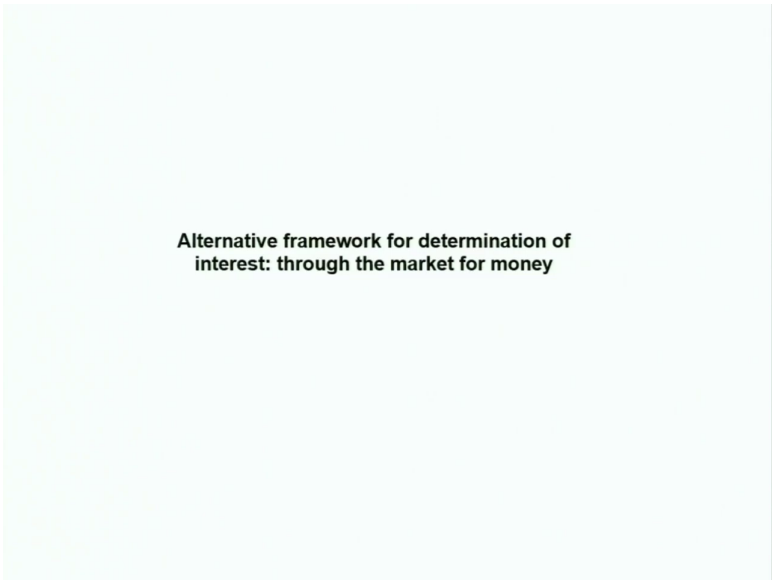


**Economics of Banking and Finance Markets**  
**Prof. Sukumar Vellakkal**  
**Department of Economic Sciences**  
**Indian Institute of Technology, Kanpur**

**Lecture - 06**  
**Interest Rate: Liquidity preference framework-I**

Welcome to this session. The objective of this session is to discuss the determination of interest rate using an alternative framework that is called Liquidity Preference Framework, that also called as Market for Money.

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**Alternative framework for determination of  
interest: through the market for money**

In the previous session, we have discussed the determination of rate of interest using a bond market and in this session we will see that, using the market for money how we can determine the rate of interest.

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**Supply and Demand in the Market for Money:  
The Liquidity Preference Framework**

Total wealth in the economy =  $B^s + M^s = B^d + M^d$   
Rearranging:  $B^s - B^d = M^s - M^d$   
If the market for the money is in equilibrium ( $M^s = M^d$ ),  
then the bond market is also in equilibrium ( $B^s = B^d$ ).

In this framework, we will be talking about the supply and demand in the market for money. In alternatively, it has also been called as liquidity preference framework. Why is it called liquidity preference? Because liquidity means the ease to convert an asset into a spendable form without loss of time and value.

In this case, among alternative assets, money is the most liquid asset; that means, you can easily use it for spending, without loss of time and value. That is what we call money as the most liquid asset. This we also called as liquidity preference framework.

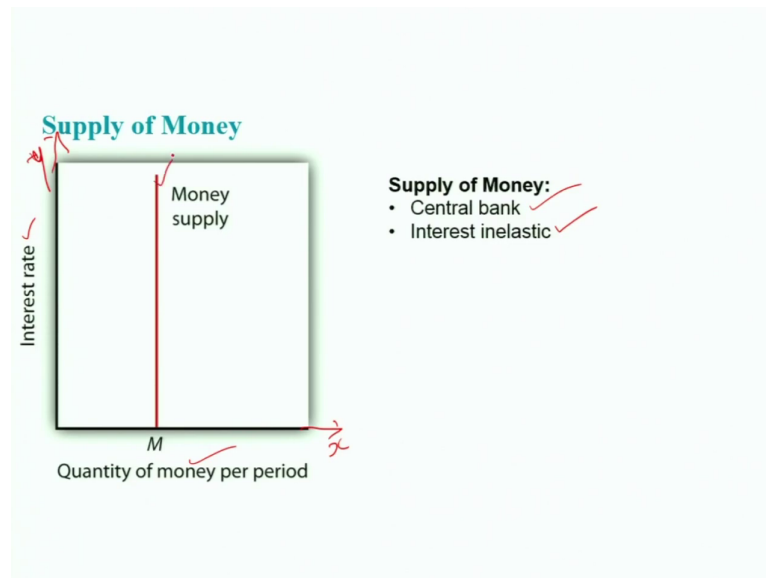
This framework was introduced by John Maynard Keynes, most celebrated macroeconomist. He categorised the total wealth in the economy in to two assets and thus, two markets: one is bond market bonds and the other one is money market.

The total wealth in the economy, assuming that there are only two assets, is bond and money. He said showed that, at equilibrium, that the total supply of asset that is equal to bond supply and money supply is equal to bond demand and money demand.

Rearranging, we can see that bond supply minus bond demand is equal to money supply minus money demand. That means, suppose if the money market in is in equilibrium, then the bond market is also in equilibrium. Alternatively, we can say that when the bond market is in equilibrium, money market is also going to be in equilibrium, assuming that there are only two assets.

However, we can expand this discussion later by including other assets like stocks, durable assets, real estate, etcetera. But, for the sake of simplicity, we are using only two assets, so that we can manage our discussion easily. We are using only two assets: bonds and money.

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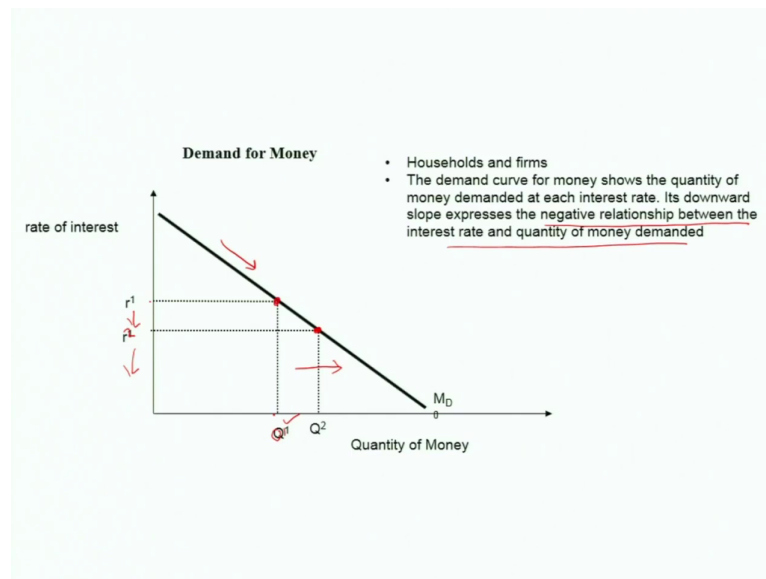
We are focusing on this one. As I mentioned here that if we are talking about bond market is in equilibrium, then money market is also in equilibrium. That means, just to understand the equilibrium rate of interest determination, we can use the money market alone for our discussion.

Look at the supply of money. Just like in the market for money, there is supply of money and demand for money. On the y axis showing the interest rate and supply of money on the x axis, you can say that the money supply curve is a vertical line because the supply of money this is arbitrarily decided by the Central Bank.

Because of that, this is interest inelastic. Does not matter the rate of interest is very high or low, overall, the Central Bank of a country will be supplying money in the economy. However, there can be other factors that it is not always necessary that money supply curve will be vertical because sometime all the other business conditions, even rate of interest, and so many other factors can indirectly the money supply curve. Thus, in some instances, we can draw money supply curve as a positively sloping.

However, we just assume that other factors do not influence the money supply, and its exogenously determine by the central bank, and hence, interest inelastic. That is, in our discussion, assuming that money supply is exogenously determined by the Central Bank, we assume that this is not responding to rate of interest. We assume that this is a vertical line, right. So, this is interest inelastic.

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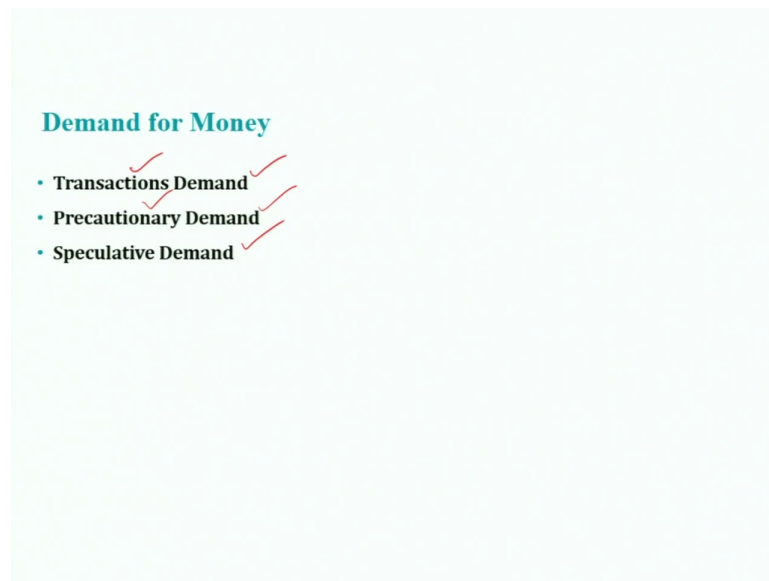


And, what about the demand? Money in an economy is demanded mainly by households and firms. So, we are drawing the demand curve downward slopping, the rate of interest on the y axis, quantity of money on the x axis, that is, the quantity of money demanded on the x axis.

The demand curve for money shows the quantity of money demanded at each interest rate. Suppose the rate of interest is at  $r^1$ , when the rate of interest is  $r^1$ , quantity demanded is going to be  $Q^1$ . This is going to be the quantity demanded. And what if the rate of interest decrease? It becomes  $r^2$ . When the rate of interest is  $r^2$ , the quantity demanded is going to increase, that become  $Q^2$ .

This is going to be the new point of intersection of rate of interest and quantity of money demanded. From this point, you can see that when the rate of interest keeps on declining, you can see that the quantity of money going to increase. Simply, the demand for money curve is downward sloping, which expresses the negative relationship between interest rate and quantity of money demanded. Then the question is, why do people, why do households, demand more money when the rate of interest decrease. So, let us discuss this point.

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Prior to that, let us see that what are the various forms of demand for money. Why do people demand money? People demand money mainly for three motives, one is transaction motive, we call it transaction demand for money. And the other one is called precautionary motive, that is, precautionary demand for money. Then the third one is speculative demand for money.

So, today we will discuss the transaction and precautionary demand for money. Then, about the speculative demand for money, we will discuss that one in the next session because that need lots of more discussion.

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**Transactions demand for money**

- Transactions demand for money due to the transactions motive
- "The transactions-motive, i.e. the need of cash for the current transaction of personal and business exchanges (to pay for goods and services).
- Transaction money demand depends not only on 1) income but also on 2) interest rate on bonds.
- Money serves as the medium for payments in the purchase of commodities whereas bonds do not
- Money holdings do not pay interest. Bond holdings do so.
- Transactions demand for money: Interest rate is the opportunity cost

About the transaction demand for money the transaction demand for money is due to the transaction motive. Transaction motive means, what? The need of cash for the current transaction of personal and business exchanges. It means, you demand money to pay for goods and services. You keep money with you, or you demand money for making payment to goods and services; to finance your day-to-day transaction.

The amount, that is, the quantity, of money demanded for transaction purpose depends on income, it will be positively related to income. When your income increases, you will be keeping more quantity of money with you for transaction purpose, because your high income means you will be buying more goods and services. That means, the transaction demand for money will be positively related to your income.

But this not only depends on your income alone, but also on interest rate on bonds. So, the moment we refer interest rate, the yield to maturity, we refer the interest rate on bonds. The transaction demand for money will be negatively related to the interest rate. Remember, money serves as a medium for payments in the purchase of commodities whereas bonds do not.

We mentioned here in the beginning of this session, the total assets in the economy can be classified into two, one is money and the other one is bond. About the money, money is the most liquid asset, and it is as a medium of payment. The main function of money is to serve

as a medium of exchange and to serve as a unit of payment and unit of account and as a store value of the assets.

Here we are talking about money as a medium of exchange. Money serves as the medium for payment in the purchase of commodities whereas, bonds are not a medium of exchange. Importantly, you know that, when you are keeping your wealth in the form of money, you are making a portfolio allocation of your wealth (and your income assets) into money and bond. What is going to happen? You know that when you are holding your assets in the form of money. it does not pay you any interest, right. But holding bonds, you are going to get a return, means, you are going to get interest income.

When you are making a portfolio allocation between money and bonds two, things come into account: one is by holding money you want to meet your transaction demand for money. For example, of your total assets, say, may be 10 percent day you want to keep it in the form of money, remaining 90 percent you are going to put it in bond market.

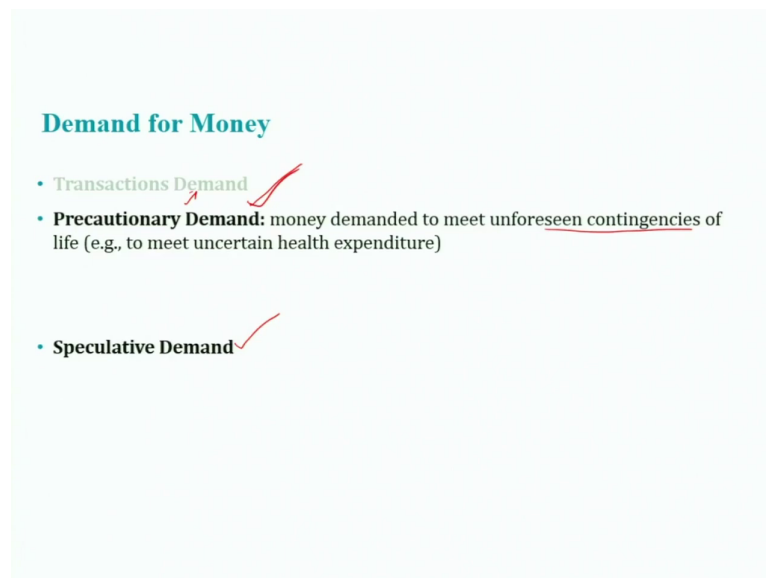
However, about the transaction demand for money, when you are keeping more and more money for transaction purpose instead of investing in a bond market, you are incurring some opportunity cost. Maybe for the sake of simplicity, you can also say that you are investing your money in or putting your money in the bank; that means, depositing your money where you are going to get interest income. And banks will be depositing this money in the bond market. if you are finding it difficult to investing your money in the bond market, you can synonymously or you can just say assume that you are putting your money in the bank. Assuming that of your total asset, how much you keep for transaction purpose, that to meet your day-to-day transaction, for to make payment for goods and services, it also depends on the market rate of interest.

Suppose, the market rate of interest is very high. Suppose in the bond market the rate of interest is going to be 10 percentage, then you will think that, why should I keep more money with me for the transaction purpose because money holding do not pay any interest.

It means, when you demand more and more money for transaction purpose, it also means that you are foregoing the interest rate income, that is, the interest income. It means, the interest rate is the opportunity cost; when the market rate of interest is increasing, the your transaction demand for money is going to decrease.

Stating it in simple terms: when the interest rate in the economy increases, the opportunity cost of demanding money also increases, then, as a result, you think that it is better to demand less money for transaction purpose. That is, there is an inverse relationship between transaction demand for money and rate of interest.

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Let's talk about another kind of demand for money called the precautionary demand for money. The precautionary money demand is the money demanded to meet unforeseen contingencies of life. For example, to meet uncertain health expenditure. Suppose some unfortunate event happened like, suppose hospitalization happened. There is an uncertainty, right. You do not know what is going to happen in the future. To meet these unforeseen contingencies of life, we keep some money.

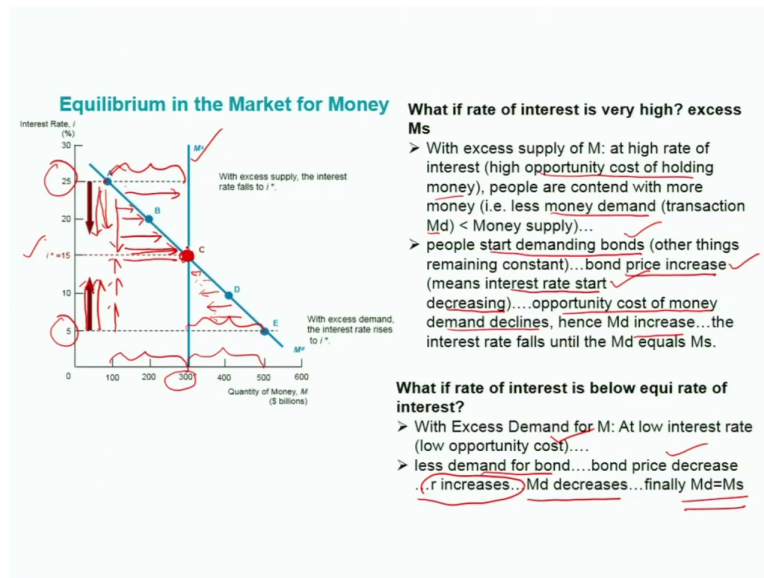
Similarly, what if you going to become unemployed or what if you see that there is going to be a lag in getting your income. To meet all these unforeseen contingencies, people keep some amount of their wealth or income in the form of money, which we call as precautionary demand for money.

Precautionary money demand for money is sometimes clubbed with the transaction demand for money. Transaction demand for money is mainly the to meet the certain aspects; with a certainty to finance your day to day transaction, (Refer Time: 13:16) but precautionary demand for money is to meet unforeseen contingencies of life.



As I mentioned before, we will discuss the speculative demand for money in one of our next sessions in detail. About the speculative demand for money, we need to relate it with the bond demand as well including the rate of interest. It means we need some more discussion about the bond market before we discuss speculative demand for money.

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This is how the money market, market for money equilibrium look like. As I mentioned the supply curve is vertical line, the demand curve is downward sloping. And, as you say that when the rate of interest decline, people will be demanding more money because the opportunity cost of holding money is low; when the rate of interest keep on declining, you can see that the opportunity cost of holding money is also declining; it means, they will be keeping more money with them.

So, in stating other words, when the rate of interest is increasing, that is when the rate of interest is high, people will be demanding less money, because of the high opportunity cost. Look at this point; the equilibrium point is here, equilibrium point is at C, you can see that the supply curve intersects with the demand curve at this point. At this point, the quantity of money demanded and supplied is 300 and the rate of interest is 15 percentage.

Then, the question here, let us discuss this point, what if the interest rate is very high? Assume that interest rate is, for example, 25 percentage in this scenario, you can see that there is excess supply of money, right, this distance, this horizontal distance. That means,

from this point to this distance, you can see that the excess supply of money in this market is 200, that is 300 minus 100, that is the excess supply of money.

You can see that, suppose the rate of interest in the market is 25 percentage, so you can see that, there is excess supply of money. With the excess supply of money, you can see that at high rate of interest. Recall that high rate of interest means high opportunity cost of holding money. Here, people are contending with more money; it means, they think that its better to, because money supply is 300 here, 300 billion, but the rate of interest is very high. That means, 25 percentage, that the opportunity cost is very high, people are contend with more money and they will be demanding less money for transaction purpose.

You know, why? Because when they are keeping more money with them, and they are foregoing interest income because the high interest rate, the rate of interest in the market is incentivizing them to make a portfolio reallocation in form of demanding less money. When they are demanding less money, it means, as there are only two assets, they are demanding more bond. When they are demanding less money means they are demanding more bonds.

What you have seen here is that when people are demanding more bonds, that is, when the households are demanding more bonds, you can see that the bond price increases, And, we have also seen that when the bond price increase, in other words, stating otherwise you can see that increase in bond price means decrease in interest rate, because of the inverse relationship between bond price and interest rate.

As a result, what you can see here that when the people start demanding more bonds, the bond price start increasing, then the rate of interest will be declining. Thus, you can see that gradually the opportunity cost of money demand declines. It means, the money demand gradually decreases.

To simplify this, we can say that, when demand for bond increases rate of interest decrease, when the rate of interest decrease, the demand for money increases, right, demand for money increases. So, you can see that money demand for money increases.

So, when the demand for money increases, finally, this excess supply of money is wiped out by increase in demand for money. So, finally, this is going to be the new equilibrium points. This is when the rate of interest is higher than the equilibrium rate of interest. So, the starting point, there is excess supply of money, then you can see that bond demand will increase then

rate of interest will decrease, then, gradually there is going to be increase in money demand. Then finally, equilibrium position will be restored at point c.

In contrast, what is going to happen if the rate of interest is below the equilibrium rate of interest? Suppose the rate of interest is, for example, 5 percent, when the rate of interest is 5 percent, what you can see here that there is excess demand, because rate of interest is very low the opportunity cost of holding money for transaction purpose is very low, right. The rate of interest is, only 5 percent, below the equilibrium rate of interest.

You can see that there is excess demand for money. When the rate of interest is very low, then at 5 percentage, you can see that this much is the excess demand for money. Excess demand for money here is this much; means, 200 billion. With this much excess demand for money, what is going to happen? When the interest rate is very low, when that at low interest rate; low interest rate means again the low opportunity cost of money. So, what people would think?

Household think that they should make a portfolio reallocation, they will be demanding less bond. The demand for bond will decline when the of interest is very low. When less demand for bond, you can say that the bond price decrease; obviously right. When the demand for bond is low, bond price decrease. In other words, bond price decrease means rate of interest increases.

When the rate of interest increases, you can say that the opportunity cost of holding money also increases; it means, the money demand decreases as a result. Gradually when the rate of interest increases like this, you can see that money demand decreases. The rate of interest decrease, you can say, that gradually the demand for money decreases.

And, the rate of interest keeps on increasing like this. Finally, the new rate of interest- the new equilibrium point- is going to be again at C. The new equilibrium point will be restored at point C, finally, you can see that at this point money demand is going to be equal to money supply.


What we have discussed here that the money market will be always in equilibrium like this, in general, in the long run. Money market will be in equilibrium where money supply is equal to money demand. Money supply, as I mentioned that it is exogenously determined by central

bank. They arbitrarily decide. So, then the households, and firms will get adjusted with their money demand with the money supply.

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**Changes in Equilibrium Interest Rates in the Liquidity Preference Framework**

- Shifts in the supply of money: ✓
  - Assume that the supply of money is controlled by the central bank. ✓
  - An increase in the money supply engineered by the Central Bank will shift the supply curve for money to the right.

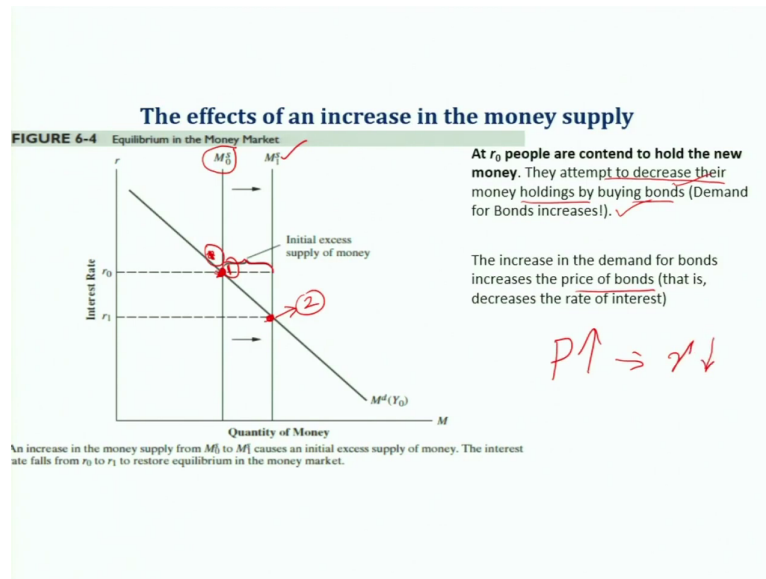
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We discussed how the rate of interest is determined in the market for money. Now, let us assume that what would happen if there were shift in the supply of money. Suppose, the Central Bank decides that they are going to print more money, that is, they are going to print more currency and inject more money in to the economy, how is is going to change the rate of interest.

We assume that all other things remaining constant, there is no change in the overall business condition, overall economic conditions in the economy, the Reserve Bank of India or the Central Bank decide that they want to print more money in the economy, they want to inject more money into the economy, then what would happen.

Assume that supply of money is controlled by the Central Bank, and you know that an increase in money supply engineered by the Central Bank will shift the supply curve for money to the right. So, it would look like this, right.

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So, this is the initial equilibrium position, and now the Central Bank decide that they are going to print more currency. The initial supply curve was  $M_s^0$  naught, then the new supply curve is going to be  $M_s^1$ . And this is going to be the new supply curve of money. So, you can see that there is initial excess supply of money. Then, you can see that how from the diagram, it is obvious that the rate of interest is going to be  $r_1$  from  $r_0$  because the demand curve did not shift from left to right or right to left, only the supply curve has shifted to the rightwards.

Obviously, you can see that this is going to be the initial equilibrium position. This one is the initial equilibrium position. Then, the new equilibrium position is going to be this one. So, what is the economics behind it? Why the rate of interest decrease? From the diagram, we can see that rate of interest has decreased and what is the economic intuition or economic interpretation of this.

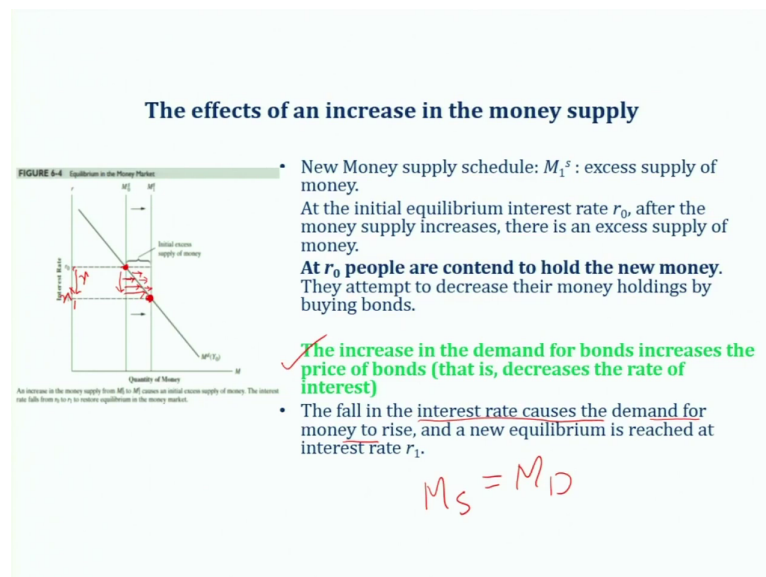
Here you can see that the initial equilibrium at  $r$ , people are contended to hold the new money, they attempt because suddenly there is increase in money supply, there is more money in the economy. So, they at  $r_0$  people are contended to hold the new money, they attempt to decrease their money holdings by buying bonds because money with them has increased.

As a result, what is going to happen? They have more money with them. Because, their total asset, we already mentioned, that it is in the form of money and bonds. When they are getting

more money and then there is no change overall condition, then, as a result, they attempt to decrease their money holding by buying bonds; that means, demand for bonds increases.

So, when there is more money in the economy, people they will be demanding more bonds, they will be trying to decrease their money holdings. So, as a result, you can say that increase in demand for bonds, increase the price of bonds. So, when the price of bonds increase; that means, we have already seen that price of bond increases because now they have more money, they must invest, they will be investing in bond market. It means, the price of bonds will be increasing, means the rate of interest will be declining.

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The rate of interest will be declining. So, when the rate of interest declines, what will they do? When there is a fall in the rate of interest, fall in the rate of interest causes demand for money to rise.

When the rate of interest is declining you can say that they will be keep on demanding more and more money as the opportunity cost of holding money declines.

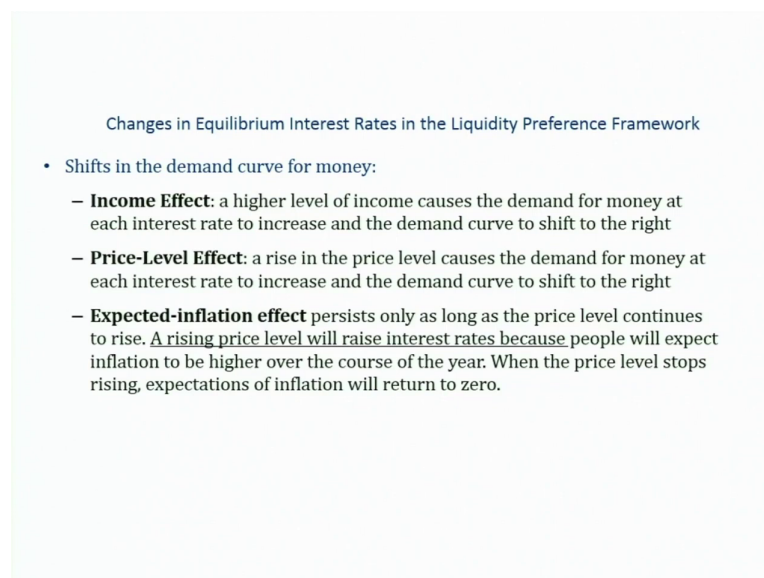
It means, initially an increase in demand for bonds then the rate of interest decrease, but when the rate of interest start declining people start demanding more money because as a result because the opportunity cost of holding the money declines. Then, as a result, the new equilibrium position will be this one, new equilibrium position is going to be this. So, you

can see that this is how the demand for money increases, this is the new equilibrium position,  $r_1$  is going to be the new equilibrium position.

It means that the rate of interest in the economy adjusts when there is an increase in money. Through the bond market, we have seen, the rate of interest declines and as a result, the money demand also adjust; there will be a gradual increase in the money demand. Then, finally, you can say that money supply is going to be equal to money demand. So, this is the mechanism in through which the rate of interest adjusts so that the money demand equals money supply.

This is the reason, when other things remaining constant, when there is a sudden increase in money supply, that is when the Central Bank inject more money in the economy, the rate of interest decline through this mechanism through the bond market, and the further mentioned mechanism which I just mentioned here. What if there are changes in equilibrium interest rate when there is shift in the demand curve for money?

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Changes in Equilibrium Interest Rates in the Liquidity Preference Framework

- Shifts in the demand curve for money:
  - **Income Effect:** a higher level of income causes the demand for money at each interest rate to increase and the demand curve to shift to the right
  - **Price-Level Effect:** a rise in the price level causes the demand for money at each interest rate to increase and the demand curve to shift to the right
  - **Expected-inflation effect** persists only as long as the price level continues to rise. A rising price level will raise interest rates because people will expect inflation to be higher over the course of the year. When the price level stops rising, expectations of inflation will return to zero.

Look at this: there are two factors. Suppose there is an increase in GDP, gross domestic product in the economy, that is, there is increase in the level of economic activity, and as a result the income of households increase. So, this is, we can call it, as income effect.

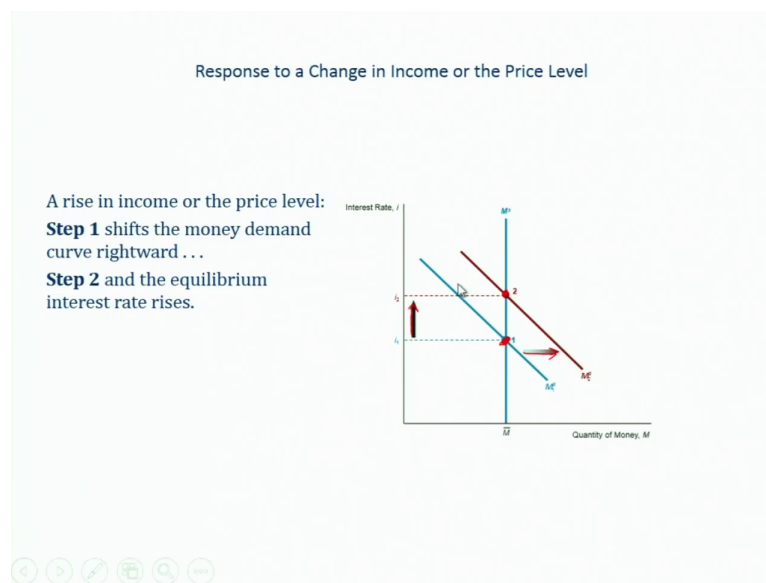
So, when we assume at this point, we assume that money supply remaining constant. When the money supply is remaining constant, what if there is increase in income of households.

This is, we call it income effect, at a higher level of income, high level of income causes the demand for money at each interest rate to increase, and demand curve shift to the right, that we have already seen. Because the high income means high transaction demand for money, and people will be demanding more money.

Another thing is that price level effect. A rise in the price level causes demand for money. Assume that there is no increase in income, but the overall price level in the economy increases; that means, people need more money for transaction purpose. As a result, people will be demanding more money.

The expected inflation effect also same. That is, the price level continues to rise. A rising price level will rise the interest rate because people will expect inflation to be higher over the course of the year. So, when the price level stop rising, expectation of inflation will return return to zero.

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Let us present this one in diagrammatically. What if there is increase in income or increase in price level? we see that the initial equilibrium position is this one, we have already seen that. If there an increase in income or increase in price level the demand curve will be shifting rightwards.

Where is the new equilibrium position? So, the new demand curve intersects with the supply curve at a point 2 and then you can see that the demand curve, the rate of interest is



increasing here, right. So, that means, you can also interpret it in this way that when there is an increase in income or price level, demand for money increases (through the bond market, you can see that the rate of interest increases here).

In this session mostly our discussion was confined to determination of rate of interest, in the next session we will discuss what are the factors that affect the changes or fluctuation in the rate of interest.

Thank you.

**Key words:** Money market, demand for money, supply of money, liquidity preference, transaction demand for money, rate of interest