Security Analysis and Portfolio Management

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Lecture No. # 33

Interest Rate: Determination and Structure

.In the previous class, we discussed about the bond analysis, and here, what we have seen that whenever we talk about the bonds, we have seen that the pricing of the bond or the yield from the bond is basically varies or basically depends on the interest rate; that means, interest rate is the source factor which affects or which determines the bond characteristics or the return from the bond.

In this context by looking into the importance of the interest rate in the bond, we have or we have always the inclination to know how this interest rate is determined and how this interest rate is basically different or varies from one asset to another asset. Therefore, today, we will be discussing about that how this interest rate is determined and how the structure of the interest rate is determined; that means how it is different from one asset to another asset.

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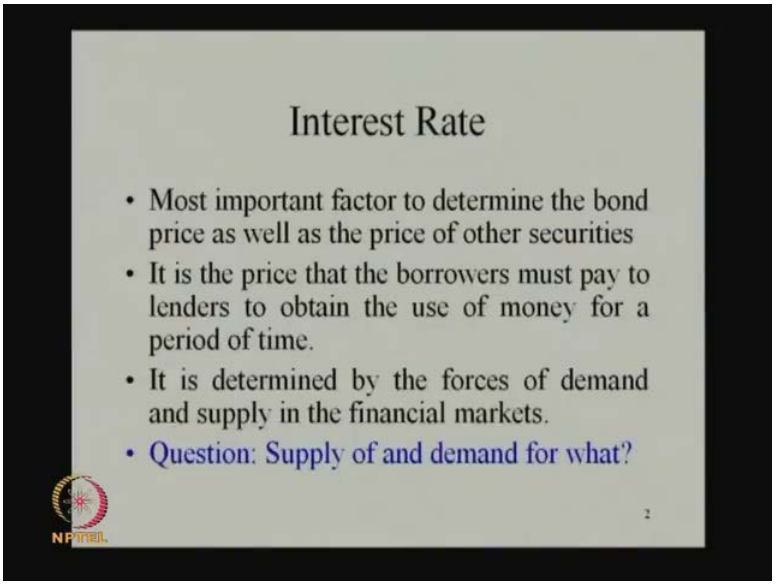

So, therefore, in this context, already what I told you that interest rate is the most important factor to determine the bond price as well as the price of the other securities, because in the financial market, if you refer that the pricing of the financial market is basically nothing but it is the interest rate; that means, the, whenever we refer to the pricing or the pricing of the any of the asset. So the price of any financial asset is basically the interest rate.

Even the stock return is a proxies of interest rate, Dividend yield, coupon, then you have the long-term securities yield, all these are the different proxies of interest rate; that means, whenever we talk about the pricing in the financial market, it basically refers to the interest rates. Therefore, any financial analyst always try to know that how this interest rate is determined and which are the various factors or various theories, which try, which are trying to determine this interest rate in the financial market.

Therefore, what we can say? It is the price that the borrowers must pay to the lenders to obtain the use of money for a period of time; that means, whenever we borrow something from the market or we borrow some money from the market from a lender, then, we have to pay certain interest or certain money to the lender by the way of interest. That is why the pricing of that particular lending or pricing of that particular money what we get it from the lender, that basically is nothing but the interest rate. Because that money we are, we have taken it from the lender; we will be using it for a reasonable period of time for the production or any other reasons.

Therefore, it is the price that the borrower must pay to lenders to obtain the use of money for a period of time. Then what I said that previously in India, the interest rates were not determined by the market, it was basically determined by some of the policy makers; that means, what we, we, can say that interest rate was administered or it was policy determined. But today, what we can see that most of the interest rates are in India are basically market interest rate or it determined by the market forces, but before going into the discussion on the interest rate determination with reference to India, let us see that theoretically how this interest rate determined by the different theoretician, or from the literature, how we can say that or how this interest rate determined from the different macroeconomic prospective.

In this context, what we can see? It is basically, determined by the forces of demand and supply in the financial market. In general, if you say that any pricing or any kind of financial market instruments, whenever we talk about their pricing their yield, they are all determined on the basis of the demand and supply of that particular asset, but here, in this context, if interest rate is also pricing of the financial assets in the financial market. So, definitely there would be some demand in supply forces which are trying to determine this interest rate in the financial market case.

Therefore, the next question will arise that which are those demand and supply? Which are the demand forces and which are the supply forces, which are trying to determine the interest rate in the financial market in the various situations? Therefore, the question always we have that supply, supply, of and demand for what; that means, supply of what and demand for what which is going to determine this interest rate in the financial market.

So, therefore, we have three theories which is trying to explain this which determines or theories of what we call it theories of the determination of interest rate. So, the first theory which we have always in the mind, that is your classical theory. Then, we have another theory, we call it Loanable fund theory; then we have the Keynesian theory. These are the different three theories which basically explains that which are the demand and supply forces which try, which basically determine this interest rate in the financial market.

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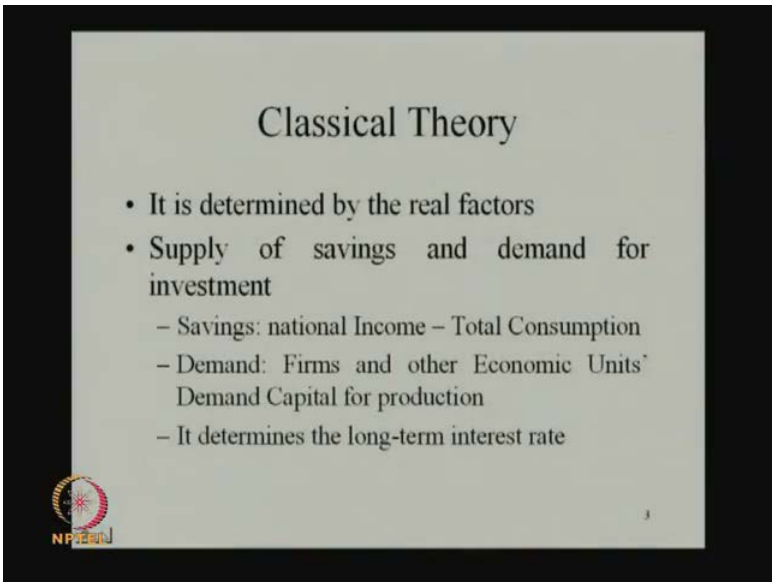

So, let us see how this different theories is trying to explain the different factors which determine the interest rate in the financial market. As you know if, if, you see that all the economic literatures or economic theories, whenever it is developed, that always the classical theorist believe in the real factors, they do not believe in the nominal factors. I hope all of you know about the what do you mean by the real factors and what do you mean by the nominal factors.

The real factors are nothing but it is basically adjusted to the inflation or the price level; that means, if you are getting your salary has increased by 10 percent and the price of the commodity what you are using in the market has increased by 6 percent, then actually your real increase in the salary of yours is basically 10 percent minus 6 percent that is 4 percent.

Therefore, what you can say that all the classical economist always believe in the real factors, they do not believe in the nominal factors; that means, they do not bother about how this interest rate or how this particular increase is there in terms of the nominal values. They basically bother about that in the real terms how this particular value has increased in the market.

Therefore, like other variables, they also conclude that the interest rate is determined by the real factors; that means, there are certain real variables in the economy which are going to determine the interest rate. Then which are those real factors? They have given that answer that the supply side comes from the savings and demand side comes from the investment; that means, they said the supply of savings and demand for investment, which are going to determine the interest rate in the financial market.

What do you mean by the savings? How you can calculate the savings? They said - savings is nothing but what basically we have the total income; that means, the total national income of a particular country, total national income, total national income, we know the total national income is basically divided into 2, that is your consumption, total consumption of the people plus savings; that means, what has not been consumed that will be saved.

So, therefore, what this real sector economist or the classical economist, say that the savings automatically will be your total national income minus consumption. So, the savings, the supply side comes from the savings; that means, it is the savings may be and they also refer that savings are basically comes from the household sector, and as we know that the savings can be made by the corporate sector also which we call it the corporate savings, but here, we can see that there are various types of the savings there we can talk about later, but here, the total savings which is the major supply factor, we use to determine interest rate according to the classical theory that comes from the, the total savings or what we can say, it is comes from the total national income and the consumption. So, the total national income minus consumption which talks about the total savings.

Then, the next question is arising - what is the demand? Who basically demands the money? Basically it is the savings is basically the supply of the money, it is the supply of the money what we always consider. Then we have the demand side and which are the demand forces and which are the factors which basically affect the demand, that basically comes from the firms and other economic units demand capital, demand capital for the production, because whenever any, whenever we, why the somebody or any unit demands the money and why we need money.

Basically we required the money for the production, for the better investment, for the future. So, what this classical economic says the classical theory says that whenever we required certain money or why we money is demanded? They said that the money is demanded for the production or the investment, and who can produce or who can invest? That is basically the business units or the economic units who are responsible for the production and investment in the financial market.

Therefore, the demand factors or the demand for the money which is a dominant factor, which determine the interest rate in the market that comes from the demand for the business units or demand for the production, demand for the capital, demand, why they demand for the capital? The, why there is a demand for the capital? It is basically the capital is demanded for the investment and why this, whenever we do the investment, it basically increases the production. So, therefore, the business sector is basically responsible for dominate factor is played by the business sector who basically demands the money.

So, what we can see, that means the supply side comes from majorly from the household sector and the demand side comes from the business sector, and once this demand and supply interaction takes place, then this, if you talk about this, this is your interest rate and this is your demand and supply, then your, somewhere this interest rate can be determined like this. The equilibrium point can be established in the interaction point, interaction point of demand and supply.

So, what we can see that whenever this concept we use in the financial market, the demand for the money or the supply of the money which basically determines this interest rate according to the classical theory. You just see that what do you mean by this demand and supply of the money. That why money is demanded, or according to classical theorist, this money is demanded it is because of the transaction; that means, either it must be in terms of the expenditure. We required the money for the transaction motives or for the business motives, what we have now to which increases the production, and by which, the total national income can be enhanced.

So, here, in this case, the classical theory was trying to explain this interest rate or determination of interest rate by interacting between the demand and supply, and what they said that the interest rate which determined on the basis of the demand and supply

of the real variables just like the savings and the investment, that basically is nothing but the long-term interest rate.

So, they believe in the long-term theory; the classical theory believes in the long-term theory, and therefore, what they conclude that the demand and supply of the various factor which determine the interest rate that basically is examined or has been analyzed from the long run prospective.

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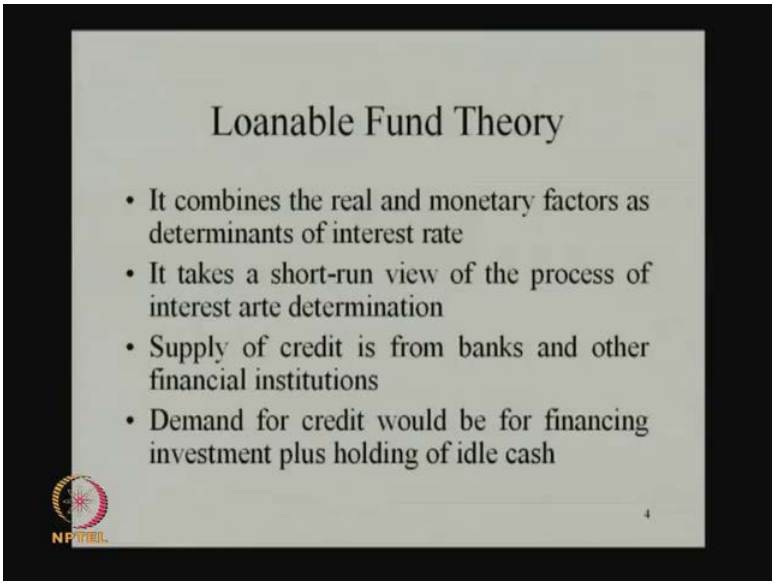

Then this theory whenever we talk about, there are certain things, there are certain variables which may not be measurable and sometimes it is very difficult to calculate the, all the totality of this particular demand and supply forces of the classical theory. In this context, what has been done, what has been made, that is, another theory has been established, that is called the Loanable fund theory.

What do you mean by this Loanable fund theory? The Loanable fund theory basically combines the real and monetary factors as determinates of interest rate. In the previous theory, whenever we talk about the classical theory, classical theory totally ignores this monetary factors which can affect the interest rate determination, but here, whenever the a Loanable fund theory has been established, the loanable fund theory was trying to explain this particular concept in the context of both nominal and real variables.

So, according to the Loanable fund theory, it is not only the nominal real variables, it is the nominal and real both will have the significant role for determination of the interest rate in the financial market. And another argument, how this rate, how this share is different? It takes a short run view of the process of interest rate determination. Basically, apart from the long run view, what this particular theory has taken? This theory was talking about the interest rate determination from the short run prospective.

Then, here also why, which are the demand and supply forces which are going to determine the interest rate. So, they said that the supply forces comes from the banks, supply comes from the bank credit, bank and other financial institutions; that means, what they said that the credit from the bank, the credit from the bank and other financial institutions generally consist of the supply of, supply side, and the demand side basically comes from the financing the investment, financing the investment by the business unit plus holding the cash.

So, here, this emphasis has been put more on the bank and financial institutions. So, apart from talking about the total savings, what this Loanable fund theory is talking about? They said that supply side is basically comes from the banks and other financial institution in terms of their credit, and why the credit is required? The credit is required for the investment.

And whenever there is a equality between the credit and the investment or we can say the demand for money in the market, then this interest rate can be determined and that fluctuation will be there or this interest rate can be fluctuating over the period of time may be in the short run basis, because the beware of the bank credit or the beware of the credit from the financial institution may be sending over the time depending upon the real economic variables.

Therefore, what we can say here? There are certain factors, there are certain variables which can be considered as a supply factor or supply side variables or the demand side variables that basically comes from the bank and other financial institutions as per the Loanable fund theory.

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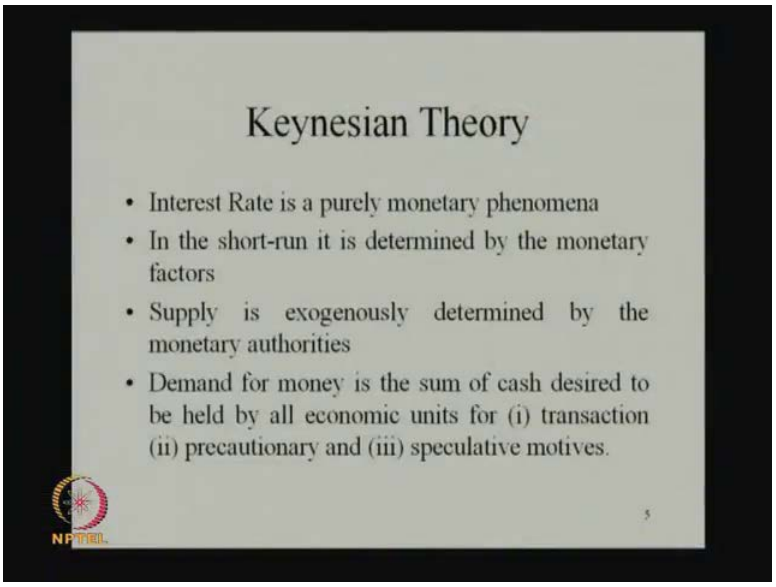

Then the next theory is the keynesian theory; it is another extreme. You see that Keynes is basically has the authority in the monitory economics. So, Keynesian theory is highly established in the modern economic literature. So, if you see that what is the Keynesian view, that Keynesian is a purely short run economist, because if you remember the famous quotation given by the Keynes that in the long run, we are all date. Therefore, we should give emphasis more in the short run.

So, you get these equilibriums or you should determine this short run policy instruments or we should determine certain pricing or we should determine certain variables which are basically short-term in nature instead of putting emphasis in the long-term. Therefore, what Keynes said, and accordingly and another point of Keynes is, Keynes said that interest rate is purely a monetary phenomenon. There is no role of the real variables, all the monetary variables which are going to, which are going to play the significant role for the determination of interest rate in the financial markets.

Therefore, according to Keynes, interest rate is a purely monetary phenomenon. At in the short run, it determined by the monetary factors. That is why what they said that we believe that Keynesian economist, believe in economist, believes in the short run phenomenon as compare to the long run phenomenon.

But another very serious assumption, what this Keynes has taken that supply is exogenously determined by the monetary authorities. What Keynes is argued Tthat you see that demand cannot be observable, but supply can be observable or supply can be determined from the beginning to what Keynes said that, you see that money, if money supply is exogenous, that means, erogeneity already I think explained in some of the previous classes, that exogeneity means this particular thing can be determined outside the system.

That means this is independently determined, or in other way very leman or very simple language, we can say if one variable is defined as the exogenous variable, then we can say it is basically is an independent variable; that means, when the monetary authority wants to increase the money supply, when the monetary authority wants to decrease the money supply, it depends under them and it depends that how the monetary authority is reacting to that. If they want, they can increase the money supply; if they want, they can decrease the money supply; that means, there is no such factors which determine the money supply.

So, if no factor determine the money supply that means money supply itself is an exogenously determined or it can be determined outside the system. If that is the rule, then what we can say, Keynes is very serious about this things and it is a very serious very important assumption what Keynes has taken that let you say, the, in the context of India. Reserve bank of India is our monetary authority, and without changing any kind of policy variables, the Reserve bank of India is able to sense the money supply exogenously or can able to determine the money supply exogenously. Then, what we can see that any time, they can control the money supply; any time they can reduce; any time they can increase.

So, here, what Keynes has said? Keynes is a very important assumption. What Keynes has taken in that particular time that, they said that in the interest rate determination, whenever we talk about the demand and supply of the money, so, here, what we can say that supply side basically comes from the, the, system or it is outside the system, and whenever we talk about the demand side, it is cannot be observable that. So, you should find out which are the factors or which are the variables which are going to affect the demand functions.

So, in this context, Keynes totally said that money supply is in the hand of the monetary authority and anytime monetary authority can increase it or can decrease it, but the demand function which is not in control the monetary authority, because this is the variable which cannot be observable. Then there are certain factors which affect this. So, you should determine that particular factors.

So, according to Keynes, why money is demanded? For example, as a human being or as a individual investor or as an individual common man, why I need the money, but Keynes has argued or before the Keynesian theory, what people were arguing or the economist were arguing? They have argued that money is demanded for the transaction; that means, for day to day expenses, for my investment, for my buying this different may be luxury or the different kind of assets, we need the money. So, the major factor or major motives for demanding money is a transactions demand motives for demand for money.

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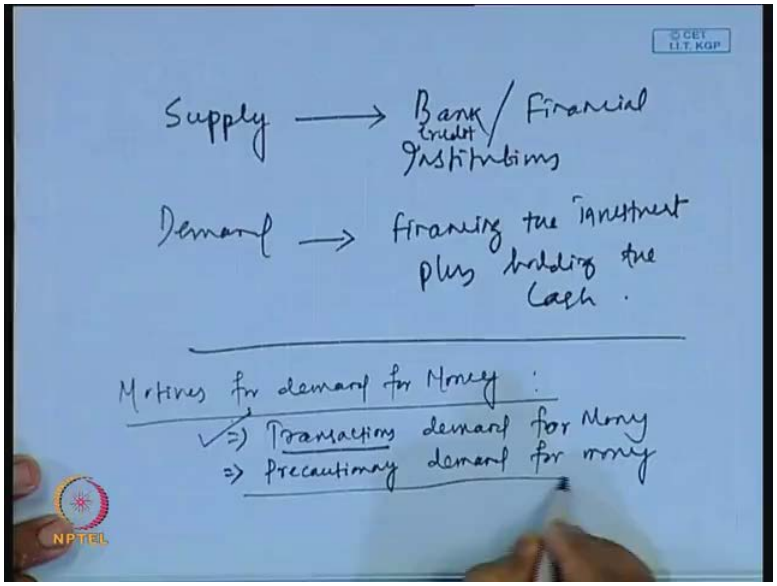

So, what before Keynes people are giving much importance? To transactions demand for money. So, money is demanded is for transaction motives for a day to day expenses or for investment whatever it may be, but people need the money for the transaction. So, much importance was given to the transaction, but then whenever Keynes has come, what Keynes said? It is true, money can be money always demanded for the transaction.

But Keynes again has added that money can also be demanded for the precautionary motive; that means, what it he means that, maybe we can say that precaution. What do you mean by the precaution? Keynes said people required some money for the precautionary motives; that means, let somebody will be ill may be on force there are certain unforcing situations through which all of sudden one, one, individual require some money. So, in this context, they generally keep some money with them or they demand some money with them or they demand certain money in a particular time period for the precautionary motives.

So, first, he has given the importance for the transaction motive which is the ultimately requirement or ultimate motives for why the people demand for the money. But second factor Keynes has included that also we need money for certain unforcing situations or may be because of our certain factors which is not visible to us or it cannot be forecasted always, always. Therefore, we should always have some money with us. So, that is why we call it the precautionary demand for money.

Then, you have another motive here; they added that is called the speculative; that is called the speculative demand for money. What do you mean by this speculative demand for money? The speculative means it is basically speculation. You see the stock market is a market for speculation or any derivatives market is a market for a speculation.

So, like that what Keynes was trying to explain that people need some money for the speculative purpose or may be maximization of the return by speculating something. Some direction they want to speculate, some kind of moment they can speculate regarding certain prices. So, therefore, they can maximize their return in the future by, by, the speculation of that particular behavior of that is particular variables.

Let I am speculating that this stock will increase further. The price of the stock will increase further. So, in this context, this investor is speculating that if I invest certain money here, then may be my return will be maximized after certain period. Therefore, Keynes has included another motives for demand for money. That is called the speculative motives. After identifying this three, Keynes said that money supply is exogenously determined. You see, how he has made it so simple? Let if you can observe this money supply or you know money supply is a exogenously determine. If a money supply is a exogenously determined, you know this is the supply of money, and now, you

know the this is the demand for money. Then it is very easy to make an interaction between the demand and supply forces of the money to determine the interest rate in the financial market.

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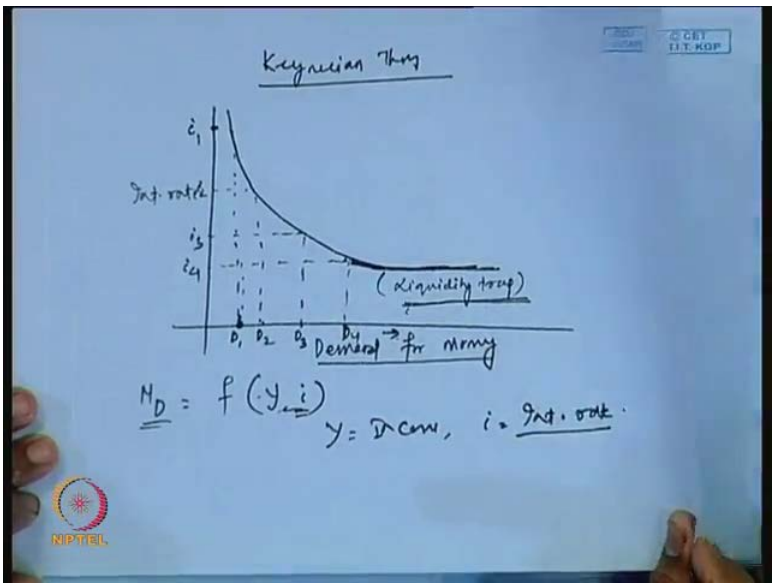

But here, you see what Keynes said that you see this is your demand for money and this is your interest rate. What Keynes said on the basis of this demand for money, the interest rate will move like this; that means, if interest rate is very high, the demand for money will be low, because people does not want to hold money with them, they want to invest it certain assets.

The interest rate goes down; the demand for money also increases like that. Again it goes down. Let this is your i 1; this is your i 2; this is your i 3; this is your d 1; this is your d 2; this is your d 3. As the interest rate declining, the demand for money increases, but according to Keynes, after certain point, let this is the point after this i 4, this is a d 4, what Keynes said that he believe this demand for money will change, this interest rate is not going to change the interest rate. There is a level of interest rate. Once we achieve or we reach that particular level, the interest rate will not move on the basis of the demand for money. So, that particular level Keynes has defined as liquidity trap .

So, even if the demand for money will be there, the interest rate is not going to be sensed. So, this is the liquidity trap what this particular concept Keynes has included,

that once we reach certain interest rate level. So, after that, even if demand for money will be changed, this interest rate is not going to be changed. So, this is the concept which is explained by the Keynesian theory. So, what Keynes said that this interest rate or we can say the, he said the demand for money is a function of y and I; y represents your income; i represents your interest rate.

So, this interest rate, even if the interest rate is determined on the basis of the demand for money or demand for money determine on the basis of interest rate. So, after certain point, even if the demand for money changes, the interest rate is not going to be changed. So, this is the concept of the liquidity trap or liquidity premium and liquidity trap what Keynes has explained to determine this general interest rate determination in the financial market.

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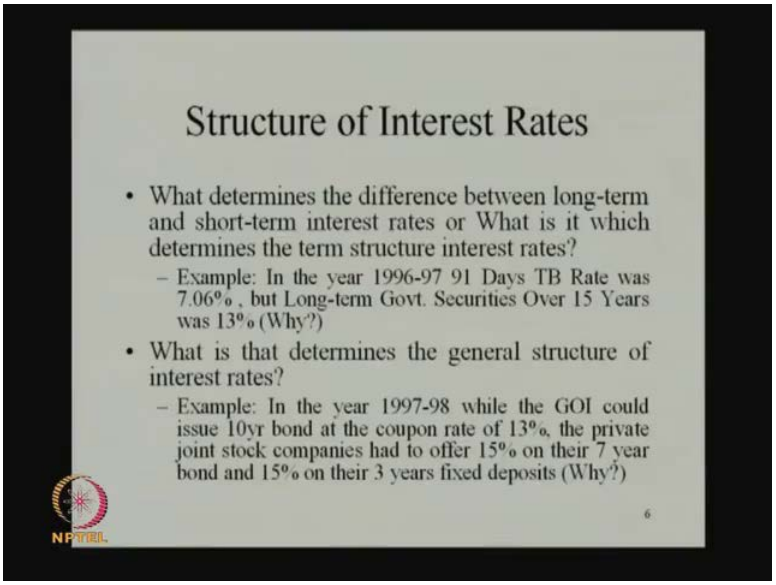

Then coming back to the structure of interest rate, what basically the structure of interest rate means? The structure means there are two questions the structure was trying to answer or the concept of the structure was trying to answer. One is what determines the difference between the long-term and short-term interest rates. Why this interest rate in the long-term bond and short-term bond are a different or what is it which determines the term structure interest rates either of this ways which can explain. You just see the example - in the year 1996, 97 91 days, treasury bill rate was 7.06 percent, but the long-term government securities over 15 years was 13 percent why.

If you ask this question why, this answer will be explained by the term structure theory. So, that is the concept of the term structure interest rates; that means why there is a difference? Why this interest rate for a short-term asset or short-term bond is different from the long-term bond? So, this is the fundamental concept or fundamental theoretical philosophy what this term structure theory was trying to explain.

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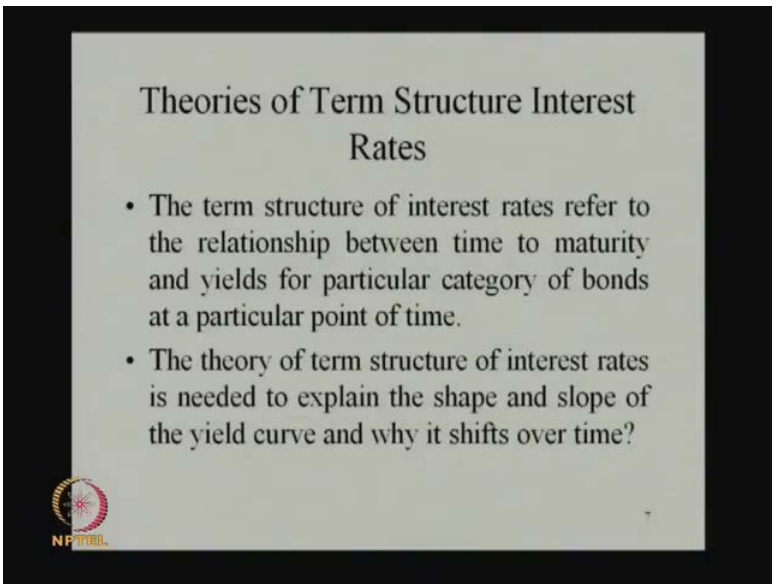

Number 2 - what is that determines the general structure of interest rates? What do you mean by the general structure of interest rates? If you see that in the year 97 98 while the government of India could issue a 10 year bond at the coupon rate of 13 percent, the private joint stock companies have to offer 15 percent on their 7 year bond and 15 percent on their 3 year fixed deposits, what is the reason; that means, on the basis of, even there are a same term to maturity that there are 1 bond has been issued by the government of India where the term to maturity is ten years. The same bond has been issued by any joint stock companies in India you can take any example. Let us say it is reliance bond or it is a or it is a any of the other private sector bonds. So then, what you can see that always there is a difference between their yields or different betweens their coupons.

So, even if the term to maturity is same but still there is a change in the interest rates, and another way also we have seen that why this short-term bonds gives less return than

long-term bonds. These are the or why there, there, is a deviation between the return from the short-term bond and the long-term bond.

So, this is the question always raised in our mind that why this particular differences are there, why this deviations are there. So, answer this deviations, just we have we have to read or we have to know that what are those different theories which are trying to explain this. So, that is why we call it the theories of term structure interest rate. So, the term structure interest rate basically refers to the relationship between the time to maturity and yields for particular category of bonds or a particular point of time.

The term structure theories basically establishes the relationship between the term or time to maturity or the term to maturity and yields for particular category of points or a particular point of time. Then the theory of term structure of interest rate is needed to explain the shape and slope of the yield curve and why it shifts over the time. So, this is the way generally we read the term structure theories to know why there is a difference? Why the yields are different? Why this varies from on the basis of the term to maturity? Why it is varies on the basis of the sources? So, these are the different question which has been answered, which have been answered by the term structure theorist.

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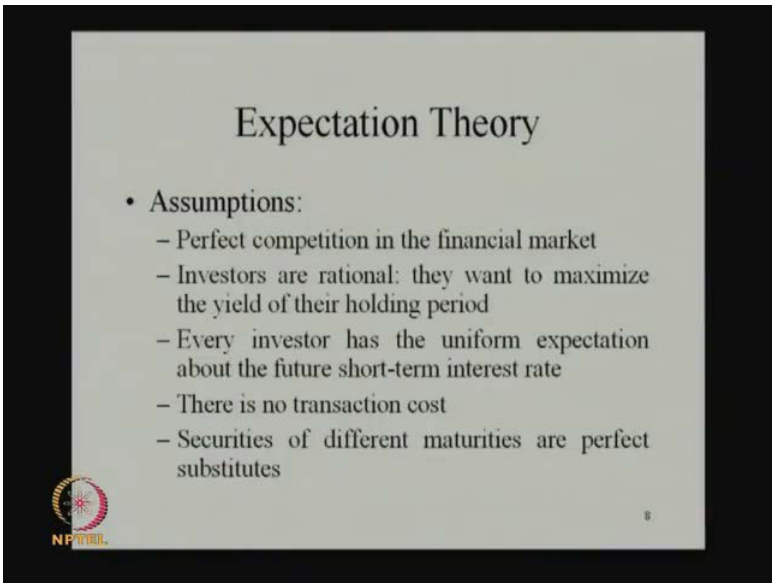

The first theory, we have various theories; we have the first theory which talks about the term structure of interest rate or interest rate theories and term structure interest rate theories is basically the expectation theory. What this expectation theory talks about? Before explaining that, expectation theory has taken certain assumptions. This assumptions are the other is a perfect market or perfect competition in the financial market; that means, there are lot of buyers or lot of sellers, there is no information gap. Everybody has the same level of information regarding these different financial assets. There is no such kind of ah information asymmetry or we can say that all the competitive, all the investors are basically, all the stake holders are very much competitive in nature.

Second assumption is taken that investors are rational. What do you mean by the rational? They want to maximize the yield of their holding period; that means, if somebody wants to invest in a five years bond, somebody invest in a ten years bond, everybody's objective is same; everybody wants to maximize their return from the investment what they have made in the different assets. So, therefore, across this time to term to maturity, the objectives of the investors are almost same.

Every investor has the uniform expectation about the future short-term interest rates; that means, what it basically means that they said that the how this interest rate will move in the near future. For example, today the interest rate is eight percent, but may be after two days, after the announcement of RBI annual policy or any of the incident which is a affecting this market, whether the interest rate will move in in upward movement or this there will be a downward movement, everybody is expecting in the same way; that means, all the investors expectations level all most all same. They have, they have a uniform anticipation that how this to interest rate is going to move.

And another very serious assumption what the expectation theory has taken that there is no transaction cost. Whatever investment you make in the market, you do not have to pay a single rupee for this transaction. That is why this is a 0 transactions investment always happens in the market. So, that is why there is no transaction cost.

And another assumption also which is again, we can consider is a faulty assumption, that securities of different maturities are perfect substitutes. We assume that the different

maturity even if one security is let 5 years maturity, another security 2 years maturity and another security 10 years maturity.

If a 1 investor is investing in five years, another investor in two years another investor in ten years, then they said that all the securities can be substitute to each other at any point of time or they can be one particular asset can be place on another particular assets, which is a again, because the objective of the investor will be different whenever they have chosen the different types of the securities on the basis of their term to maturity, but here, this expectation theory has ignored that objective of the investor. They totally have considered that all the securities or all the bonds with a different term to maturity are perfectly substitute to each other.

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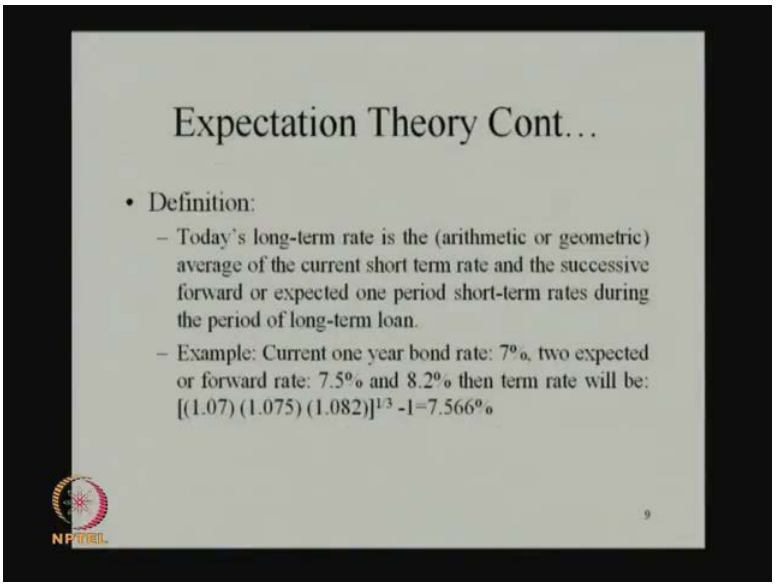

So, assuming this concepts, what the expectation theory says that today's long-term rates is the average of the current short-term rate and successive forward and expected one period short-term rates during the period of long-term loan.

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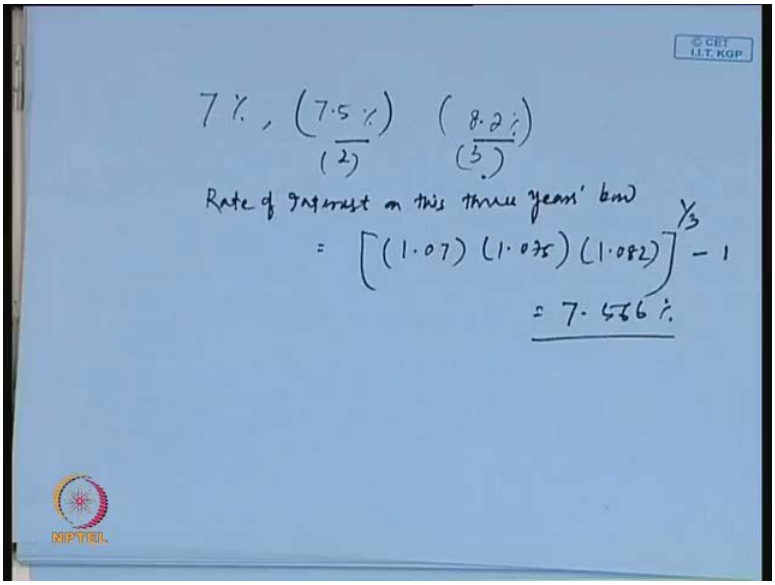

That means they said or the average can be arithmetic average or it can be geometric average. You just see the example that current one year bond rate is 7 percent; that means, today the short-term rate of the bond is seven percent, and we are expecting let after next year, what should be the bond rate? It is the second year, and what should be the bond rate in the third year.

So, as the today's rate, whenever we are expecting about the second year, we call it the forward rates or expected rates. The expected rates and what we have seen that all the investor are expecting that the, either it will increase or decrease or we are expecting, let it will increase, and accordingly, they have assumed let it is 7.5 percent; let it is 8.2 percent.

So, tomorrow's, about today's expected rate basically will be the tomorrow's current rate, and again, next day also it will be the current rate of the third year. So, therefore, what this expectation theory says that if you go for this geometric mean, we can say that the three years bond if somebody wants to buy, then the rate, rate, of interest, rate of interest on this three years bond on this 3 years bond are basically 1.07 into 1.075 into 1.082 to the power 1 by 3 minus 1 this will be 7.566 percent.

That means it is nothing but the arithmetic or geometric mean of the short-term interest rate. What is, what is there currently available today and the expected or the future short-

term debts what we are going to or what are going to be prevent in the future. So, therefore, long-term interest rate is the simple average of the short-term rates or short-term current rate in short-term forward rates are the expectations.

And what are the implications we can get from this theory? The implications are the long-term rate will be more than short-term rate. If investors expect future short-term spot rates will be higher than the current short-term rate what we have observed here. Long-term rate obviously will be more than the short-term rate if the investor expect future short-term spot rates to be higher than the current short-term rates.

Long term rate will be lower than short-term rate if investor expect future short-term spot rates to fall below the current short-term rate. If you are saying that, today it was seven point five percent and next year it was 6.5 and next year it is 5.8. Then, we can observe that the average of this three rates either it is a geometric or arithmetic, the average will be somewhere less than the 7 percent. Therefore, the long-term interest rate depends on what is this movement of the interest rate is going to happen in the near future.

Then, we have the long-term rate is equal to short-term rate if no change is expected between future short-term spot rates, and there is a mistake here; there is 0; there is nothing there between short-term, between the short-term spot rates and the current rate. Let this 7 percent continues over the period of time. There would be no change, then what will happen that the short-term interest rate will be equal to the long-term rates.

So, after explaining this theory, what we can observe here which are the drawbacks. The drawbacks are most of the assumptions what the expectation theory has taken. These are the faulty assumption number 1. Number 2 - they have always talked about forward short-term, forward rates short-term, expected rate or the short-term rates all this things, but they never explain how this short-term rate is determined. They never said that how this short-term rate is going to be determined; that means how the 7.5 determined? How this 7.5 percent determined or how the 8.2 percent determined? That particular explanation has not given by the people who are the advocator of the expectation theory. So, that is the major drawbacks of the expectation theory whatever we have.

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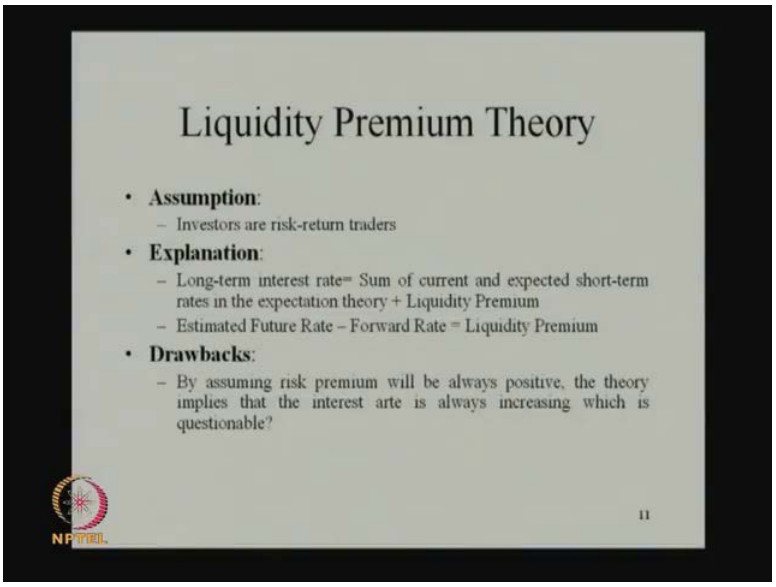

Then, we have the another theory again this theory is given by the Keynes or Keynesian theory talks about this, what we call it the liquidity premium theory. What do you mean by the liquidity premium theory? That here Keynes has taken the assumption, that investors are risk return traders. Always the investor decide the return on the basis of the risk level or the risk appetite or there is always a risk return tradeoff of the in the financial market.

So, what Keynes said that the long-term interest rate is basically determined, determined, as the sum of the current and expected short-term interest rates in the expectation theory plus the liquidity premium; that means, whatever interest rate we have decided here, if somebody is going to wait for the long-term to get this return; that means he is going to take more risk. So, if he is going to more risk, then what Keynes said that definitely the return also should be more.

That means investment in the long-term is always a riskier than the investment in the short-term according to Keynesian framework. Therefore, Keynes said that there is always a premium involved if somebody invest in their long-term features or long-term bonds.

So, what Keynes said that estimated future rate. Whatever we are going to measure on the basis of the available data minus the actual forward rate what is going to be prevent, that basically is nothing but the liquidity premium. So, why this deviation is there? The deviation is there because somebody is taking more risk. That is why this interest rate also should be more. So, liquidity premium is basically the difference between the expected future rate. What is exactly has happened minus the forward rate. Forward rate means what? Already happened in that particular time period, but there is a drawbacks.

Again in the Keynesian theory, what is the drawbacks by assuming risk premium will be always positive the theory implies that the interest rate is always increasing which is questionable; that means, Keynes said that always investing in the long-term is a risky; that means, we can assume that the premium is always positive, but is it true? Why the premium will be always positive? Maybe there are certain macroeconomic factors; there are some other exogenous variables which can determine this, but Keynes has never explained that part that which are those factors, which are going to explain this factors which affect the liquidity premium on which the whether the premium will be positive or the premium will be negative, that will be determined.

So, that what has not been answered by the Keynesian theory? So, always assuming that always there is a positive premium or all we are expecting that the interest rate will be go up in the future that is a questionable argument given by the Keynes.

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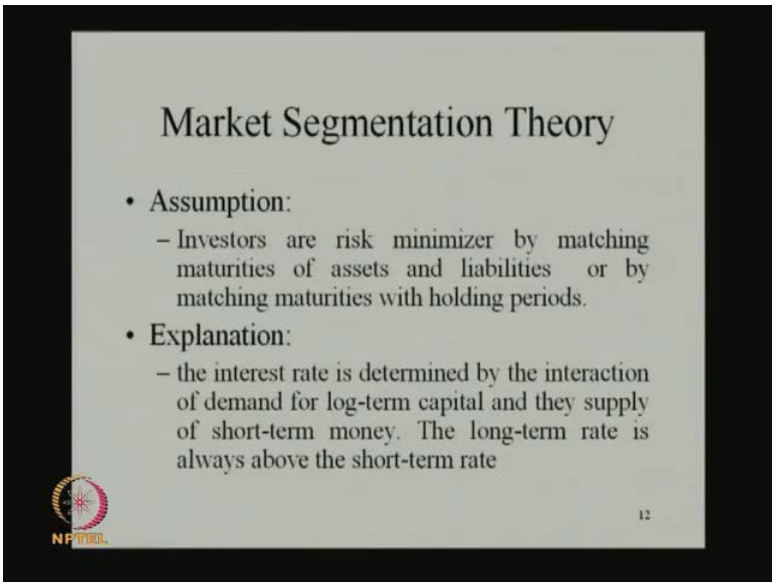

Then we have another theory called it market segmentation theory. What do you mean by the market segmentation theory? Here, the investors are risk minimize by matching maturities of assets and liabilities or by matching maturities with holding periods. What does exactly it mean that whenever we decide on the basis of the our requirement on the basis of the objective, what the investor does? Investor basically decides the investment. They invest in certain bonds on the basis of their objective or the requirements.

So, if I need money after ten years, so I should invest the money on the 10 year bond, or if somebody is going to require or require some money around 3,00,000 may be after 5 years for (( )) daughters marriage. So, he will invest certain amounts in such a bond which will fetch him 3, 00,000 lakhs after 5 years. Then if something is extra, that is a different story.

So, what generally here we are assuming, there is different markets for the different type of investors on the basis of their objectives. So, therefore, what we can say? You cannot convince a investor who wants to investment the money for 5 years, he will convert it up to the 10 years or you cannot tell that a ten years investor who always wants money after 10 years will come back to the 5 years.

So, that is why properly there is a segmentation. If there is a segmentation of the market, and why this segmentation is made? The segmentation is made, because all the investor wants to minimize the risk to get a certain amount of the return. So, that is why they are always matching with their, their time period with the certain goals or the objective what generally they are going to achieve.

And therefore, the, the, matching maturities maturity of the bond should be exactly equal to the holding period of this particular investor, the, that is, that investor will hold this particular bond may be up 5 years, that is why they are see, you look for a bond where the term to maturity is 5 years. So, therefore, that is the assumption always we have and that is also practically true.

Therefore, in this theory, how this interest rate determined? The interest rate is determined by the interaction of demand for long-term capital and the supplier and the supply of short-term money. The long-term rate is always above the short-term rate.

So, therefore, if there is a interaction between these two, then what we can say that or according to market segmentation theory, again we can say that if there is a different preferential allotment and we always expect that the long-term interest rates are always riskier than the short-term interest rate, and if they want to minimize the risk in the market, they always involve in the short-term bond or short-term assets, but if always they want to get some high return, they can takes little bit more risk. So, that is why they invest in the long-term bond. So, we are expecting always the long-term rates will be more than the short-term rates.

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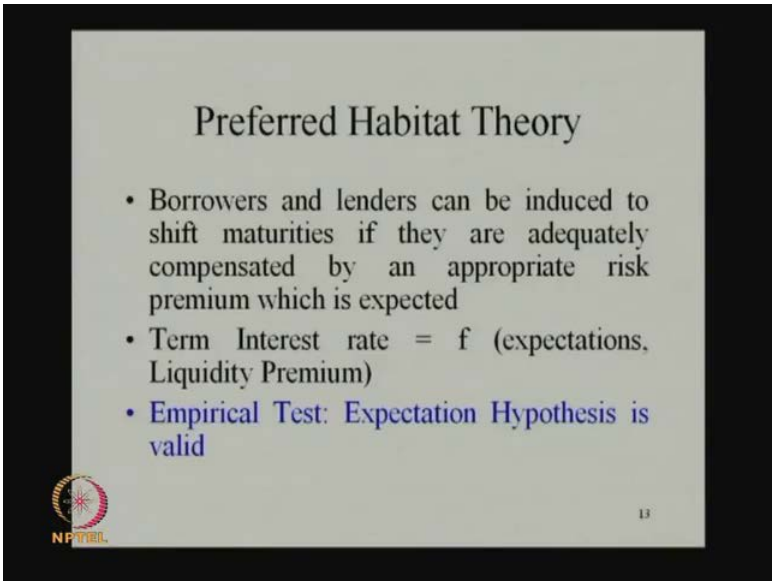

And the preferred habitat theory is basically linked to this market segmentation theory. What it basically means that borrowers and lenders can be induced to shift maturities if they are adequately compensated by an appropriate risk premium which is expected. So, that is why the term structure interest rate is basically a function of expectations and the liquidity premium.

Before habitat theory, what he says just know what I told you that a investor who wants to invests for 5 years, he cannot convert it into the 10 years or the investor who wants to invest in the 10 years, he cannot be converted into 5 years, but they can be convert it. When they can be convert it when these, a good amount of the compensation, good amount of the premium will be given to them.

So, if the premium will be given to them, good amount of the compensation will be given to them. Then, maybe there is a probability that the investor may change their attitude, maybe they can go to from one investment horizon to another investment horizon.

But here, what we can say that the actual interest rate term structure interest rate is basically depends on the expectation and the premium, but empirically whatever work has been made has been done, they found that the expectation hypothesis is empirically valid as compared to the liquidity premium and the market segmentation on the preferred habitat theory.

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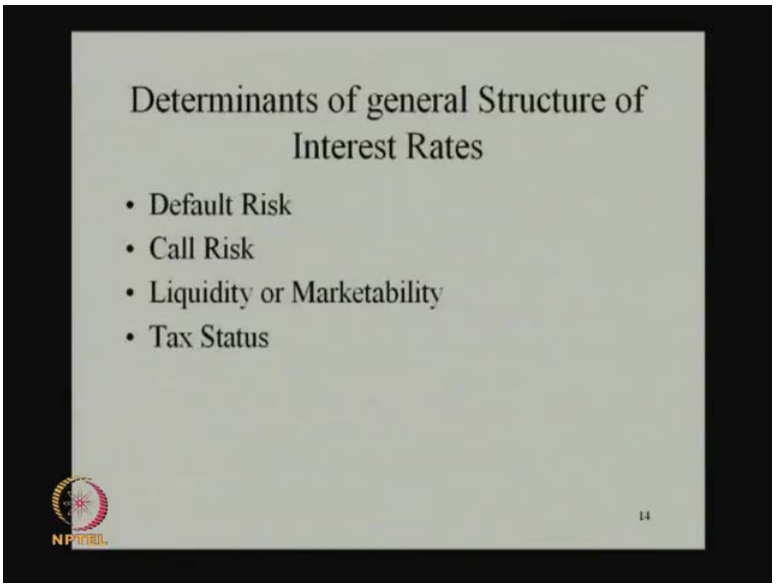

Then, in general, if you talk about how the structure of interest rate is determined, it is the default risk. Already you know the default risk means basically depends on the, what is the probability of default in a particular bond and the probability default is always higher for a long-term bond than the short-term bond.

Then, we have the call risk if there is a callable and non callable bonds, what we explained that if there is a call features is there, then the, there is a this is highly risky than the other normal plane nominal bonds. Therefore, the return will be higher in that case liquidity or the marketability. If liquidity of a particular bond will be higher or particular asset will be higher, then maybe the return will be less for the liquidity will be

more then, or there is a chance of our less liquidity, then we have to give the premium. Again for that, that is why again it will happen the return. Then there are certain bonds which are tax exempted. So, those bonds also little bit the coupon will be less as compared to the normal bonds which are not tax adjusted or tax exempted.

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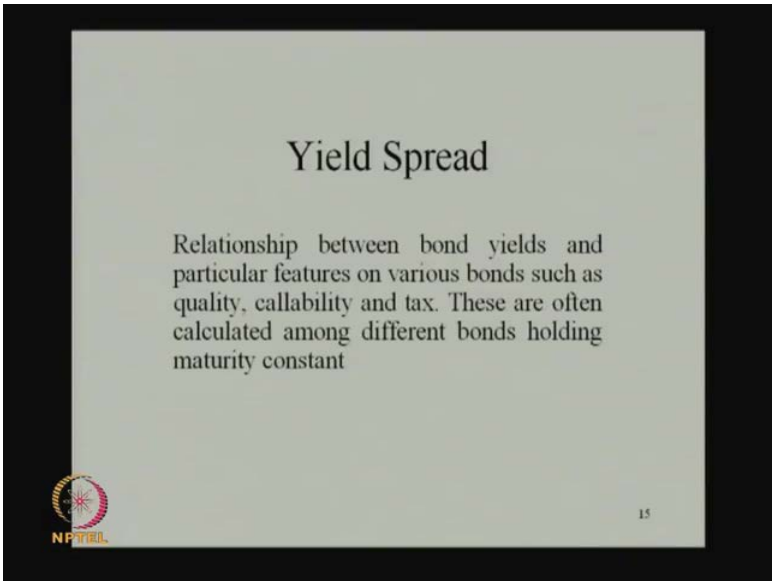

So, these are the common factors which are affect the structure of the interest rate. Then we have the yield spread. Already I told you that it basically talks the relationship between bond yields and the particular features on various bonds such as quality, callability and tax. These are often calculated among different bonds holding maturity constant.

In the second question, what I told you that keeping your maturity constant, why the returns are different? The returns are different it is because of their quality who are the issuer; what is the chance of the default and whether the return can be achieved or not and the tax structure. The features of the bond whether there is a call feature are not. So, these are the different factors which basically determined, or basically in aggregate, we can say that the risk factor basically determines even if the term to maturity is same, the return from the two bonds is different. So, that is why we call it the yield spread.

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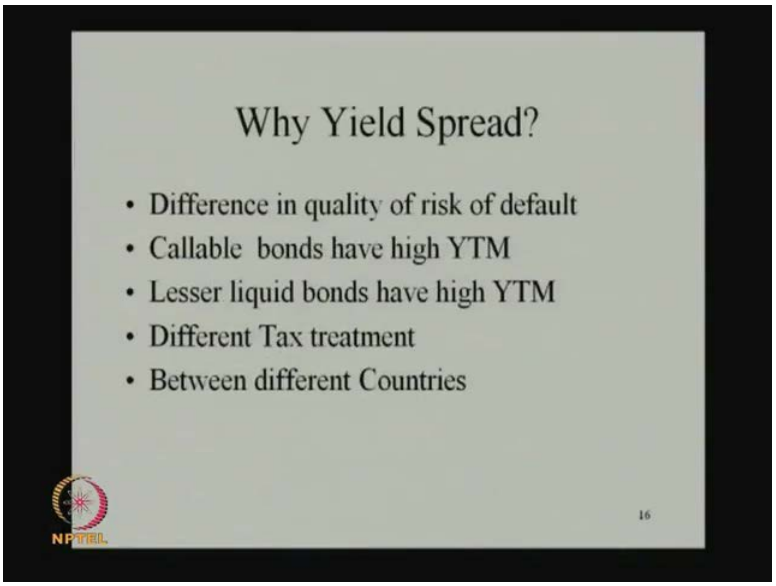

And why this there is a difference? The difference is because of this quality of risk of default already what I told you. Then we have the callable bonds of high yield to maturity; then lesser liquid bonds of high yield to maturity. Then, if the as a tax exempted, then the return is lower than, if there is a particular bond which keeps, there is a, there is no tax exemption. Then between the different countries, because the country risk also plays a role, that is why if it is issued from the different, different countries, the return from, the, those particular bonds also will be different.

Therefore, in aggregate, what we can say it is the quality; it is the features; that means, callable or non callable or it is the liquidity and also the tax and the country risk is basically plays the significant role which determines this interest rate fluctuations or the change in the interest rate between the different type of a assets and as well as we discussed about the how this general interest rate determined and also there are certain factors which are responsible for change in the interest rate for the different type of the assets.

And after that, we will be discussing about that how the bond price can be volatile. If it is volatile, then how this particular volatility can be measured and which are the different concept associated with measuring this different level of the volatility, what price volatility in the market, we will be discusssing it in the next class. Thank you.