Security Analysis and Portfolio Management

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Module No. # 01
Lecture No. # 26
Multifactor Pricing Model

In the previous class, we discussed about the arbitrage pricing model and according to this arbitrage pricing model what we found, that there are certain factors apart from the market risk like beta, which affect the stock return or the expected return of the stock is determined by some other factors apart from the beta what the capital asset pricing model has explained. But the problem was with this arbitrage pricing theory, that this arbitrage pricing theory could not explain the exact number of factors, which can affect the expected stock return or the expected return from any of the assets.

So, to overcome this problem, the other resources have tried to find out the exact number of factors or we can say the actual factors which can affect the stock return or the return of the various assets in a particular time. So, in this context, the theory or the model, this has been developed after this arbitrage pricing theory that is defined as the multifactor model.

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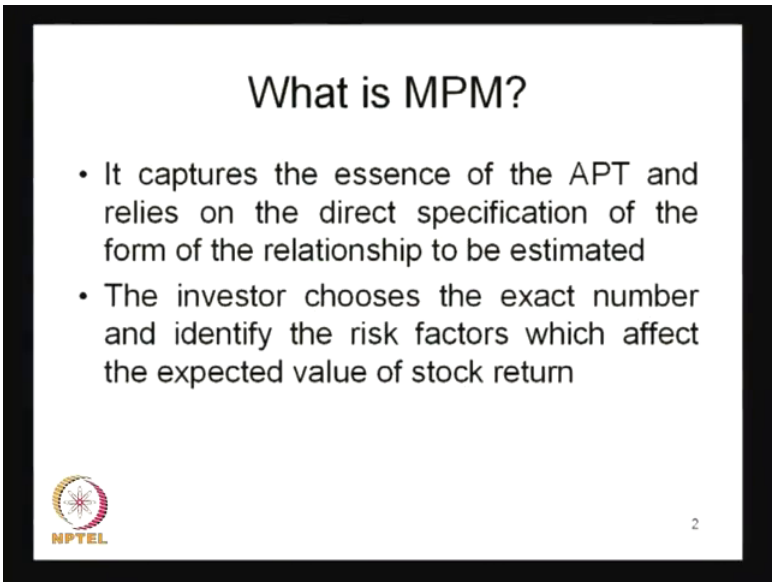

So, let us see what this multifactor model is basically or what this multifactor model is trying to explain. The multifactor model basically captures the essence of the arbitrage pricing theory and it relies on the direct specification of the form of the relationship to be estimated.

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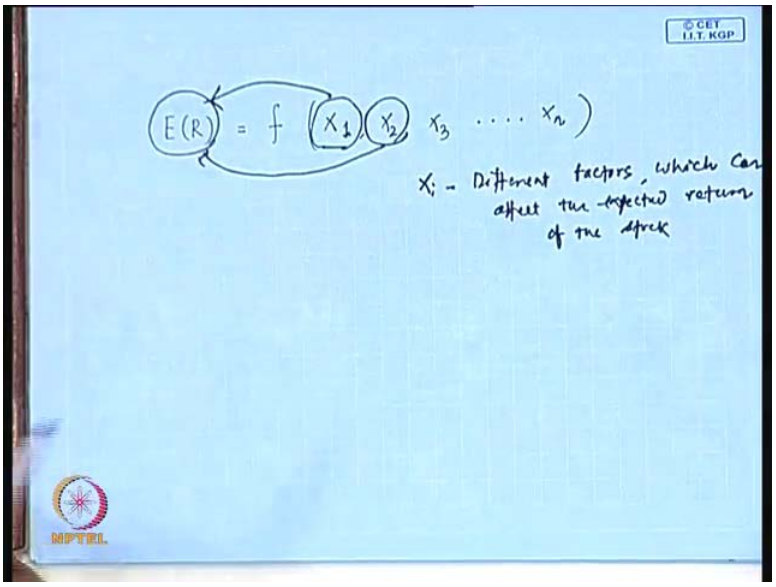

That means, what this MPM or the multifactor model was trying to say, for example, we say your expected return of the stock is a function of X or we can write X 1, X 2, X 3 like X n and this X 1, X 2, X 3 and X n these are basically the different factors; X is basically the different factors which can affect the expected return of the stock.

In the same way, the arbitrage pricing theory was also trying to explain this, but the basic difference between this arbitrage pricing theory and multifactor model in this case is, clearly the multifactor model was trying to explain how the X 1 is going to affect your expected return; how X 2 is affecting your expected return or how the X 3 is affecting the expected return, What it implies? There is a direct one to one relationship can be established according to the multifactor models.

Here what we can see that, if you have identified the exact number of factors or you can see that these are the probable factors which can determine the expected return of the stock, then what we can conclude that, in each factor whether they affect this expected return positively or directly or they can affect this particular expected return immensely, that can be judged or that can be guessed from the direct specification of the model; there is should not be any kind of ambiguity by defining this model in establishing or for establishing the relationship between the expected return and the other factors.

So, that is the major advantage. So, that is the major advantage what the multifactor model was trying to say. Then the other thing is, the investor chooses the exact number and identify the risk factor which affect the expected value of the stock return. That means, here what generally we are talking about? The investor basically choose the exact number, but the arbitrage pricing theory was not explaining the exact number; the arbitrage pricing theory was talking about the K factors, but how many factors really were there what this k represents that number was not explained by the arbitrage pricing theory.

But if you see, if you observe that multifactor model was trying to show or trying to explain the exact number of factors, which can affect the stock return at a particular time remark or particular time period that is the major advantage or major concept or major logic or major fundamental logic, which this multifactor model was trying to explain.

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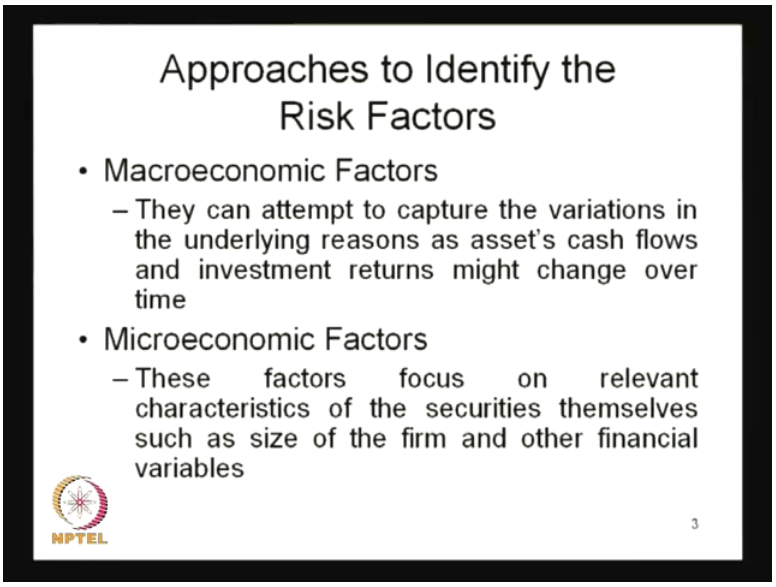

Then there are various approaches to identify the risk factors, because you see if you see the core theme of the model, the basic factor basic importance of the model is, it talks about the risk factors, which could have the impact on the expected return of the stock. But which are those risk factors, how can we identify those risk factors that is the question here that is the academic and as well as the practical question always comes to the mind of the investor or the academician to know how we can identify or how what is

the different ways or different approaches through which we can identify, which are the risk factor which are the factors which can affect the expected return of the stock.

So, that is the question actually comes to mind of the people that which are the different ways or which are the different methods through which the risk factors can be identified. So, here broadly if you see there are two approaches or there are two major types of factors or there are two categorization of the factors through which we can say that which factor is affecting the stock return and which factors are not affecting the stock return.

One approach is basically talks about the macroeconomic factors, then the other factors are basically the microeconomic factors. I hope you must be aware about the basic difference between macro and micro. Here what generally we can talk, whenever you talk about the macroeconomic factors, it is basically relate related to the whole economic factors; basically the growth rate of the GDP, the inflation, the policy or we can say this political stability or the exchange rates stability or the political relationship with the other countries.

So, these are the different factors, which basically comes under or come under the macroeconomic factors and those factors will have the impact on universe of the stock, that means, which are the stocks, which are available in the market, all the stocks are affected by the macroeconomic factors.

But whenever we come to the microeconomic factors, the microeconomic factors are restricted to the individual companies or we can say in a very different way or in a very layman perspective if you want to explain, it is basically the complex specific factors. And there are hundred complex specific factors which could have the impact on the stock return and those factors should be identified and the theoretical relationship between those factors with the stock return and how those factors can affect the stock return, those relationships can be established; those theoretical linkages can be established or the theoretical logic can be established.

If those things will be first, we should establish that relationship or the probable way of effect on the stock return, then those factors can be incorporated into our model to find out the different determinacy or the different factors which have the impact on the stock

return actually. So, here coming back to our discussion, so that is why what we can say, the macroeconomic factors are basically attempt to capture the variations in the underlying reasons as assets cash flows and investment returns might change over time.

That means already we said that, whenever we talk about the underlying reasons of the different cash flows, the factors which affect the cash flows of this particular company or the factors which affect the expected investment returns of this particular company. So, these are basically the macroeconomic factors and already I told those factors will have the impact on all the stocks feature available in this particular economy or the particular stocks which are affected by any kind of policy decisions taken by this particular country.

So, therefore, what we can say that, you take the example of a business cycle; if there is a upturn, then the market will do better; if there is a down turn, the market will not do better or the market will be totally going in a reverse direction or the performance of the particular companies will not be better in that particular time.

So, that way what we can say that, business cycle is basically macroeconomic variable which is affecting the expected return of the stock in the various periods. Like that you can take the growth rate of the GDP, if the growth rate or there is a favorable condition in the economy and almost all the stocks are performing better, then we can blindly say or we can conclude that again those stocks also we will be performing better or the stock market will perform better.

So, that means, what we can we are trying to say? There are some linkage; there is some theoretical linkage can be established between the different macroeconomic variables, like your price stability or like your inflation or we can say this time more or less same price stability and the inflation, then we talk about the growth rate of the GDP, then we talk about interest fluctuation, then as well as the political stability, etcetera.

These are the different macroeconomic factors, which always play the role for determination of the stock return in a particular time and how they affect that we will see gradually. But the microeconomic factors already what I told, these factors basically focus on the relevant characteristics of the securities themselves such as size of the firm and other financial variables. Already I told you, there are these factors are basically the

company's specific factors like size of the company, profitability, liquidity, then you you have the other variables like a market to book ratio, then your price running ratio.

These are the different variables which could have the impact on the stock return and those those factors basically varies from company to company and that is why we say these are all the microeconomic factors, because these factors affect individually to the individual stocks.

That means the expected return of the different stocks varies irrespective or across the companies because of the variety or the variant nature of the particular companies on the basis of their fundamentals. Because these are basically the fundamental factors of the company like your profitability, liquidity, volatility, etcetera which basically affect the stock return in various ways. So that also we will see that how those fundamental factors will have the impact on the stock return in various ways.

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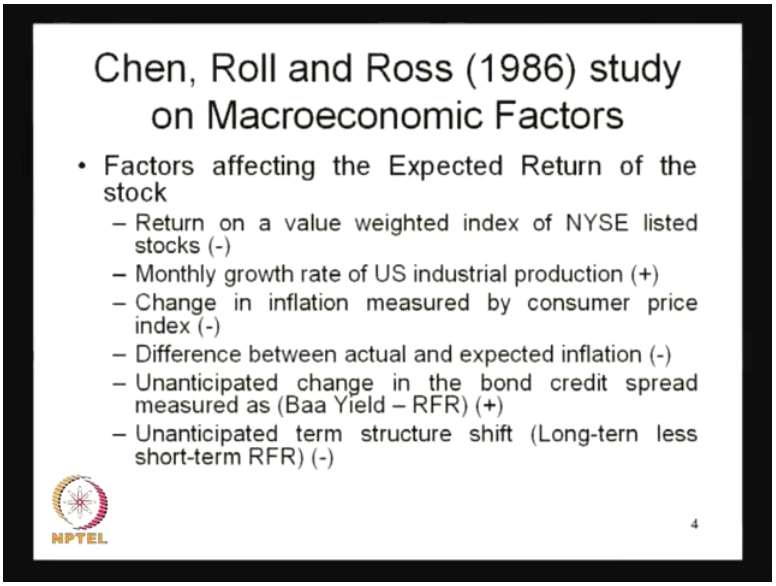

So, to express this theory or to prove this theory or to establish this theory, various people have tried to use those various approaches what just now we discussed to know what exactly the factors what exactly the different factors, which can affect the stock return in a particular economy. So, here the most of the very celebrated study or fast study we can say done by Chen, Roll and Ross in1986 and their study basically has focused on the macroeconomic factors.

Chen and Roll were trying to find out which are the possible exact macroeconomic factors keeping the company specific factors remaining constant, that means, their assumption is all those factors which basically affect the stock return that is confined to the macroeconomic factors.

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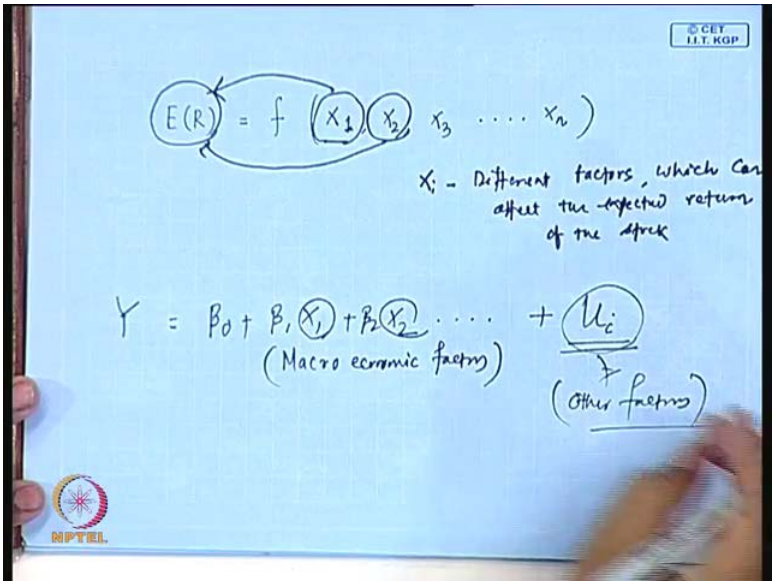

And what they assume that, let if your Y is equal to your stock return the expected stock return, then they said this is basically your there are different beta 1 X 1 plus beta 2 X 2 like that; these are the different X 1, X 2 like that, these are the factors, these are basically the macroeconomic factors; X 1 and X 2, these are the macroeconomic factors which can affect the stock return and already I discussed these things, they will have a have an error term here, may be this error term will capture the other factors which could have the impact on the stock return, but that is not directly incorporated into our model.

So, which are the factors this Chin, Roll and Rose have identified? The first factor they said that, the return on a value weighted index of NYSE listed stocks, monthly growth rate of US industrial production, change in inflation measured by consumer price index; difference between actual and expected inflation; unanticipated change in the bond credit spread measured as the Baa yield and the difference between Baa yield and risk free rate of return then unanticipated term structure shift that is the long term less short term return.

What they said that, the first of all they said that the return of the stock is determined by the market risk and the market risk is related to the stock return of this particular or the market return of this particular economy and if your beta will be more, then obviously, what we can say the market risk of this particular stock will be more; if the market risk will be more, then we are expecting the return also should be more, then they have taken another variable what basically they talk about, that is the monthly growth rate of US industrial production; it is basically a proxy which is used by them to reciprocate or to know the impact of the growth rate on the stock return.

What basically this growth rate impact of the growth rate on the stock return. You take the example, if the growth rate of the economy will be better, it means GDP growth rate will be better, then what you can predict there is a favorable situation in the economy to perform by any means or in any of the sectors. So, if you consider those things in the back up of the mind, then what you can say that, if the economy's growth rate will be more, then it will have a positive impact in all the sector of this economy, then obviously, the stock market also will work in the same direction.

That means if the growth rate will be better, then the stock market also will do the better; also there are lot of debates between whether the growth rate will affect the economy or the growth rate of the economy will affect the stock return or the stock return will affect the economy, but still if you assume and that is also some of the countries we found both are affecting each other some countries, we found that the stock return affect the growth rate of the economy some countries; we found that the growth rate of the economy affects the stock return.

So, the results varies on the basis of the data; results varies on the basis of the nature of the economy; result also varies on the basis of the different characteristics of this particular political stability or the characteristics of this particular basic characteristics of the functioning of this particular system. But here what we can say, if you assume that the growth rate of the GDP as an indicator which talks about the favorable situation of the market or we can predict whether your market is doing well or not.

Then we can say that this is one of the factors which could have the impact on expected return of the stock by looking into this growth situation by looking into this, how this

particular market is performing, then some investor can predict whether this particular stock or this particular market will perform better in that particular situation or not.

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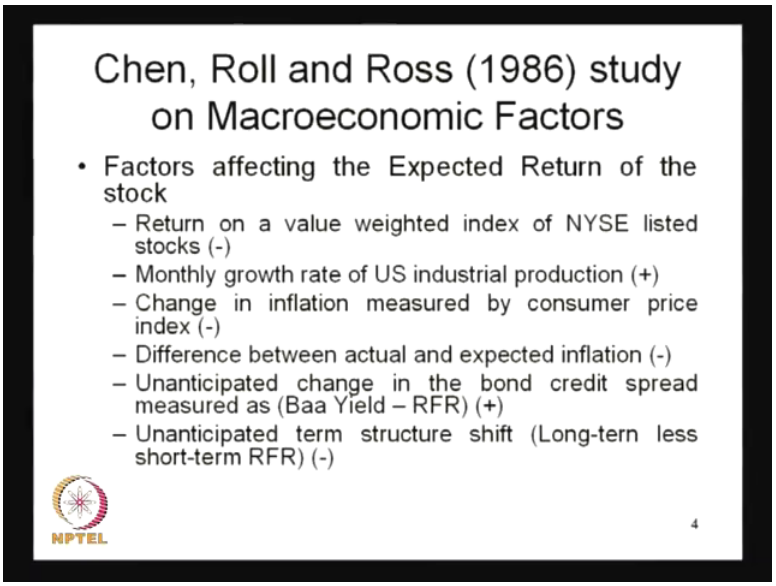

So, that is why they will have should have a positive impact on the growth rate of the economy positive impact on the stock return, then the change in inflation measured by the consumer price index. You just see, if your inflation rate will be more if your inflation rate will be more, then what we can say, that the system is losing or the economy has no price stability if there is no price stability, then what you can say, then the purchasing power of the consumer or the purchasing power of the people who live in this particular country will be going down.

If inflation rate will be more, the purchasing power of the consumer will go down or purchasing power of the investor will go down, then what will happen, then obviously, it will have the impact adversely to the market functioning. If the market will not function properly because of the destabilization of the pricing, then what will happen? It will have also the unfavorable impact on the stock return, although we are expecting that the stock risk inflation will be higher, the return also should be higher.

But what generally we are talking about here, that if your consumer price index, which basically the change in the consumer price index which is give you the inflation and whenever we see that inflation will be more, we are they are hypnotizing or they

concluded that it will have a negative impact on the whole stock market; so, obviously the return also will go down.

Then another factor they have incorporated that is the difference between actual and expected inflation, what do you mean by the expected inflation? It means, basically how we are expecting, how this inflation will grow up or what could be the inflation in the next period or next year that is basically expected. So, how we can measure it mathematically? We can measure it is basically the rate of change of this with respect to the time period if you want to measure the rate of change; this is basically your expected inflation.

But in general, how this inflation can be measured or how the expected inflation can be measured? Then one of the better proxy to use it for expected inflation is the moving average; moving average may be you can I use three years moving average of the actual inflation. So, if you already know that what do mean by the moving average, it is basically giving the different weight age on the basis of the time period and accordingly if you see that, the expected inflation can be measured through this three years moving average, then what this particular and if you establish one to establish the relationship between the expected inflation and the return of the stock.

Then what you will find if your expected inflation will be more, then the investor always feel that I should get more return in the future why it is because that, if the expected inflation will be more, then the risk level of the economy will be more, because the real rate of return in the economy will go down.

So, in this context, if the investor assumes or predicts that the expected inflation will be going to be higher in the next year or the next period, then what the investor will feel that, if he really wants to invest in the market then he will reduce his or he will always expect that the return also should be higher because there is a probability of reduction of the real rate of return in the next period.

So, therefore, if the his expectation will be there expectation will be more in terms of the inflation, then he will should pre-assume that the return also should be in the same direction. That means, what here we are trying to see, if we I assume that or the investor assumes that the expected inflation will be more in the next period, then he should expect

that the return also should be more in the next period, because he is going to take more risk because of the reduction of the real rate of return in the next period.

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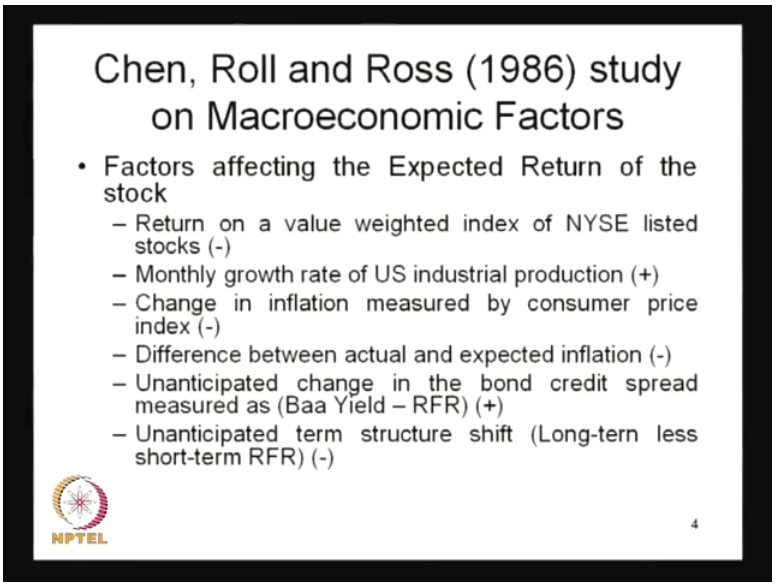

But here what this Chen and all has taken that the difference between actual and expected inflation, for example, here actual inflation was five percent and the expected inflation was six percent, then the difference between actual and expected is minus one percent, that means, what basically here they talk about that, if there is a big gap between actual and expected, then the predictive power of this particular model will be less.

So, there is that leads to more uncertainty; if that leads to more uncertainty, then it will have the adverse impact on the stock return. So, therefore, if you take the difference between actual and expected, then what you will find, it basically this impact on this stock return will be adverse or it will have negative impact on the expected return of the stock, then they have taken also another thing that is called the change in the bond credit spread what basically the credit spread means.

It is basically talks about the default spread which is again sometime we use different measures to measure the default spread what we talk about the default spread? It is basically the risk premium that means, whenever what do we mean by the risk premium, whenever we take more risk in the market, we should also assume that the return also should be more.

So, in this context what we can say? If you assume that I am going to take more risk in the market, then obviously, the premium also should be more and already in the previous classes, we discussed these things that always this premium is about the risk-free rate of return. Because the risk-free rate of return is basically the minimum return what the investor can get without any kind of risk, because he assume that if some investor will take more risk, the return also should be more.

So, in this context what you can say? Once we say that if the spread between the yield or the bond yield and the particular risk-free rate will be more, then what we can say that also the return also should be more; that means, the premium also if premium will be more, then the return from the stock market should also will be more what do you mean by the bond yield? If you read, that it is basically nothing but whatever return or the market interest you are getting from this.

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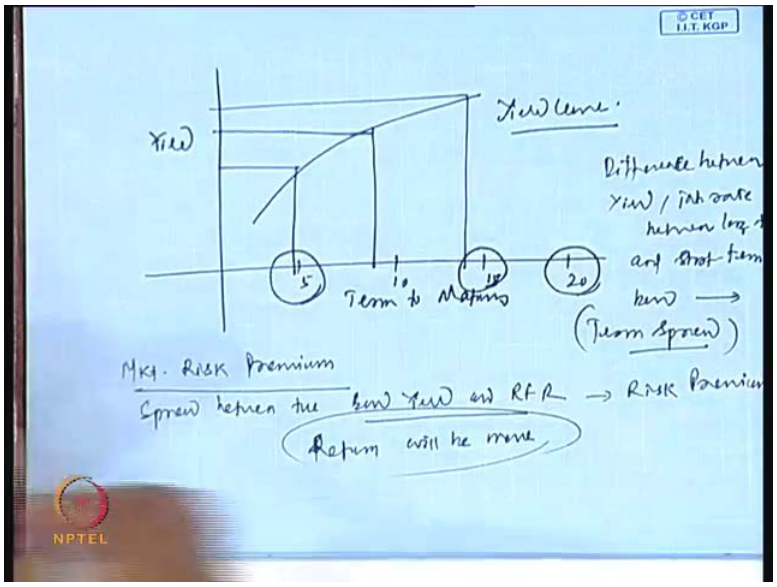

So, if this is your term to maturity and this is your yield, then if your term to maturity will be more, that means, it is a 5 years bond; this is a 10 years bond; this is 15 years bond; this is a 20 years bond.

Then what we can assume, that the particular case always the if your term to maturity will be more, then your yield also will be more, that means, this particular curve is

basically defined as yield curve which will discuss extensively later. How this yield curve can be explained?

But here what we are trying to say that, if your market risk premium or we can say that the spread between the bond yield and RFR. Basically, that means, the difference is basically the defined as the risk premium and when there is premium will be more, when the return also would be more and you are expecting that this part will have a favorable impact on the expected return of the stock what we are going to get from the market. Then another factor they have taken that unanticipated term structure shift that is your short term versus the long term, that means, your long term return minus the short term return; that means, you talk about a bond, let there is a bond of 20 years yield or 15 years yield; there is a another bond which is a five years yield.

The difference between difference between the yield or the interest rate between the long term and short term short term bond is basically, we call it the term spread and what here this Chen and all were trying to explain that, if this there is earn, there is anticipation, there is expectation between the change of this short term and long term interested differential, then also it will have the impact on the stock return.

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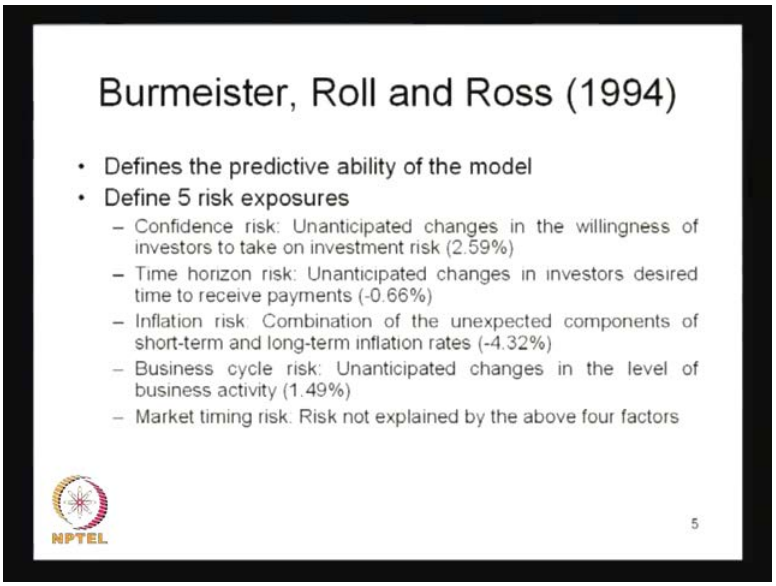

And according to them, it will have a negative impact or the inverse impact on the expected return of the stock, then another study has famous study done by the

Burmeister, Roll and Ross in 1994. In between also, the other people who are trying to explain those studies in the various ways, but here the Burmeister, Roll and Ross was trying to explain the study and their study basically talks about the predictive ability of the model.

What do you mean by the predictive ability? That is basically related to the good specification or actual and correct specification of the model and how far the model is correctly specified and how far really the model is trying to explain the variation of the expected return of the stock in the different time period. What here we are trying to say if your model is correctly specified, that means, the predictive power of the model is quite high, then all those factors which have been taken into consideration to explain that particular model will always give you the favorable results or this can be used in practice to take the investment decision in the market.

So, here what this Burmeister and all were trying to explain, they said that instead of talking about the different individualistic character of the different factors, we should talk about the different risk exposures or different risk factors which could have the impact on the expected return of the stock.

In this context what they did? They have identified different types of the risk. So, this is basically the model which is based on the different risk factors, how those risk factors can effect this expected return of the stock in the different time period that was generally the Burmeister and all was trying to explain, then a first factor they said this is the confidence risk and how they have measured this confidence risk, this is the unanticipated changes in the willingness of the investor to take on investment risk.

You see this is very interesting factor what this Burmeister and all were trying to include trying to include in their model. It is basically what the Burmeister was trying to say that the investors confidence on the market is most important factor, which can explain the expected return of the stock. That means, if today's scenario, if you could have assured that most of the regulators and most of the investors and as well as the government was trying to explain the two factors or two concepts always, they always talk about the consumers confidence and as well as they talk about the investor sentiments.

That means we can say that the Reserve bank of India is most concerned about the consumer confidence and the semi people is talking about the investor's confidence or investors sentiments what it basically talks about, that it talks about that how far the investor or how far the consumer has confidence on the market and how he can rely on the market, that if, he now should takes the position in the market for the investment, then his return will be maximized.

So, that is the issue what the Burmeister and all was trying to include in their model defining the concept of the confidence risk and they said, they have they have found that this particular factor, the confidence risk is basically affecting your expected return largely.

That means the coefficient they found that is 2.59 that means, to increase the expected return of the stock by 1 percent, they have to increase your business confidence by 2.59 percent, that means, it will have a greater role to determine the stock return and it is also statistically significant.

That means here we have what we are trying to say above all the factors what we are trying to explain, which could have the impact on the stock return out of them, one of the factors is maybe, it is it is basically subjective or psychological factors, but still it is one of the factor most important factors which talks about the determination of the expected return in a particular time and that is your business confidence risk or we can say that confidence risk only which have a positive impact if confidence will be more, then the return also will be more.

Then the time horizon risk, it is basically the unanticipated changes in the investors desired time to receive payments. You see in the market, there are different types of investor; some investor wants to gain in the short run, some of the investor investors who are trying to gain in the long run.

So, the basic objective of the investor always varies from time to time on the basis of their time horizon or on their basis of their investment holding period. So, if and that investment holding period or the time horizon varies depending upon the investors objective, investors appetite towards the risk or appetite towards the investment.

So, here what they found, if investors wants to when investors wants the money or when the investor wants to realize the return what he is going to get from the market, if an investors wants to realize it in the long period and another investor wants to invest in the short period, those factors will have the impact on the expected return of the stock.

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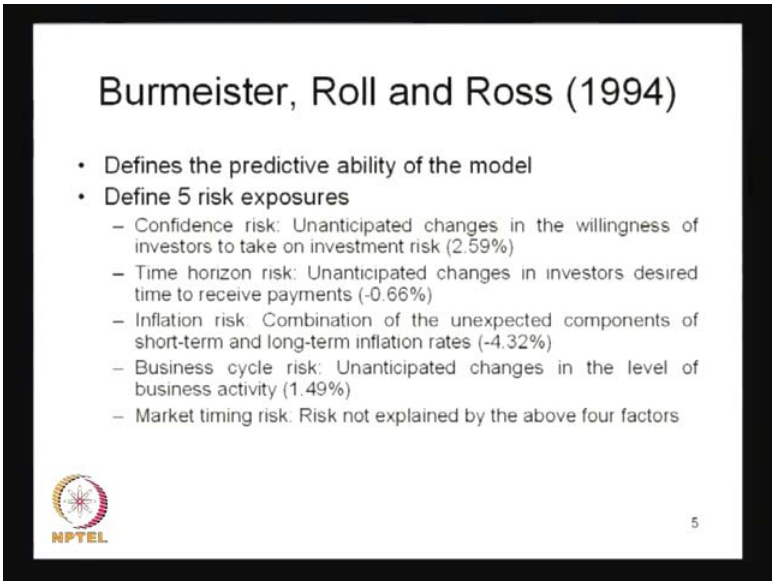

That means the expected return will be more here and there is a unanticipation of the changes, because they cannot know if their change of the time horizon will be very much uncertain in nature, then it will have a negative impact on the expected return of the stock. But if the investor is very much sure from the beginning that what is his time horizon and what is this investment holding period and how this investment holding period he wanted to utilize it in the market and under what circumstances he always wants to invest it in the market. Then what will happen that, always the return also will be maximized in that direction, because the strategy the investment strategy what is going to adopt to maximize, the return that basically he can do from the beginning.

But if he is very much uncertain that what is his holding period and when he wanted to get this return or when he wanted to realize this return, then it will have the adverse impact on the expected return what he is going to get from the market, then another risk they have included that is called inflation risk it is a combination of unexpected components of short-term and the long-term inflation rates.

What basically here we talk about they said that sometimes some of the people said if the inflation rate will be higher in the short run then the return from the market will be different if the inflation rate is expected inflation rate will be more in the long term then the particular return will be different or the expectation of the investor will be different.

To to overcome all these problems what this study was trying to show? They have combined both the short-term and long-term interest rate sorry long-term and short-term inflation rate and what they found? They found that they these particular factors will have the negative impact on the expected return of the stock.

That means if inflation risk will be more, the return or the expected return of the stock will go down, that means, they also found very high elasticity between these two that is around 4.32 percent, which implies that to change this 1 percent of stock return to increase the 1 percent of the stock return, they have to reduce minus 4.32 percent of the inflation risk in the market, which is measured by the combination of the unexpected components of the short-term and the long-term interest rates.

Then another factor they have included that is called the business cycle risk and already I told you that business cycle is the one of the core factors, one of the very important factors which always affect the expected return of the stock means always if there is a boom, we are expecting that our return will be more whenever there is a recession, we are expecting that return will go down.

So, looking into these things, they have incorporated the business cycle risk into their model and they found that, they will it will have a positive impact on the expected return of the stock, then the market timing risk basically what they talk about market timing it is a very important concept into this modern finance literature what this market timing talks about if you say the example from the various company prospective what we can say that they refer that if your timing is good your return will be good does it it does not necessary that the other factors also should be the favorable in that time.

So, what do you mean by mean by the timing or the market timing; that means, if you in the layman perspective you want to define this market timing the market timing is nothing, but it basically talks about the actual time or when is the good time to issue the stock and which the good time to repurchase the stock.

So, what generally we talk about here whenever the price will be higher they will issue the stock whenever the price will be lower we should repurchase the stock that is the company's prospective always we talk about, but here if you observe that how can you identify this timing this timing can be identified by various ways, but it is very difficult to identify this time. So, that is why what this study was trying to show after inclusion of all the variables, whatever remaining error terms are there according to them that incorporates the market timing risk.

If there is a in anticipation or there is we can say that it is not predictable that the timing when the timing will be good when the timing will be bad in that particular situation what we can say that we should always expect that this particular factor should be incorporated into the error term or the particular variables or the particular explanatory power what the other four risk factors do not have those factors can be explained by the market timing risk

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Then the other factors Macroeconomic factors what basically affects your stock return that is your Monetary policy and stock return because we know that we know what is the instruments of the monetary policy the instruments of the monetary policy are basically the money supply and if you increase your money supply then there is excess liquidity will be will be available in the market or we can say to increase the money supply they have to reduce the interest rate.

If they have to reduce the interest rate the investment opportunity in the market will be more or the more people will be investing and that is why what will happen or the cost of borrowing from the corporate prospective also will be lower. So, in that context what you can see that it will have a positive impact on the expected return of the stock. So, in that way what we can say any of the policy variables or any of the macroeconomic variables what generally affect the stock return that based on the different policy variables like your money supply.

Through this different channels it will have the impact on the expected return of the stock it may not be directly affecting the expected return of the stock, but basically there are various channels through which these factors can affect the expected return of the stock in different time period. So, another variables that is why we have taken that is the change in interest rate and the stock return because what we have observed that if the interest rate will be more the return will go down because the investment will go down and the cost of debt also will be more for the companies.

But the change in interest rate will be in the downward direction we are expecting that the expected return of the stock also will be more then another factor we have that is your industry dynamics in the stock return what do you mean by this industry dynamics in the stock return industry dynamics is basically talks about the average return of the industry most of the companies what they do even if they do not have any typical or particular investment philosophy they always try to follow the industry for example, you talk about the manufacturing industry and there are may be ten thousand companies coming under the manufacturing industry and if you assume that one company is not following any kind of actual policy or actual kind of investment strategy.

What basically they do they basically always follow this particular how much is the average return what the industry is going to get in the future or what the investor what the industry is is getting now.

So, they'll be targeting that and without any kind of complexity they always follow the industry. So, that is why what generally we can say most of the people follow this industry average that is why the industry average will have impact on the expected return of the stock of a particular company and sometimes also what we found that the strategy of the different companies from different industries are different.

For example, one company is operating in a service sector another company operating in the manufacturing sector, then their investment philosophy or the investment strategy will be different and here why this investment philosophy or investment strategy will be different it is basically because of their industry dynamics.

That means if this particular companies who are trying to follow this particular industries average or the industry characteristics on the basis of their customers on the basis of their buyers and sellers will be different then accordingly the return or expected return of the stock also will be different. So, therefore, some models also we are trying to explain the industry dynamics is one of the factors which can affect the expected return of the stock in these multifactor models.

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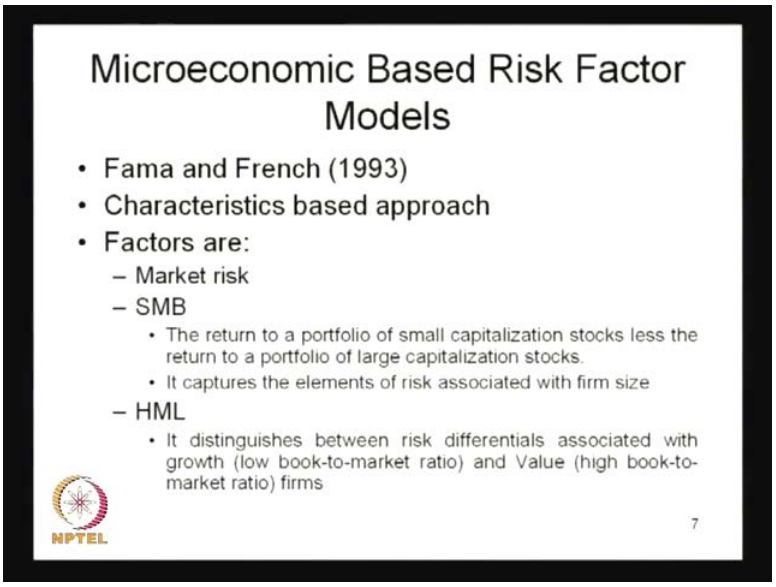

Then coming to the microeconomic based factors, already told you these are the factors which are basically company specific or the we can say the particular factors which are specific to the company, but it is it may not be available to other companies where what we are talking about it is restricted to individual company itself.

In this context, the one of the famous study is Fama and French have made 1993 what they have done? They have identified three factors which could have the impact on the expected return of the stock.

The three factors are one factor is basically market risk, which defined as the beta. Already we have explained about the beta extensively, whenever we discussed about the capital asset pricing model and according to Fama and French beta is also a factor which is and beta of the company varies from company to company depending upon their sensitivity towards the market return.

So, this factor also play the significant plays the significant role for determination of the stock return at a particular time, then another variable they have included that is your small minus b in short we call it SMB; it is basically measured as the return to a portfolio of small capitalization stocks, less the return to portfolio of large capitalization stocks.

So, what generally here they are trying to explain, they are trying to explain that how the firm size is affecting the expected return of the stock a burns. In a famous study in 19 taken the data from 1926 to 1986 what they found that always in USA, this small size companies performs better; that means, if your size is small, then the performance of the particular company or the expected return of the stock will be better.

So, in this context, fame was trying to incorporate that size effect in this particular case and they concludes also they conclude that, in the study concludes that the expected return of the stock is also determined by the size of the companies.

That means the size of the company play the significant role for the determination of the stock return in a particular time, then they have taken another variable which talks about HML, that means, your with they talk about the in this context, they talk about the high minus low.

What basically it basically talks about that, it distinguishes between the risk differential associated with growth and value firm, that means, if the literature if you talk about, there are two types of broad companies; we have one is growth firms and another is value firms and those are measured by the fame in using the book to market ratio of the particular company.

In according to fame, the growth company have low book to market ratio or we can say high market to book ratio and the value companies have high book to market ratio or the low book market to book ratio; that means, they said or the study says that the value

companies always performs better in the market or the expected return of the value companies will be more in the market. It is because that the value companies have more potential, they have the opportunity, and they have the growth potential to grow further.

But if the growth companies case we talk about the growth companies, growth is already taken place that means, what we can say? Already this this particular companies have been realizing this high expected return from the market. So, again further increase of the expected return may not be possible for those companies, but if you talk about the value companies, they are still in the undervalued level and there is an expectation that the future opportunity growth opportunity of this particular company will be more. So, that is why they can perform better in the market.

So, in general, if you talk about fame has Fama and French, they have tried to conclude that, try to say that the factors which affect the expected return of the stock is basically the market risk, then the size of the company, then the nature of the company like your whether the company is a value company or it is a growth company which is measured by the market to book ratio and the market to book ratio is basically the proxy what we use to know the growth opportunity of the company in a particular time framework.

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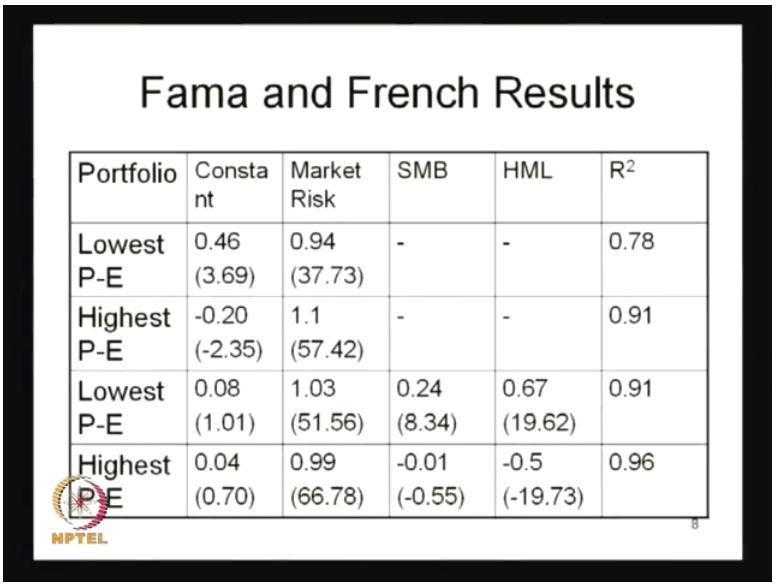

Then this fame's result if you observe that, fame has taken two portfolios: one portfolio they have taken this particular company which have low price-earnings ratio; another portfolio, they have taken that which has the highest price-earnings ratio and whenever they have taken only the market risk like your capital asset pricing model, what they found, that the market risk is quite significant. The explanatory power of the model also the quite high or the goodness of the (( )) of the model is quite high from these R square values.

And what Fame and French has found that, it is 0.94 and 1.1 is the beta what this particular case on the basis of the lowest P by E and highest P by E companies.

But whenever Fame and French have included this, another two variables like your SMB and HML what they found that, again these two variables also are highly significant, because the bracketed values are basically the t statistics and these are the regression coefficients and if you observe these are quite high econometrically, if you're you know that these variables are it itself shows that these are quite significant, but whenever the they talk about the highest p price-earnings ratio, they found that these factors is not significant; that means, the size may not be a significant factor for the companies which are in highest level of the price-earnings ratio.

But again the market risk and the HML are significant factors which could have the impact of the expected return in a particular time and if you see the beta values for the lowest P by E, this ratio companies it is gone up from 0.94 to 1.03 and for highest P by E ratio it is gone down from 1.1 to 0.9 and here in the lowest P by E case, this size of the company will have the positive impact, then the HML we have the positive impact for in this case both the variables have the negative impact.

So, the results has been varied; the result varies on the basis of the sample what this fame and French was trying to explain, but after all they have discovered that that the with the market risk size of the company and the growth opportunity or we can say the whether the nature of the company will have the impact on the stock return, then the other people have try to extend this model a then fame's model basically we call it the three factor model, but after this because they have taken the risk factors into consideration while deciding that which factor affects the expected return of the stock.

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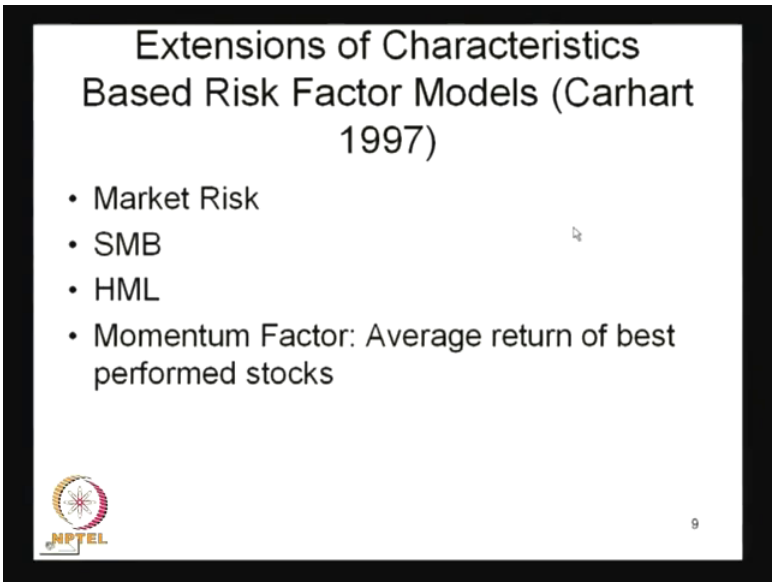

Then finally, this Carhart in 1997 have taken another study which is extension study of Fama and French and they have included another factor which is your Momentum factor. What do you mean by this Momentum factor? This is basically, the they have taken this average return of the best performed stock, that means, what according to their argument what they are trying to say if one stock is basically performing better in a particular time period, the same momentum will carry for what for the next period, because all of sudden the momentum may not be lost by these companies .

So, that is why we are expecting that high performed company will perform better and the low perform companies will not perform better in the different time framework. So, in this context what we are trying to say that, always we should say that the momentum is also to significant and it is also understandably correct that the same momentum sometimes goes on whenever we deal with the equity market for the different reasons.

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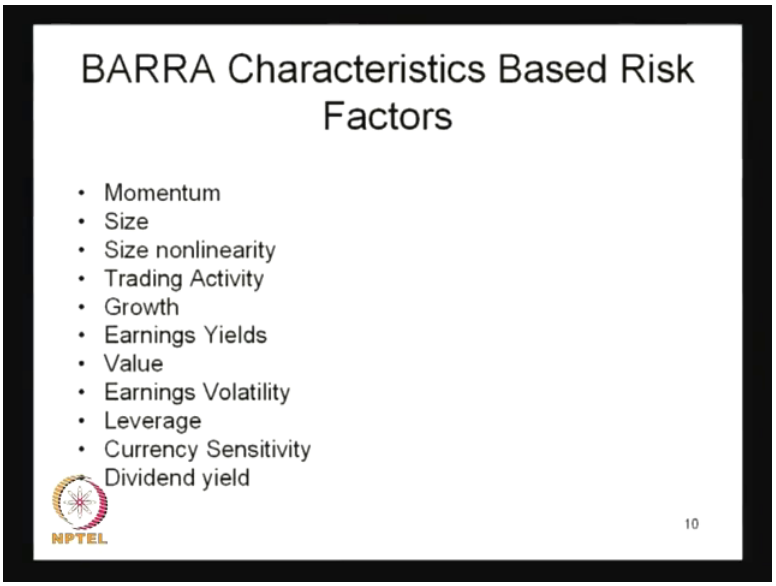

Then if you see that, this consulting company like a Barra, which talks about the different risk factors and this is very extensive factors or very comprehensive factors they have identified, which could have the impact on the stock return; they have incorporated momentum, they have incorporated the size of the factors or size of the company as one of the factors, then to test whether the size is linearly related or nonlinearly related, they have taken this square of the size also into their model.

Trading activity trading activity means the particular stocks which are traded frequently, those have the more impact on expected return than the other stocks which are not the active traders in the market or they trading does not takes place frequently for those kind of stocks; then they have taken the growth growth which is basically talking about the growth of the total assets or growth of the total yields. If the growth rate will be higher, then we can expect that they will have the different varieties of impact on the stock return.

That means sometime we assume that the growth company or we can say if the growth opportunity will be more, then it it will stock will perform better, which already it is the growth will be already more than it is not expected that the stock will perform better.

Earnings yield will have the impact if the high yield companies may not perform the expected return from this; may not be high in the future if the market value, that means,

it based on the market to book ratio. Already I told you that, if market to book ratio is higher, this is basically growth company; if market to book ratio is lower, it is a value company that means it has the steel potential to grow further in the market.

Then the volatility which earnings volatility which basically talks about the risk of this particular company, if the earnings will be more volatile for the company, then we conclude that it is a more risky company than the other companies. So, that is why we should be very careful for those companies, where earnings is highly volatile in the particular time, then we have the leverage; leverage will always have the impact on the stock return and it will have the different varieties of impact on the stock.

Sometimes we say that leverage is a good sign for the company; sometimes we say that high debt with a bad sign for the company. So, depending upon the time period, it will have sometimes the positive impact; it will have the sometimes negative impact depending upon what signals it sends to the market.

Sometimes the investor feels that it is a good sign recent financial crisis talks about the leverage is a bad sign because of the crises happen, because of the high debt ratio for some of the companies. So, like that in short term period also investor feels that if the debt equity ratio is quite high, then it is good for the company, because it has the credit potential. So, it is credit over the…. So, that is why it should have performed better.

Then the currency sensitivity, that means, your exchange rate, that means, we what we talk about multinational companies. So, they will play the significant role that, if the exchange rate risk will be more, the company may not perform better; but the exchange rate risk will be low, then the company may perform better; then the dividend yield basically dividend is also one of the factors which talks about the potentiality or how the fast the company is really performing in the particular market.

So, if there is a loss, high fluctuations in the dividend yield. So, that also sometimes sends to the bad signal to the investors and that is why the expected return may go down, but sometimes we we know the dividend theories that dividend always maintain the consistency. So, therefore, or there is a sticky nature it does not change very frequently, but still if it is changing, then it is a bad company to be invested in a particular time period.

So, comprehensively what we can say that, there are some macroeconomic factors or macro specific factors; there are some company specific factors and there are there are some policy oriented variables and as well as more specifically the micro unit factors like your size, like your profit, like your growth, like your momentum, like your individual risk level, etcetera or we can say that dividends and the leverage.

These are the most important factors or these are the different determinants, which basically decides the expected return of the stock in a particular time period, which concludes the the validity or the extensive or comprehensiveness of the multifactor pricing model.

Thank you.