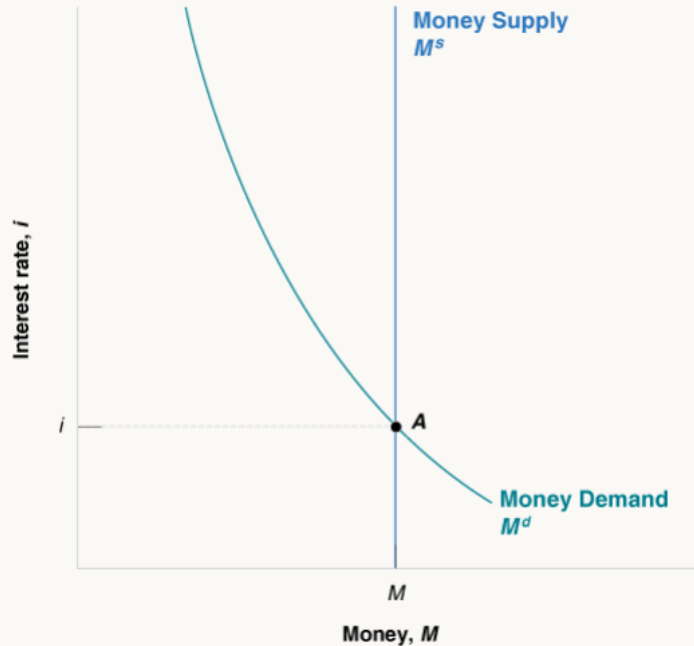
The Equilibrium Interest Rate (LM Relation)

$$\text{Money Supply} = \text{Money Demand}$$

Figure 4 - 2

The Determination of the Interest Rate

The interest rate must be such that the supply of money (which is independent of the interest rate) is equal to the demand for money (which does depend on the interest rate).



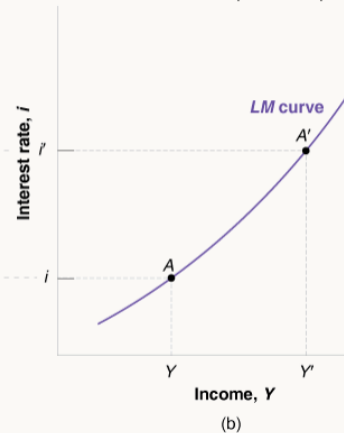
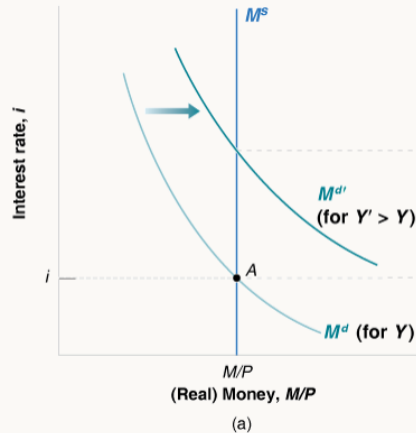
Deriving the LM Curve

Figure 5 - 4

The Derivation of the LM Curve

a) An increase in income leads, at a given interest rate, to an increase in the demand for money. Given the money supply, this increase in the demand for money leads to an increase in the equilibrium interest rate.

b) Equilibrium in the financial markets implies that an increase in income leads to an increase in the interest rate. The LM curve is therefore upward sloping.



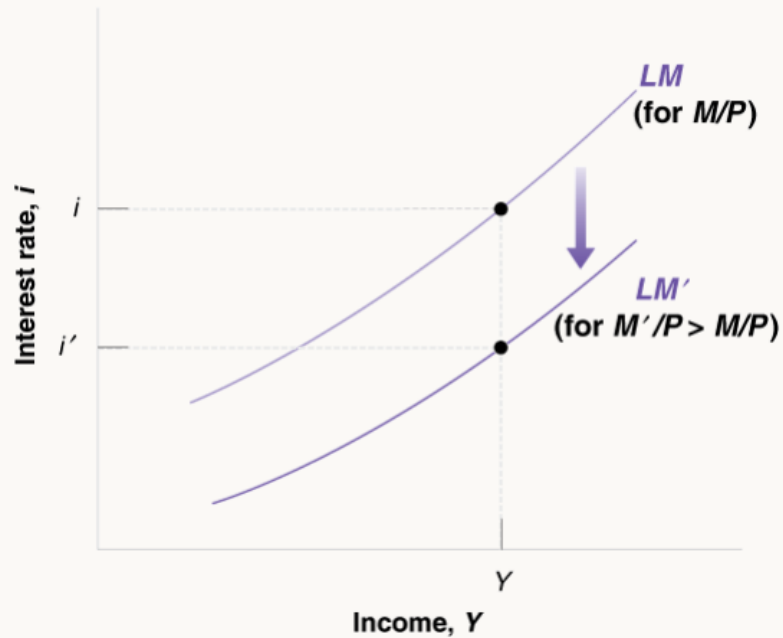
- LM curve relates output and the interest rate

Shifts of the LM Curve

■ **Figure 5 - 5**

Shifts of the LM curve

An increase in money causes the *LM* curve to shift down.



CHAPTER 5 - Goods and Financial Markets: The IS-LM Model

Putting the IS and the LM Relations Together

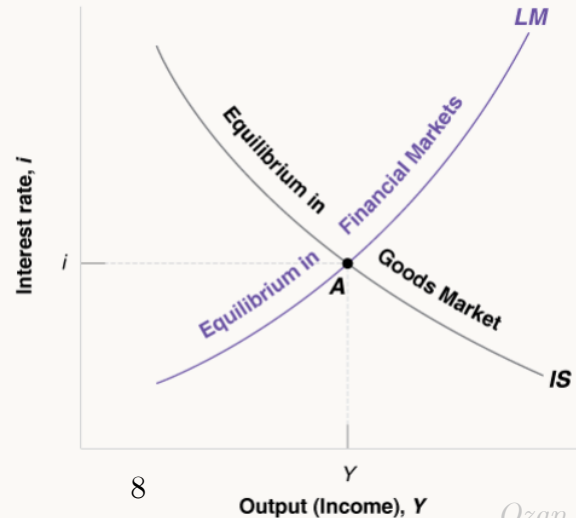
$$IS \text{ relation: } Y = C(Y - T) + I(Y, i) + G$$

$$LM \text{ relation: } \frac{M}{P} = YL(i)$$

■ **Figure 5 - 6**

The IS-LM Model

Equilibrium in the goods market implies that an increase in the interest rate leads to a decrease in output. This is represented by the IS curve. Equilibrium in financial markets implies that an increase in output leads to an increase in the interest rate. This is represented by the LM curve. Only at point A, which is on both curves, are both goods and financial markets in equilibrium.



Fiscal Policy, Activity, and the Interest Rate

- Fiscal contraction, or fiscal consolidation, refers to fiscal policy that reduces the budget deficit
- An increase in the deficit is called a fiscal expansion
- Taxes affect the IS curve, not the LM curve

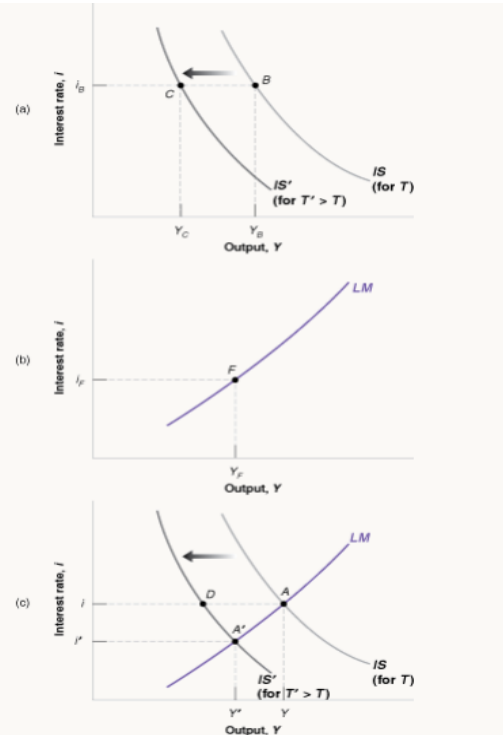
- The effect of an increase in taxes

Fiscal Policy, Activity, and the Interest Rate

■ Figure 5 - 7

The IS–LM Model

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Monetary Policy, Activity, and the Interest Rate

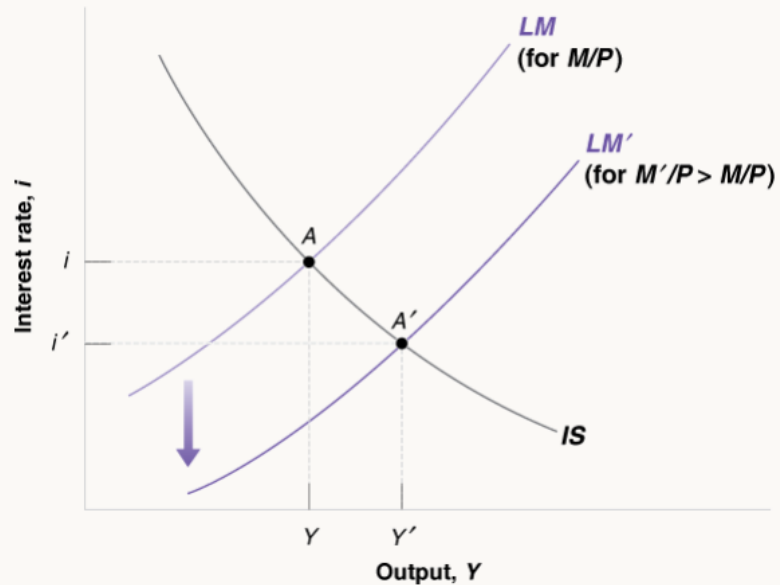
- Monetary contraction, or monetary tightening, refers to a decrease in the money supply
- An increase in the money supply is called monetary expansion
- Monetary policy does not affect the IS curve, only the LM curve. For example, an increase in the money supply shifts the LM curve down

Monetary Policy, Activity, and the Interest Rate

■ Figure 5 - 8

The Effects of a Monetary Expansion

A monetary expansion leads to higher output and a lower interest rate.



Putting IS-LM Curves Together: AS-AD Model

Aggregate Demand

- The aggregate demand relation captures the effect of the price level on output
- It is derived from the equilibrium conditions in the goods and financial markets:

$$IS \text{ relation} : Y = C(Y - T) + I(Y, i) + G$$

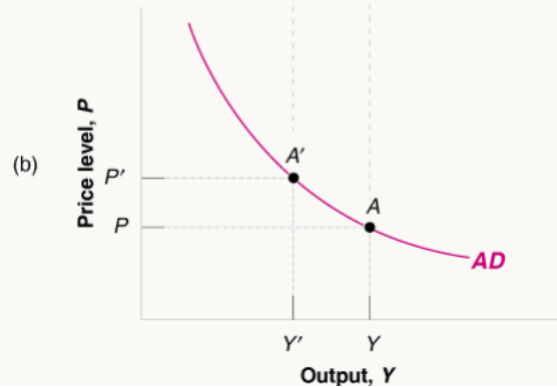
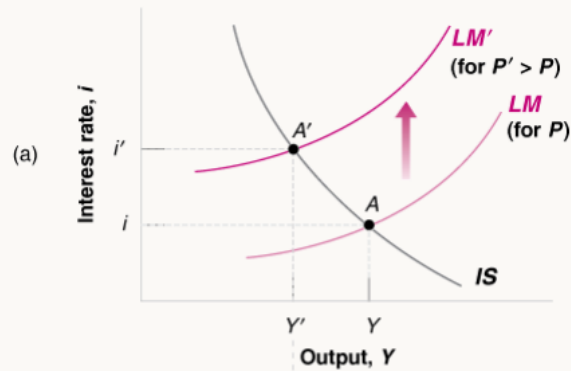
$$LM \text{ relation} : \frac{M}{P} = YL(i)$$

■ **Figure 7 - 3**

**The Derivation of the
Aggregate Demand
Curve**

An increase in the price level
leads to a decrease in output.

$$\uparrow P \rightarrow \downarrow \frac{M}{P} \rightarrow i \uparrow \rightarrow \downarrow \text{demand} \rightarrow \downarrow Y$$

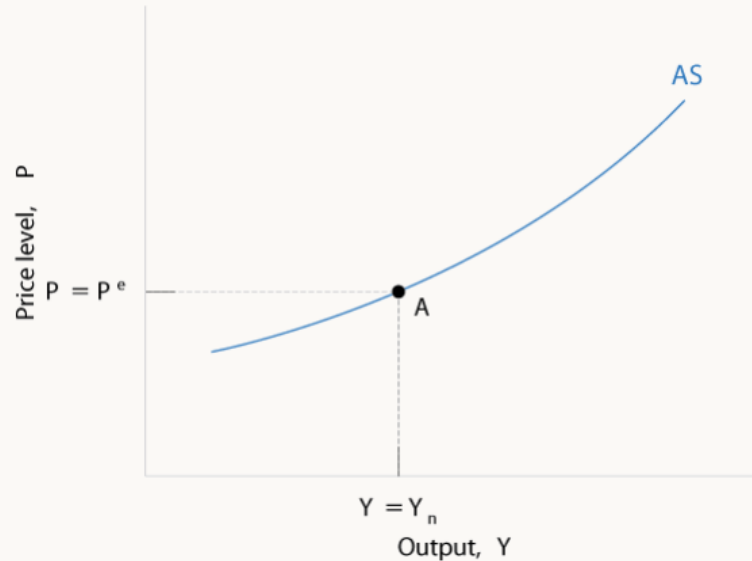


CHAPTER 7 - Putting All Markets Together: AS-AD Model in the Short Run

■ **Figure 7 - 1**

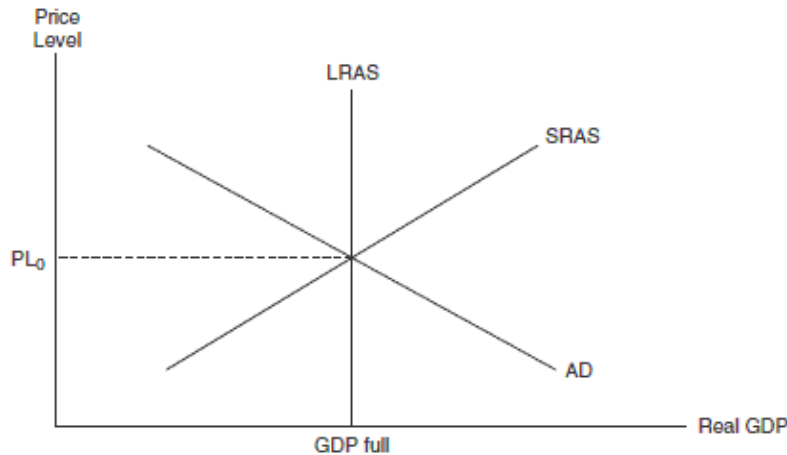
The Aggregate Supply Curve

Given the expected price level, an increase in output leads to an increase in the price level. If output is equal to the natural level of output, the price level is equal to the expected price level.

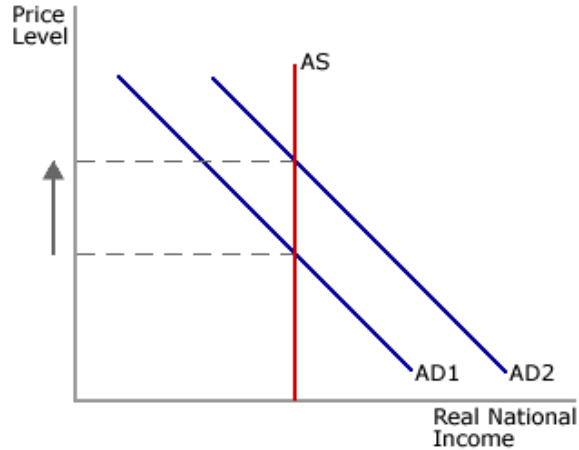


Equilibrium in the Short Run and in the Medium Run

- In the short run, changes in any of the variables that enter either the AS or AD relation lead to changes in output and to changes in the price level



NOTE: AS-AD Model in the Medium (Long) Run



- Only upward sloping AS is consistent with Keynes's conjecture: changes in demand can affect the real output
- Notice that as long as we have constant supply (LRAS, where output is fixed by the factors of production), changes in aggregate demand affects only price level but not the output

The Effects of a Monetary Expansion

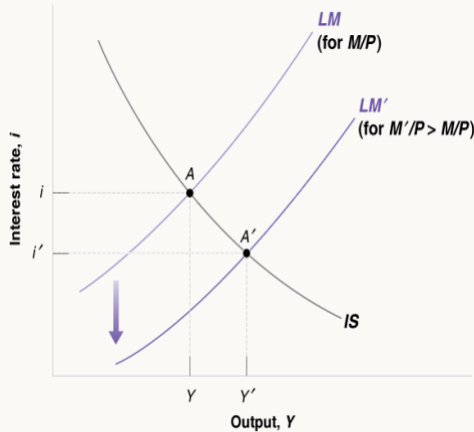
Short Run

Monetary Policy, Activity, and the Interest Rate

Figure 5 - 8

The Effects of a Monetary Expansion

A monetary expansion leads to higher output and a lower interest rate.



Short and Medium Run

The Dynamics of Adjustment

Figure 7 - 7

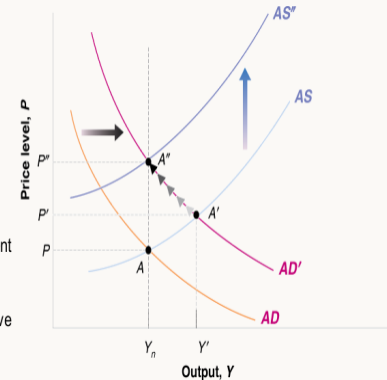
The Dynamic Effects of a Monetary Expansion

A monetary expansion leads to an increase in output in the short run but has no effect on output in the medium run.

The difference between Y and Y_n sets in motion the adjustment of price expectations.

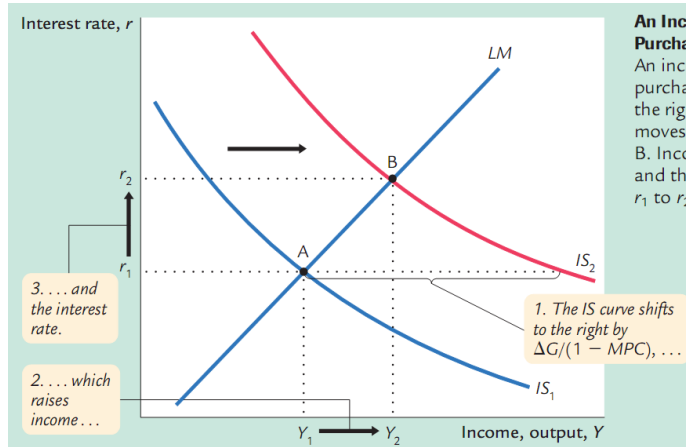
In the medium run, the AS curve shifts to AS^* and the economy returns to equilibrium at Y_n .

The increase in prices is proportional to the increase in the nominal money stock.



- In the short run, a monetary expansion lowers the interest rate, which stimulates investment and expands the total demand together with the price level
- In the medium run, the increase in nominal money is reflected entirely in a proportional increase in the price level (LM curve shifts back). The increase in nominal money has no effect on output or on the interest rate.
- The neutrality of money in the medium run does not mean that monetary policy cannot or should not be used to affect output.

An Increase in the Government Purchases



The Dynamics of Adjustment

Figure 7 - 7

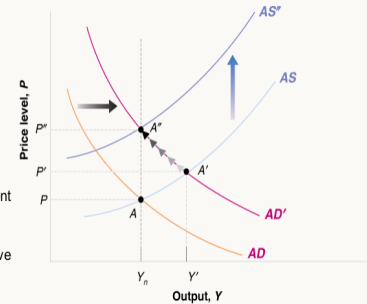
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- Short-Run (A to B): IS curve to the right. The rise in income (Y) increases the money demanded at every interest rate. Interest rate rises, reducing investment and also partly Y_t
- Long-Run (B to C): Prices adjust to the increase in demand. LM curve shifts to the left. The economy is on Y_1 again. Interest rate and the price level are permanently higher, investment is lower

What Happens in the (Long) Medium Run?

- *General Information:* Remember that money does not appear in the national income identity ($Y = C + I + G$) but in the real money balances: $(M/P)^d = L(r, Y)$.
- In the long-run, for any level of output the changes in the price level (P) are proportional to the changes in money supply (M). Thus, monetary policy is ineffective on the real economy.
- An increase in the government consumption (expansionary fiscal policy) increase the demand for goods and services. As supply is fixed, such an increase in demand can only

be met by decrease in investment

$$Y = C(\bar{Y} - \bar{T}) + I(r \uparrow) \downarrow + G \uparrow$$

which requires interest rate to rise

(*You are not responsible from this part)

Complementary Analysis on the Short-Run Effects of Monetary Policy in a Closed Economy Model

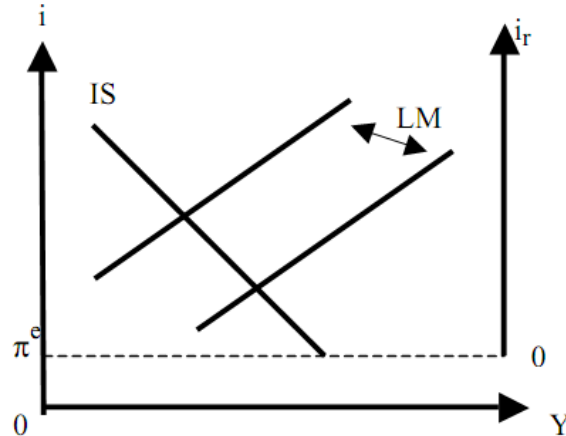
- The two equations used: $Y = C(Y - T) + I(r) + G$ (IS)
& $M/P = L(r, Y)$ (LM)
- In fact, the cost of holding money in your pocket is the nominal interest rate. Hence, money demand depends on the nominal interest rate

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

- The problem is that goods market depends on the real interest rate (r), and the money market depends on the

nominal interest rate (i).

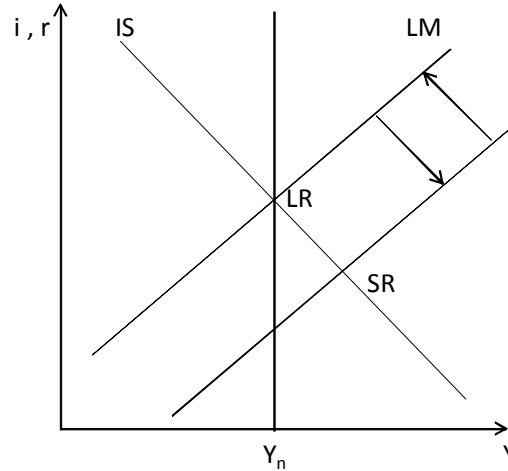
$$M/P = L(i, Y) = L(r + \pi^e, Y)$$



- The left axis shows the nominal interest rate, and the right one shows the real interest rate. LM curve can be drawn

for both the nominal interest rate, and the real interest rate

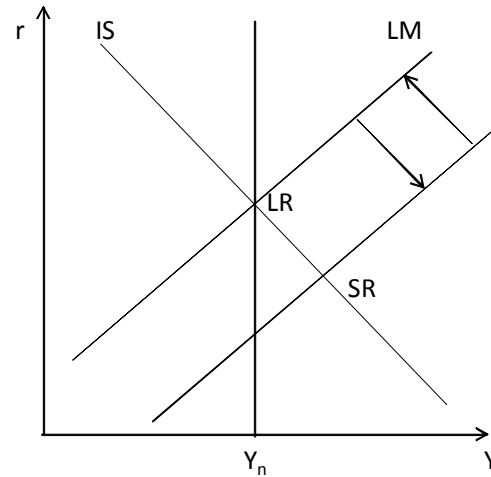
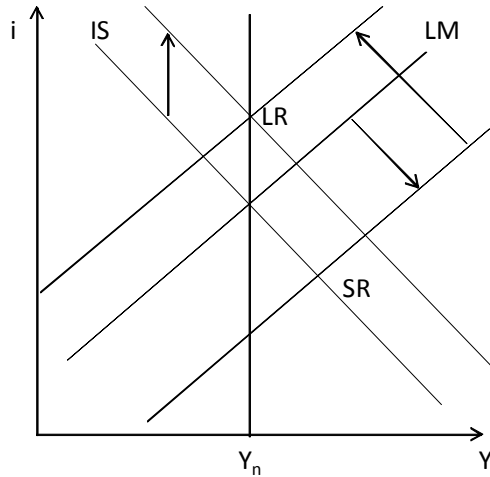
Example 1: One-time increase in the money stock.



- Since it is a one time increase, it does not affect the inflation expectations. So nominal or real interest rates can be used on the diagram

- Initially LM curve shifts to the right, then as prices increase, the LM curve shifts to the left until it returns to its initial position

Example 2: Consider a permanent increase in the money growth rate from zero to some positive value



- This means the money stock is increased repeatedly, forever. Each time, the LM curve shifts to the right. The

initial impact is the same as in Example 1

- Money supply increase create permanent inflation; hence, the demand for money decreases according to the condition: $M/P = L(r + \pi^e, Y)$
- Therefore P has to rise to satisfy the equation. Hence, P increases faster than M. LM curve shifts to the left of its initial position
- At that point, prices and money supply increase at the same rate
- Even though the real interest rate is back to its original value, an increase in inflation brings the IS curve to the

higher nominal interest rate for each r

- So the nominal interest rate also increases by the money growth rate, i.e. the Fisher effect (the one-for-one relation between the inflation rate and the nominal interest rate: $i = r + \pi^e$) applies