

The IS-LM Model

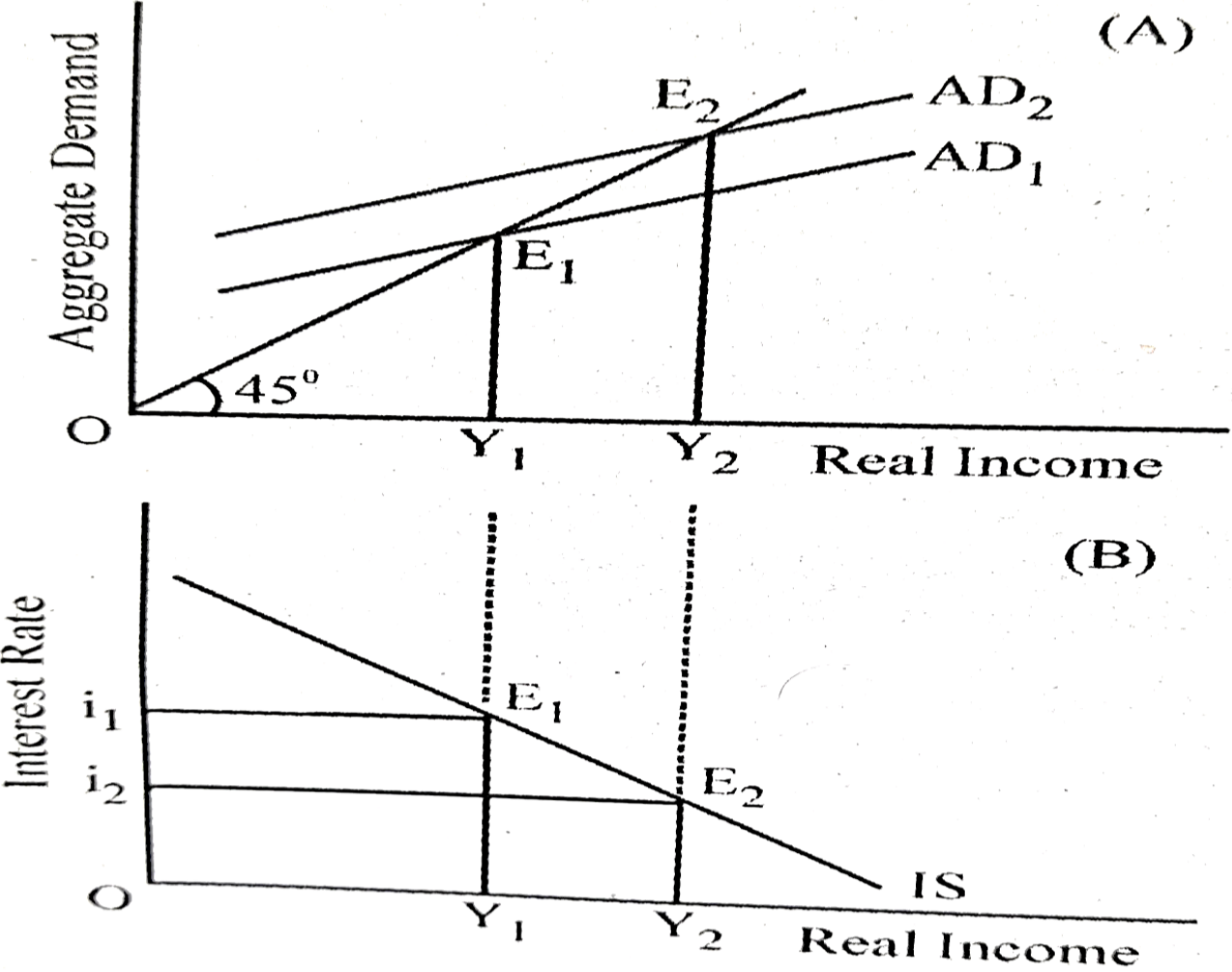
- The IS-LM (Investment Savings-Liquidity preference Money supply) model focuses on the equilibrium of the market for goods and services, and the money market. It basically shows the relationship between real output and interest rates.
- It was developed by John R. Hicks, based on J. M. Keynes' "General Theory", in which he analysed four markets: goods, labour, credit and money.
- In order to understand how this model works, we'll first see how the IS curve, which represents the equilibrium in the goods market, is defined. Then, the LM curve, which represents the equilibrium in the money market. Finally, we'll analyse how the equilibrium is reached.

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IS Curve: The Market For Goods And Services

- The goods market is in equilibrium when the output or income is equal to aggregate demand in the economy. At this point, saving is equal to investment.
- The aggregate demand is determined by consumption demand and investment demand. Thus IS curve relates different equilibrium levels of national income with various rates of interest. With a fall in the rate of interest, the planned investment will increase which will cause an upward shift in aggregate demand function resulting in goods market equilibrium at a higher level of national income.

Derivation of IS curve



- IS curve is the locus of pairs of interest rates and level of income which are compatible with goods and services market equilibrium.

- Slope of IS Curve:

IS curve is negatively sloped. This is because increase in interest rate causes investment spending to rise which shifts the aggregate demand curve up and raises the equilibrium income level. Also, increase in interest rate causes investment to fall, which shifts aggregate demand curve down and lowers the equilibrium income level.

Steepness of the IS curve will depend upon the sensitivity of investment towards interest rate. Highly sensitive investment will lead to a flatter IS curve and vice-versa.

- Shifts in IS curve:

Changes in factors apart from interest rate that would shift the aggregate demand would shift the IS curve.

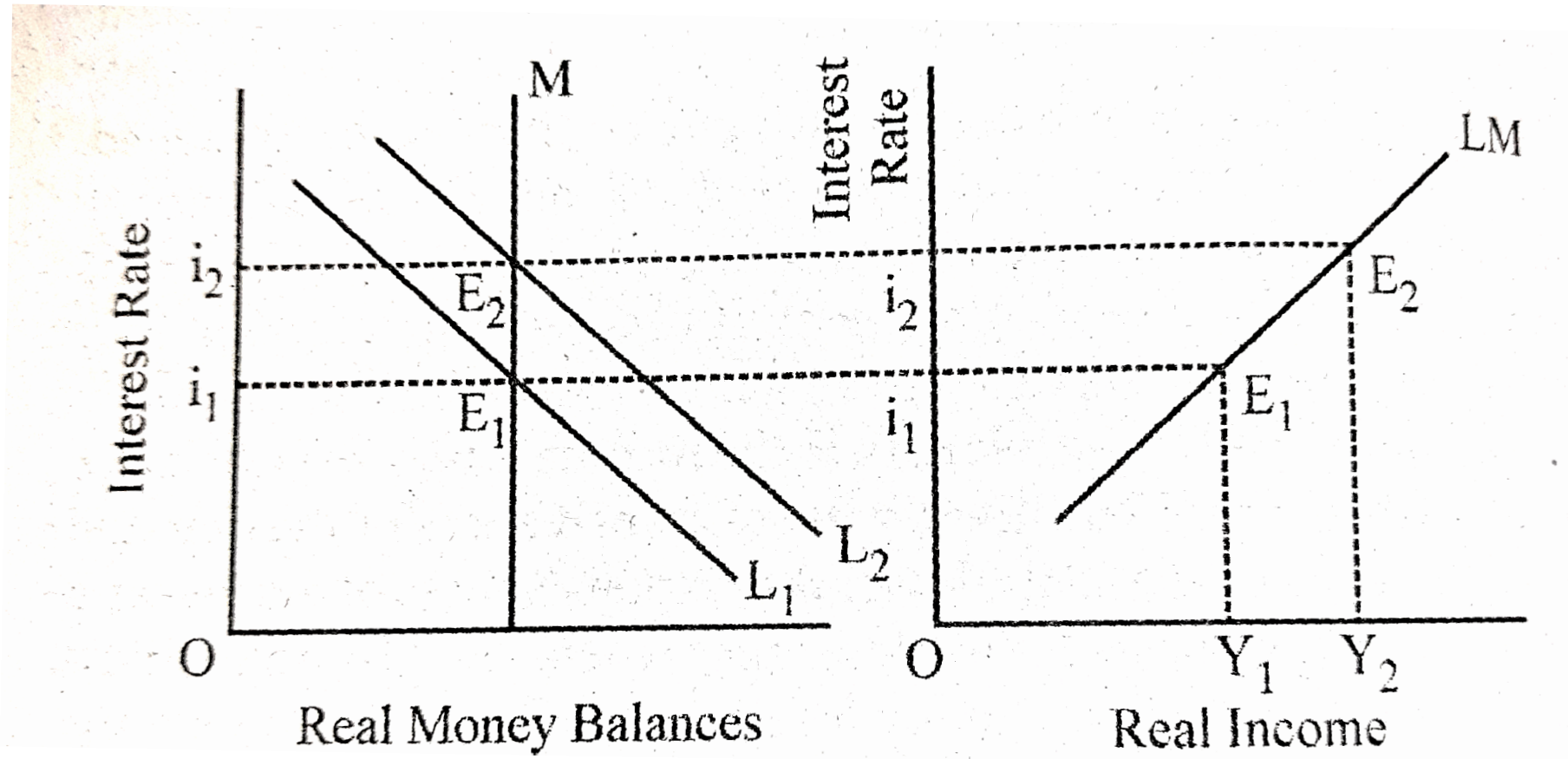
Factors responsible:

1. Change in government spending
2. Changes in taxes
3. Autonomous change in investment

LM Curve: The Money Market

- The money market is concerned with demand for and supply of money.
- The money market is in equilibrium when the demand for money equals the supply of money.
- The LM curve shows the different combinations of interest rates and income at which the money market is in equilibrium.
- Along the LM curve the demand for real money balances is equal to the supply of real money balances.
- LM curve represents the points where liquidity preference equals money supply.

Derivation of LM Curve

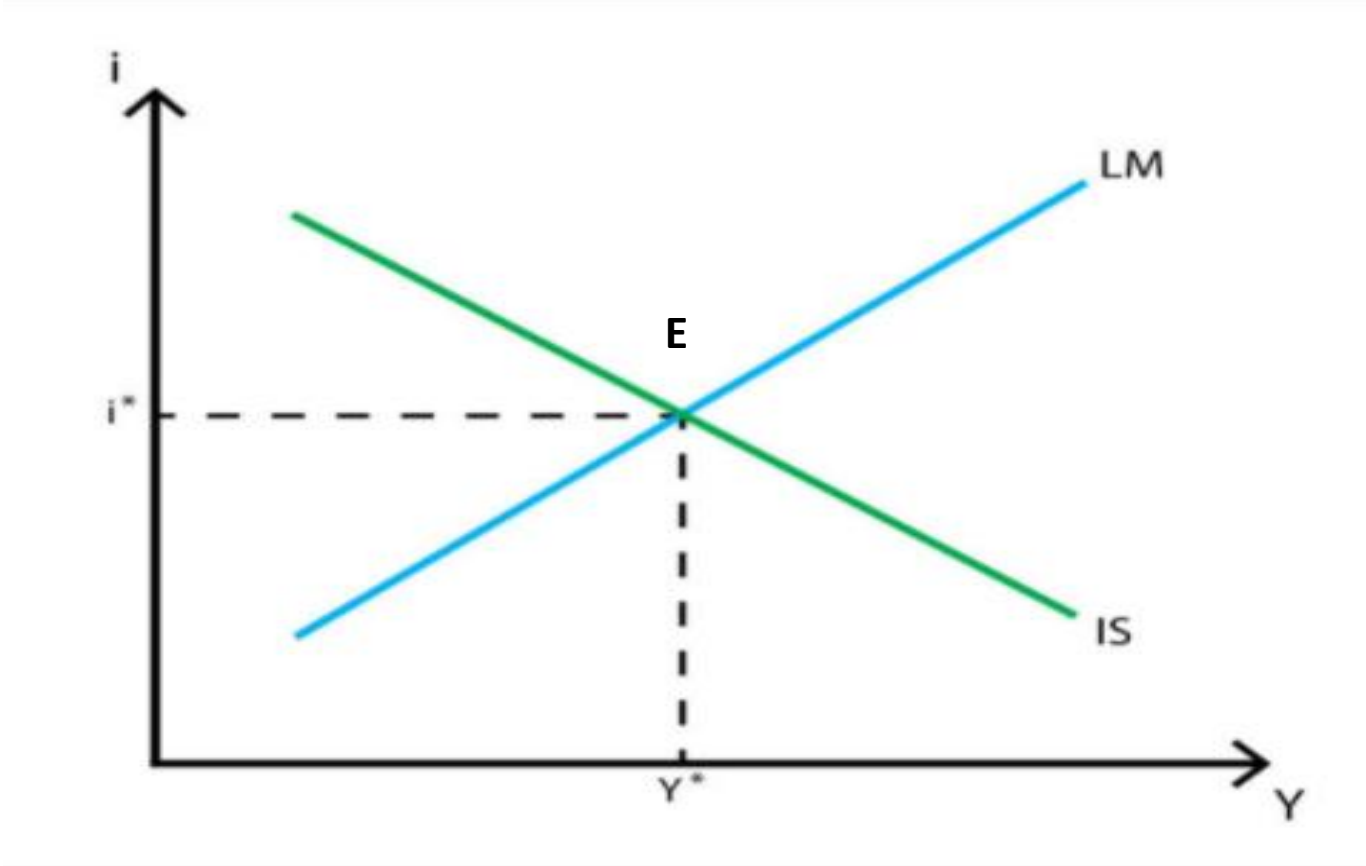


- The diagram on the left shows equilibrium in the money market with a given supply of real balances of M . The demand curve for a real money balance L_1 is drawn for a given real income Y_1 . The money market is in equilibrium at E_1 and the equilibrium interest rate is i_1 .
- When income rises to Y_2 the demand curve for money shifts to L_2 . E_2 is the new equilibrium in the money market and i_2 is the equilibrium interest rate.
- Many such points of correspondence between different levels of income and rate of interest are joined together to derive LM curve.
- This, LM curve is the locus of pairs of interest rate and income level which are compatible with money market equilibrium.

Slope of the LM curve

- The LM curve slopes upwards to the right, i.e. it is positively sloped. An increase in the rate of interest reduces the demand for real money balances. To maintain the demand for real balances equal to the supply of money, the income level has to rise.
- Therefore, money market equilibrium implies that an increase in the rate of interest is to be accompanied by an increase in income. Thus, LM is positively sloped.
- If the money demand is highly responsive to the changes in the rate of interest, then the LM curve is flatter and vice versa.
- An increase in the money supply will cause a shift in the LM curve to the right.

Equilibrium in the Goods Market and in the Money Market



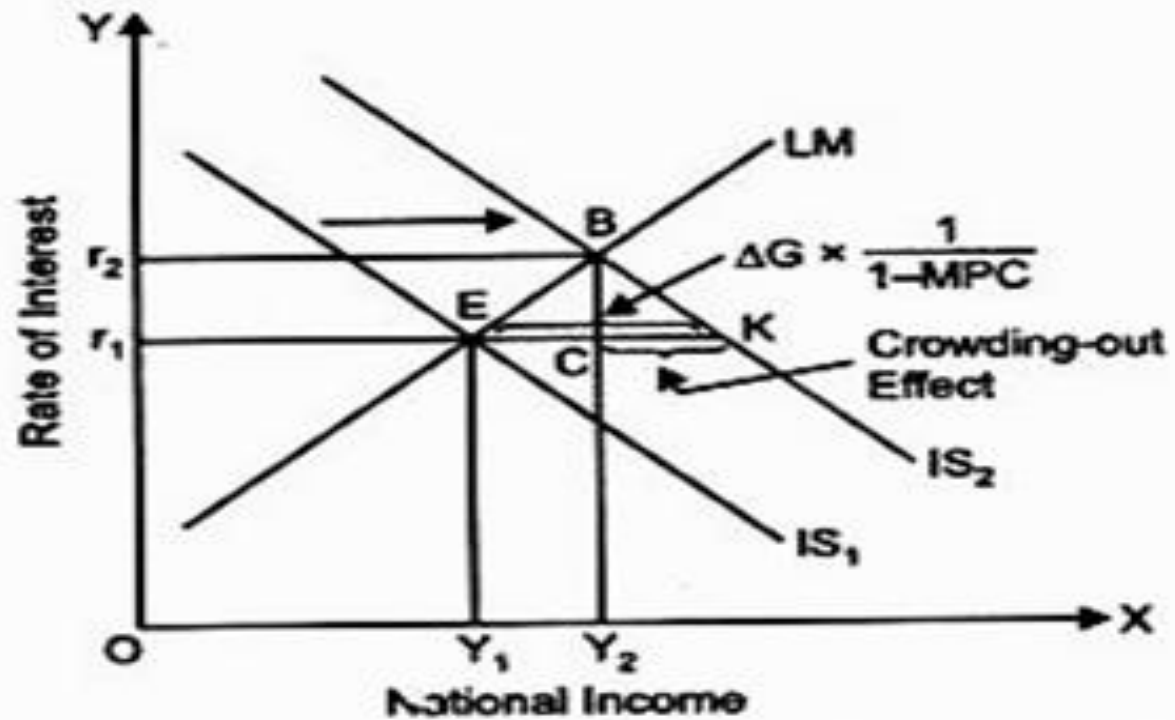
- The goods market is in equilibrium at all points on the IS curve and the money market is in equilibrium at all the points on LM curve. At point E, both the markets are in equilibrium, with i_0 and Y_0 being equilibrium rate of interest and equilibrium level of income respectively.

- **Effect of Fiscal Policy:**

- Let us first explain how IS-LM model shows the effect of expansionary fiscal policy of increase in Government expenditure on level of national income.
- This is illustrated in the diagram. Increase in Government expenditure which is of autonomous nature raises aggregate demand for goods and services and thereby causes an outward shift in IS curve, as is shown in the diagram, where increase in Government expenditure leads to the shift in IS curve from IS_1 to IS_2 .

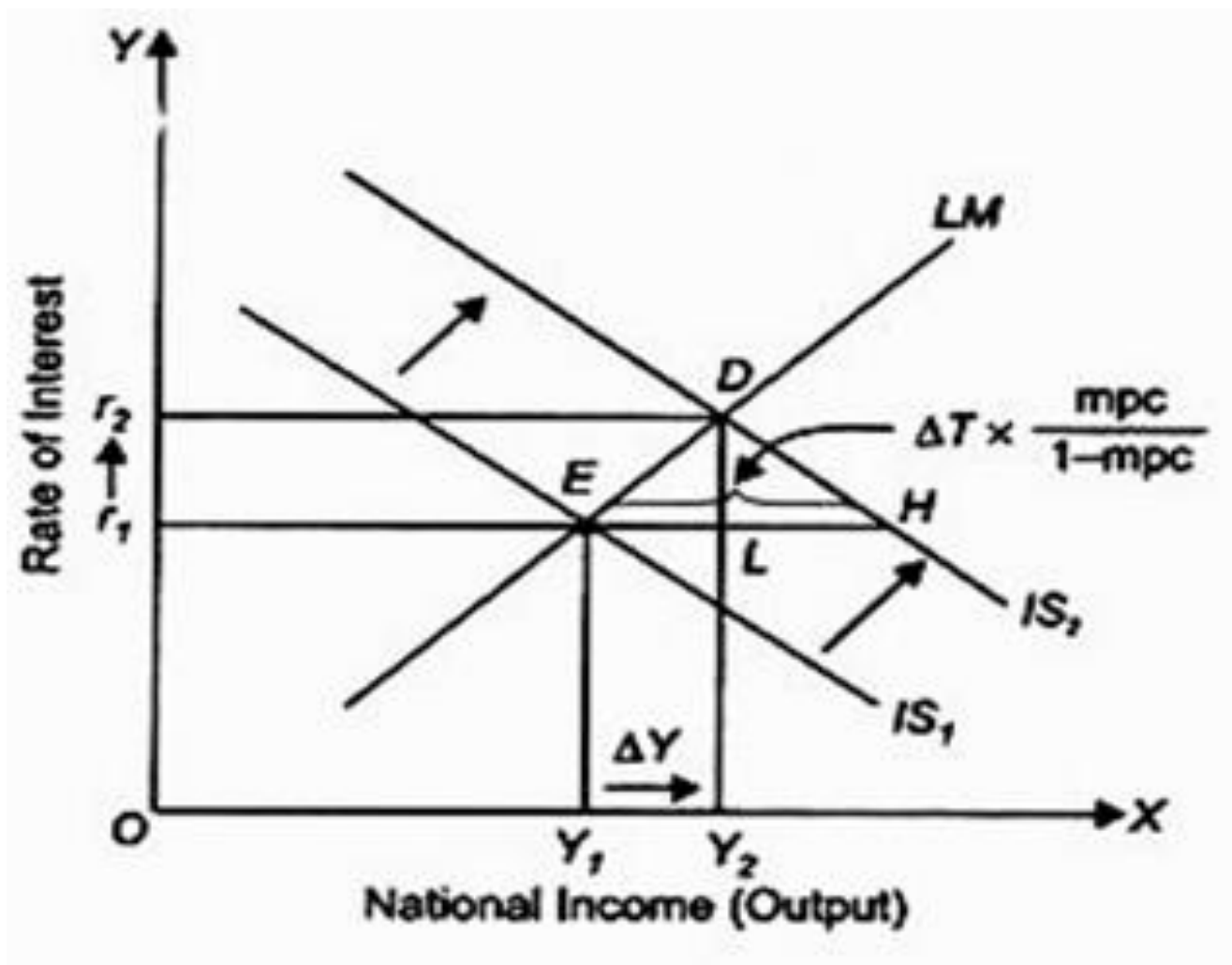
- Note that the horizontal distance between the two IS curves is equal to the increase in government expenditure times the government expenditure multiplier, that is, $\Delta G \times 1/1-MPC$ which shows the increase in national income equal to the horizontal distance EK that occurs in Keynes' multiplier model. However, in IS-LM model actual increase in national income is not equal to EK caused by the working of Keynesian multiplier.
- This is because with the rightward shift in IS curve rate of interest also rises which causes reduction in private investment. It will be seen from the diagram that, with the LM curve remaining unchanged, the new IS_2 curve intersects LM curve at point B. Thus, in IS-LM model with the increase in Government expenditure (ΔG), the equilibrium moves from point E to B and with this the rate of interest rises from r_1 to r_2 and income level from Y_1 to Y_2 .

- Income equal to CK has been wiped out because of rise in interest causing a decline in private investment. Thus CK represents crowding-out effect of increase in government expenditure. Thus, IS-LM model shows that expansionary fiscal policy of increase in Government expenditure raises both the level of income and rate of interest.



- It is worth noting that in the IS-LM model increase in national income by Y_1 Y_2 in the diagram. IS-LM model takes into account the fall in private investment due to the rise in interest rate that takes place with the increase in Government expenditure. That is, increase in Government expenditure crowds out some private investment.

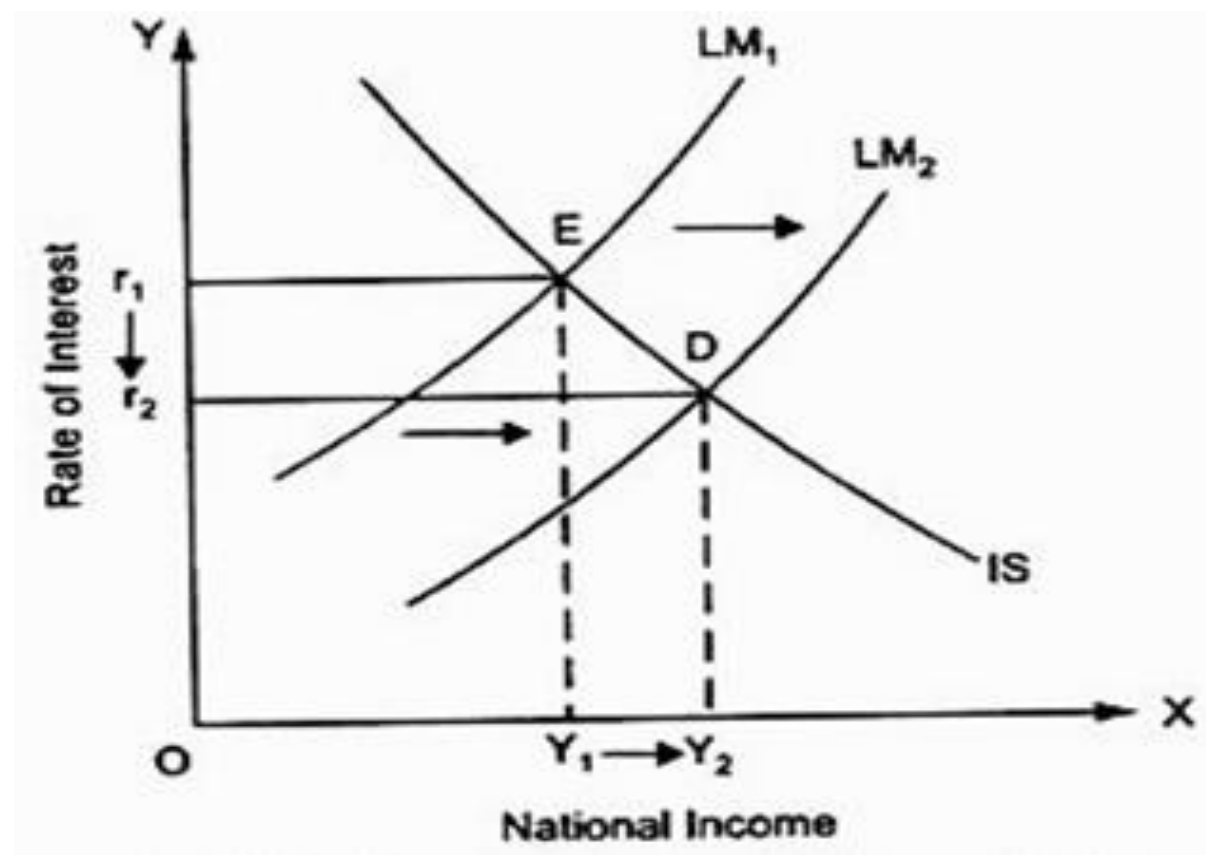
- **Expansionary Fiscal Policy: Reduction in Taxes:**
- An alternative measure of expansionary fiscal policy that may be adopted is the reduction in taxes which through increase in disposable income of the people raises consumption demand of the people. As a result, cut in taxes causes a shift in the IS curve to the right as is shown in the diagram from IS_1 to IS_2 .
- in the IS-LM model, with the shift of the IS curve from IS_1 to IS_2 following the reduction in taxes, the economy moves from equilibrium point E to D and, as is evident from the diagram, rate of interest rises from r_1 to r_2 and level of income increases from Y_1 to Y_2 . Income equal to LH has been wiped out because of crowding-out effect on private investment as a result of rise in interest rate.



Effect of Monetary Policy

- IS-LM model can be used to show the effect of expansionary and tight monetary policies. A change in money supply causes a shift in the LM curve; expansion in money supply shifts it to the right and decrease in money supply shifts it to the left.
- Suppose the economy is in grip of recession, the Government (through its Central Bank) adopts the expansionary monetary policy to lift the economy out of recession. Thus, it takes measures to increase the money supply in the economy. The increase in money supply, state of liquidity preference or demand for money remaining unchanged, will lead to the fall in rate of interest.

- At a lower interest there will be more investment by businessmen. More investment will cause aggregate demand and income to rise. This implies that with expansion in money supply LM curve will shift to the right as is shown in the diagram
- As a result, the economy will move from equilibrium point E to D and with this the rate of interest will fall from r_1 to r_2 and national income will increase from Y_1 to Y_2 . Thus, IS-LM model shows that expansion in money supply lowers interest rate and raises income.



- If the economy suffers from inflation, the Government will like to check it. Then its Central Bank should adopt tight or contractionary monetary policy. To control inflation the Central Bank of a country can reduce money supply through open market operations by selling bonds or government securities in the open market and in return gets currency funds from those who buy the bonds. In this way liquidity in the banking system can be reduced.
- To reduce money supply for fighting inflation the Central Bank can also raise cash reserve ratio of the banks. The higher cash reserve ratio implies that the banks have to keep more cash reserve with the Central Bank. As a result, the cash reserves with the banks fall which force them to contract credit. With this money supply in the economy declines.

- Thus, IS-LM model can be used to show that reduction in money supply will cause a leftward shift in LM curve and will lead to the rise in interest rate and fall in the level of income. The rise in interest rate which will cause reduction in investment demand and consumption demand and help in controlling inflation. This is shown in the diagram.

