**Security Analysis and Portfolio Management**

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**Module No. # 01**

**Lecture No. # 24**

**Capital Market Theory – II**

So, in the previous class, we talked about the capital market theory one, and here what we have observed that what we have seen that capital asset pricing model is the founding theory, which explains the concept of required rate of return or the calculation of required rate of return with certain assumptions, and here what we see that there are certain factors– there are certain variables, which basically, we should know or we should determine before using this capital asset pricing model to calculate the expected return of the asset or expected return of the equity.

So, if you see those kind of variables, and again, those variables are not exogenously determined. I hope you should know what is the meaning of exogeneity and what is the meaning of endogeneity. What basically we see that if exogenous means there is certain, or in general, we call it the independent variables, which is outside the system.

We can make certain changes with that, or it is free for the regulator and free for the investor; it is free for the authority to play with that particular database. At any moment, they can change it or they may not change it. But if it is endogenous, then we cannot change it without using or without changing some other variables; that means, in general, we can call it endogenous variable is nothing but that is the dependent variable. So, if this dependency is there, or to determine certain variables, if we need certain other variables, then it is very difficult to use that.

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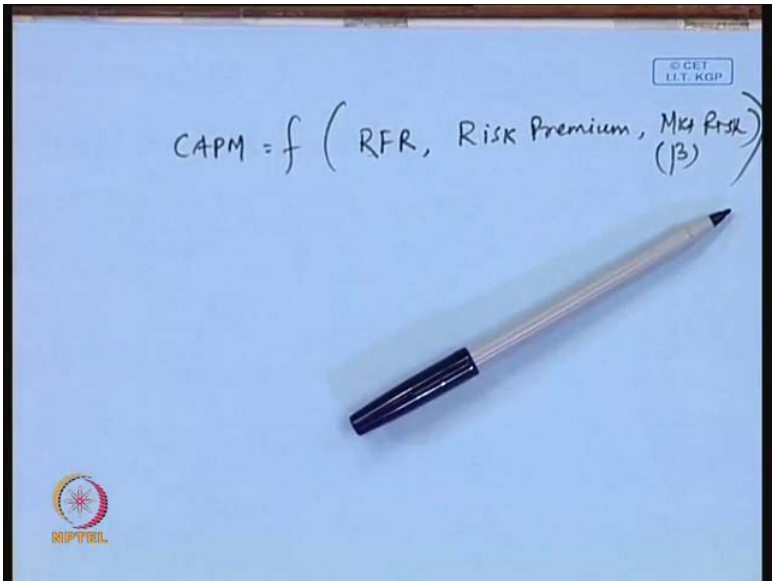


So, that is why whenever we use the capital asset pricing model, we have certain things which is used for to or used to use this particular model, and what are those things? And one thing is– already we have seen that is your risk free rate, then we have the risk premium. Then we have also the market risk, or we can say, beta the systematic risk beta or systematic risk, or any name you can give for this.

So, what generally we can see here that when we calculate this thing or when we use this capital asset pricing model, we should always know that what is the risk period of return and what is the better proxy for this, and how the risk premium can be calculated and how the beta or the market risk also can be calculated. If you know all these three, then only the capital asset pricing model can be used, but here, those are also not exogenously determined. There are certain variables. Again, determine these three variables.

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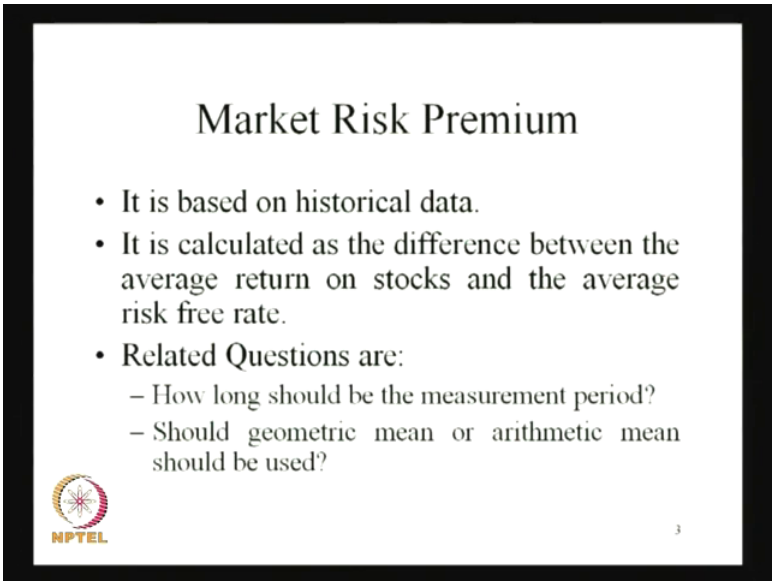


So, which are the things or which are the variables which operate this, and how these particular factors basically determined to use in… to be used in the capital asset pricing model to calculate the expected return of the equity or the stock. So, market risk premium– if you start with what is this– it is nothing but it is a basically, the extra return what the investor wants to take the risk in the market, because already we know that the there is a risk return tradeoff. If somebody wanted to take more risk, then the return also should be maximized.

So, therefore, whenever we talk about the premium, that means somebody wanted to take more risk in the market; that is why he needs more premium above this. So, any risk premium, basically, whatever we talk about, this is above the risk free rate of return what we always have without any risk, because the risk free rate of return is basically without risk. So, if you are taking more risk, the benchmark is always the risk free rate of return, because any return what exactly extra you are getting for investing in this particular asset, which is more than the risk free rate of return, that is basically the risk premium.

So, it is calculated as the difference between the average return on stocks into the average return from the risk free rate. Already, I told you that the… it is… that is why the risk free rate of return is the benchmark return, because without any risk, we are getting this much return. So, if you take more risk, then what should be the more return out of that? So, that is basically is defined as the premium, because we are taking more risk; that is why we were charging more premium.

What are the questions here that how long should be the measurement period? Should geometric mean or arithmetic mean should be used? How we can measure this? Because we said that this risk free rate of return, or we can say the market risk premium, is determined historically, then what is the period? How much should be the adequate period we should take to calculate this?

And whenever we are talking about the average, what kind of average we should take? Whether we should take a geometric average, or we should take arithmetic? Because once we take this different type of different technique to use or we always use the different techniques to calculate this average, then the results will be different.

So, that is why the confusion always comes to the mind of the investor in the practical world: how, generally, what can be the better proxy, first, to risk free rate? Then, once you decide what is the risk free rate, then whenever you talk about the premium, then how much premium data you should take? And once the data is also taken, then to average this particular data about the period, which kind of average we should consider? Whether it is a geometric mean or whether it is a arithmetic mean?

So, that is the questions always comes to the mind, but for your understanding I can tell that always the arithmetic mean is used, because that is easy to use and the measurement period basically depends on the availability of the data; more the longer period, more the accuracy will be there.

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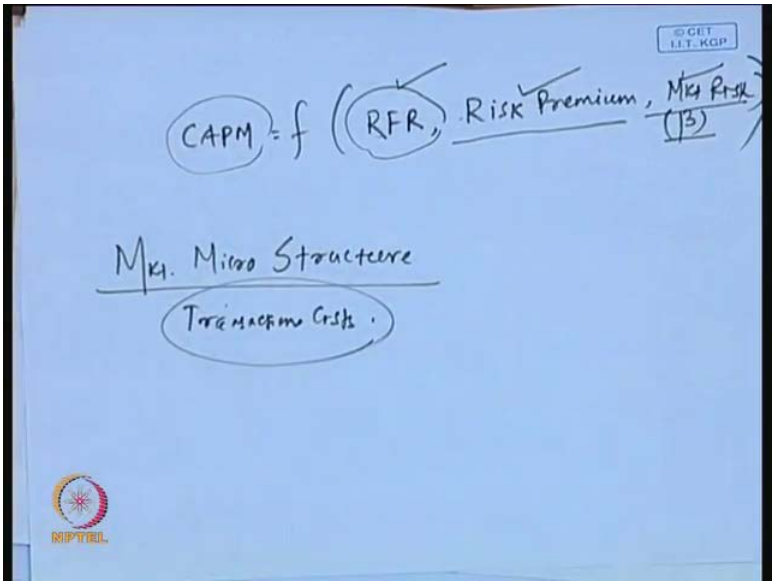


That is why what we can see, already I told you that the risk premium is basically endogenous variable, which is determined by the certain factors, and what are those factors? These factors are basically the variance of underlying economy, the political risk, and the market structure.

If you observe that the risk premium of a particular market– it totally, or we can say, in a larger extent, explained by a certain macroeconomic variables, which are those macroeconomic variables? The macroeconomic variables can be growth rate of the GDP; it can be inflation; it can be the international scenario, or we can say our balance– trade balance position– in the economy, or we can say it is the industrial production rate, or we can say it is the… even there are certain variables like, let if you talk about the commodity market and the rainfall is also a factor.

So, there are certain factors, who basically affect the risk level of this particular economy– change in interest rates, change in expectation of the people, change in the sentiments of the people. So, any particular variables which is the contributing factor of the variability of the market, either it is inflation or the price stability or it is growth rate of the GDP, or it is anything else that basically seeks that how much risk the economy has, now, and how much risk the economy is going to face.

So, if those variability are more in terms of the macroeconomic sense, then what will happen that automatically, the investors will always feel that once we are operating in a risky environment, the premium also we should get more. So, once their expectation is

there to earn more premium, because market is volatile– because economic scenario is volatile– then what will happen? Automatically, The premium also will increase.

And another thing is political risk, which is a very much important factor for either from Indian context also, because if you do not have any political stability– if whole political instability is prevailing in the market, there is no such kind of uniformity in the policy structure, then what will happen that because of the different attitude or different policy making decisions by the different governments, the variability of the sentiments of the people will be changed.

If the sentiments of the people will be changed or the market scenario will be changed, and because of that, the international relationship in the globalized market also will be changed, then what will happen? The risk level of the economy also will increase. If again, the risk level or the risk appetite of the economy will again increase, then it is very difficult to again offer it in that particular environment, because it is… the environment is already volatile.

So, in this context also, the risk premium increases because the investors always demand more risk– more risk premium– because they are operating in a highly risky environment. Then the market structure– what do we mean by the market structures? You see that whenever you talk about the market structure, market can be a monopoly market; market can be perfect market; market can be very much efficient market; market can be inefficient market. So, here, if you observe your market is very much efficient, already we have explained what do you mean by the efficiency of the market.

For example, your market is totally efficient from the information point of view, then the confidence of the investor on that particular scenario will be more. If the confidence of the people or the confidence of the investor on the market will be more, because they assume that your market is an efficient market, then, maybe it will have the impact on the premium; they may not charge that much premium, because already, its return is assured from the beginning, because the risk level will decline if your market is more efficient.

But if your market is inefficient, then definitely, they will be expecting that this should get more return, because they are going to operate in a very uncertain market or

uncertain environment. If the uncertain environment we are going to deal with, so, in that particular scenario, what will happen that the return also will be varied.

Therefore, what we can say that always, the market structure has the impact, and another way already told you that if your market is a highly perfect market, everybody has the same information; all lot of buyers and sellers are available, and what we can see that there is no such kind of market force– there is no such kind of outside forces or external forces, which can regulate the pricing of the particular asset.

So, that particular… this is the typical characteristics of the perfect market condition. If your market condition is perfect– if you are operating in a perfect market condition– obviously, the confidence of the people or the investor will be more on the market. If a once they are more faith on the market, that means once their confidence level increases, what we have seen, the risk level also will decline. If the risk level will decline, then definitely, the risk premium also will decline because they do not want to get that much premium– what could have been there if your market is more uncertain. Therefore, we can say the market structure is also quite important.

And another observation– nowadays, people talk about that we call it market micro structure. What do we mean by this market micro structure? The market micro structure is basically deals with the transaction cost. You see that this is also one of the contributing factors for the risk level, and as well as the total cost, what the particular investor is going to face, and another way also we can say it is basically nothing but it deals with the (( )) spread of this particular market.

So, if the transaction costs are quite high, and when the transaction cost will be quite high, when your market will be inefficient? When your market will be inefficient, we know that the market will be inefficient when there is a huge information gap between the different stake holders in the market.

So, if there is a huge information gap that leads to increase this inefficiency in the market, and that inefficiency increases the transaction cost, if that increases the transaction cost, automatically, the (( )) spread will increase. Then, automatically, it will have the impact on the risk premium.

So, therefore, what we can see, sometimes, because of this uncertainty in the market– not only in the equity market, but also in the bond market also, if the investors are ready to invest in the bond market, because of high inefficiency in the market from the information point of view, or because of the huge information gap between the different stakeholders or different people or the different participants in the market, then it also affects this interest rate or label in the market.

If once the interest rate will be affected by that, then what will happen that automatically, the bond price movement will be there. If the bond price movement will be there, the people or the investors who want to invest their particular money into the bond, their appetite, their sentiment, their confidence also changes because of the high fluctuation in the interest rates.

In that scenario, what will happen that what or what we can observe that always, that will have the impact on the risk premium. These are the different characteristics or different functions which basically affect the risk premium level, and if you observe the different literature, most of the literature talks about that the risk premium varies from country to country; risk premium varies from economy to economy, depending upon their political stability, depending upon their market efficiency, and as well as also the some of the issues related to the economic variables, fluctuations.

You just take the example of the subprime crisis. Because of the subprime crisis, the risk (( )) of the particular… or the risk appetite of the investor, basically, is affected by that. How it is affected by that? But investor feels that now the market is more risky. If they are going to invest in the more risky market, so, obviously, the premium is not that much higher; they will not be investing in the market. If they will not be investing in the market, then what will happen? This price level will be unstable, which is happening in the USA and other countries, even including India.

What we have observed that because of that crisis in the market, it will have the larger impact on the different market, including the equity market or any other market. Therefore, what we can say, the major factor who affects this risk premium is related to the macroeconomic factors, or the factors which is varied on the basis of the economic sense or from one economy to another economy.

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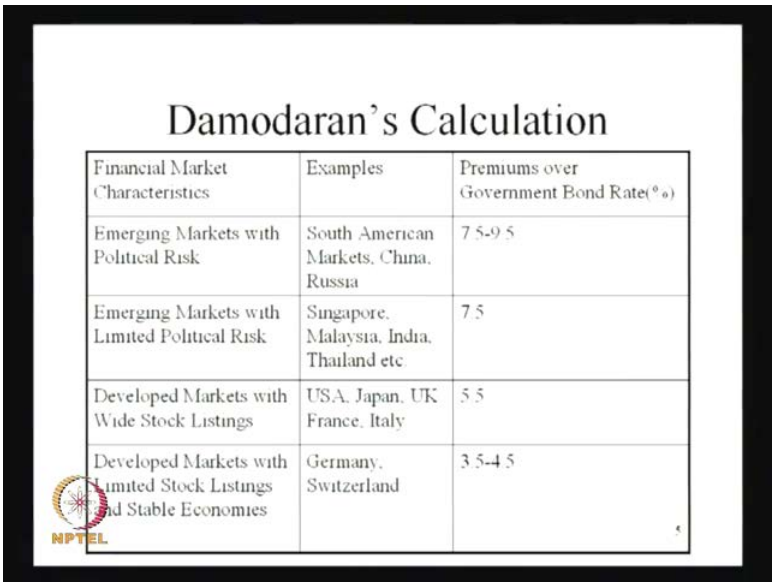


So, therefore, it is for your reference: what you can see here that there are certain calculations was… Professor…, Professor Damodaran has calculated here. If you observed that he as calculated that the emerging markets with political risk, they have seen that that South American markets and China and Russia, if you observe, they have premium around 7.5 to 9.5, and this calculation is based on the difference between the return from the risky return, return from the risky assets, and the government bond rate.

Then, then we observed the emerging markets with a limited political risk– Singapore, Malaysia, India, Thailand. Then, we have around 7.5 percent– this date is basically 2000, 2003, whatever we talk about. Then the developed markets, with the wide stock listings like USA, Japan, UK, France, and Italy, because their market is quite efficient in that way, and as well as also, they have more number of companies in that listing process and there is less information gap between the different stakeholders of the company.

So, here, if we observe, their premium is around 5.5 percent. For the developed markets with the limited stock listings and stable economies, like Germany and Switzerland, and there, it is around 3.5 to 4.5 percent. So, if you observe that wherever the political risk will be more wherever the information gap will be more. There, the… you will observe that the risk premium also will be more, but wherever the political risk will be less, the information gap will be less, and as well as what we can see that what we have observed that… that the income variability of the country, and as well as the other economic

variables like inflation, then the… we can say industrial production, agricultural production, etcetera, are more or less stable. In that countries, also, the risk premiums are less.

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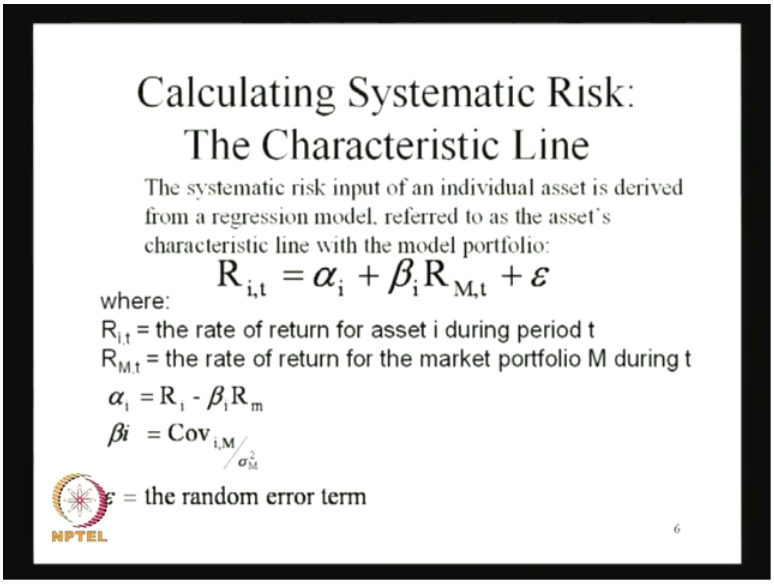


So, therefore, it is one of the major concerns for any economy to know that how the risk premium is calculated, or which are the factors which affect the risk premium. So, the another variable– already I told you that– that is your market risk, and the market risk, or we can say that the systematic risk what we talk about, you see that systematic risk is measured as beta; beta is equal to your systematic risk.

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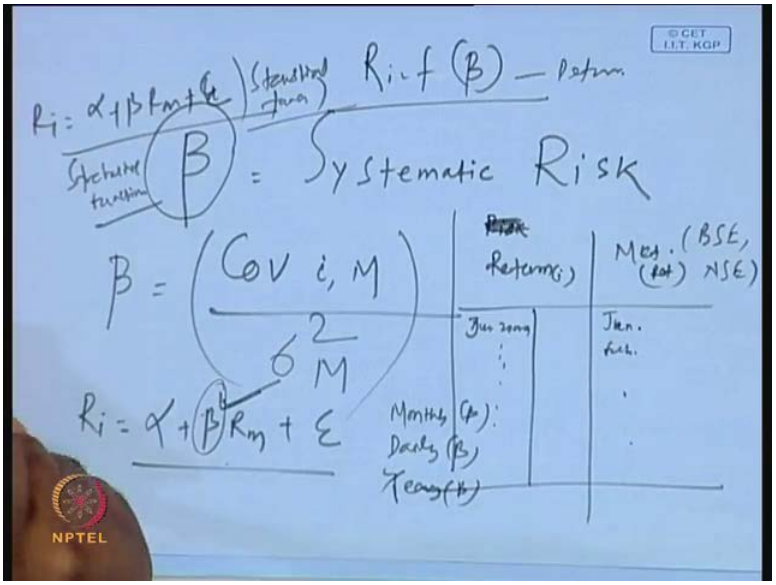


If beta is equal to your systematic risk, so, then what we can see here that what– how– this beta can be calculated. Already, what we have seen that beta is calculated in this way that covariance between the individual stock with the market portfolio divided by the variance of the market; this is the way, basically, we can calculate.

But basically, what we can see the– easiest way of using this is, generally, is also take the return from the stock– individual stock's return– return i. Then, this is your market return. So, if you have the column of data, for example, you are taking data– monthly data– January 2009, February, March, April, like that– and here also the market return, you can say either BSE Sensex or NSE Nifty– these are basically the different proxies that you can use to calculate the market return.

So, here, if you also take this– January, February– like that, then you run this regression between these two, defining this model which is defined as a your R i is equal to alpha plus beta R m plus epsilon. So, here, the coefficient what you are going to calculate, that is nothing but the beta. So, if you are taking this monthly data, we call it monthly beta; if you take the daily data, we call it a daily beta; if you talk with yearly data, then we will call it yearly beta.

So, like that, what we can do? You take this function in this manner, and if you observe this function in this manner, then gradually, what will happen that it will give you whatever coefficient– regression coefficient– you will derive from this, that regression coefficient will give you the beta.

So, here, in this case, this particular model or this particular function what we have specified or what we have specified to derive this beta, this particular function is defined as the characteristics line. So, here, the systematic risk input of an individual asset derived from a regression model– already I told you– referred to as the asset characteristics line with the market portfolio.

So, this is your R is equal to alpha plus beta R m plus epsilon, and epsilon is the error term what always we take in the statistical function, because we cannot incorporate other variables, which which affect your return from this particular asset. So, basically, the u or the epsilon, which incorporates the particular factors, we do not… we do not consider in the model. So, this is the way the function is different from a mathematical function.

If you want to derive it in a mathematical function, basically, R i is a function of beta, which is a mathematical function. But if you talk about R i is equal to alpha plus beta R m plus u or epsilon, then this particular function is a statistical function.

And statistical function, basically, is a… we can say, or mathematical function is a deterministic function, and statistical function is basically a stochastic function. Mathematical functions are always deterministic; it has a definite answer. But statistical functions are basically not deterministic; it is a stochastic in nature, and the difference on the number of variables, what we are incorporating in this case, and the particular variables, which we could not incorporate in this case, that will be reflected in the (( )), what we have taken in the end.

So, your alpha is equal to R i minus beta into R m. So, basically, this is the excess return what we are going to get, or this is the intercept always in our line, because this is the line always we draw in this case.

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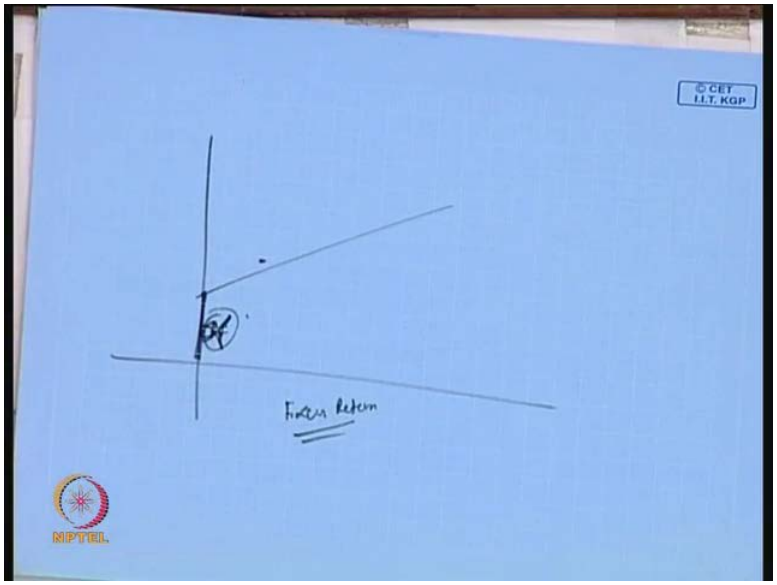


So, if you talk about this line, so, this is your… this part is your R f, or we can say, this is your any line; this is your alpha– the excess return. So, and already, already, we have seen this particular equation before, whenever we talk about the security market line.

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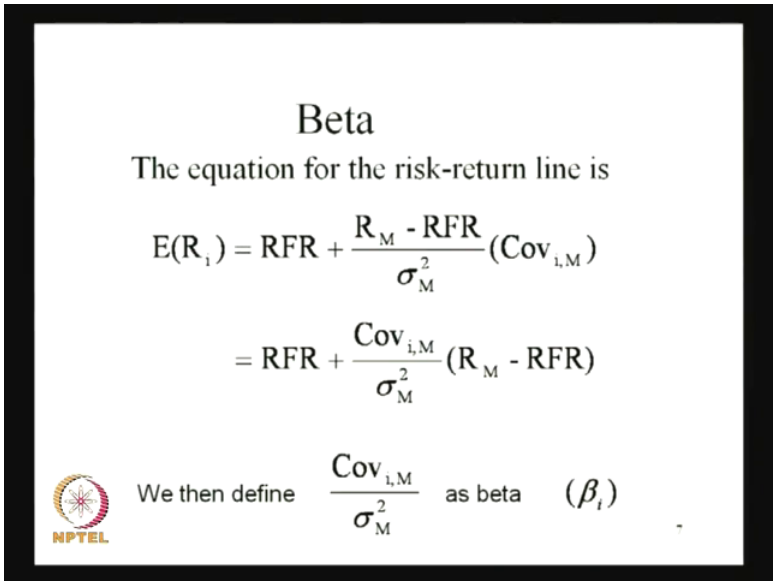


So, here, this particular beta equation is nothing but this is the risk rate of return, plus this is your… this covariance i, M, divided by the variance same that will give you the beta; R a minus R f will give you the risk, sorry, market risk premium; then, this is the beta. This way, this is calculated.

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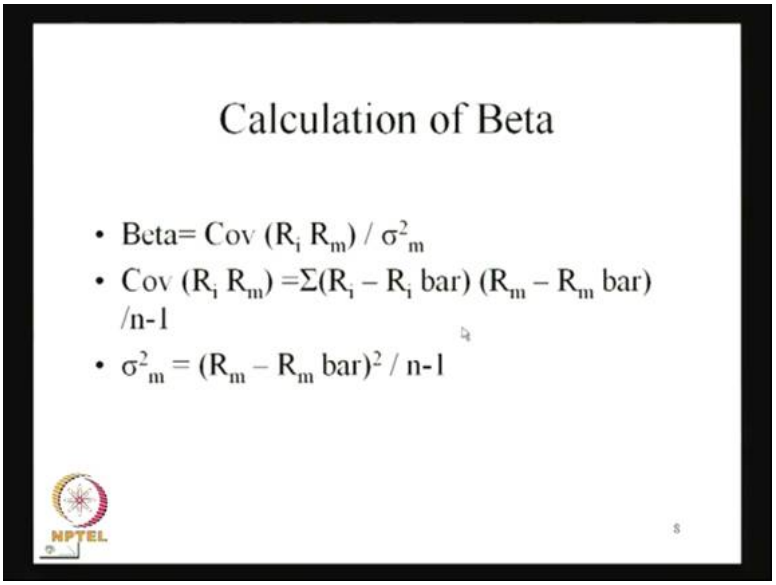


Now, what is the core audience– R i and the R m. This is…, already we know that is the summation of the R i minus R i bar. R i bar is nothing but the mean of this expected, sorry, return from this particular asset, and R m bar is nothing but the mean of this return, what you are getting from the market portfolio, divided by the n minus 1; n minus 1 is the decrease of (( )).

Then, this– this is your variance; this is basically R m minus R m bar R m bar. Already, I know I told you that this is the mean of the average of this particular market return divided by n minus 1. Then, if once this thing will be calculated, this thing will be calculated; this also will be calculated, but the best way of calculating beta is calculating this using this regression line.

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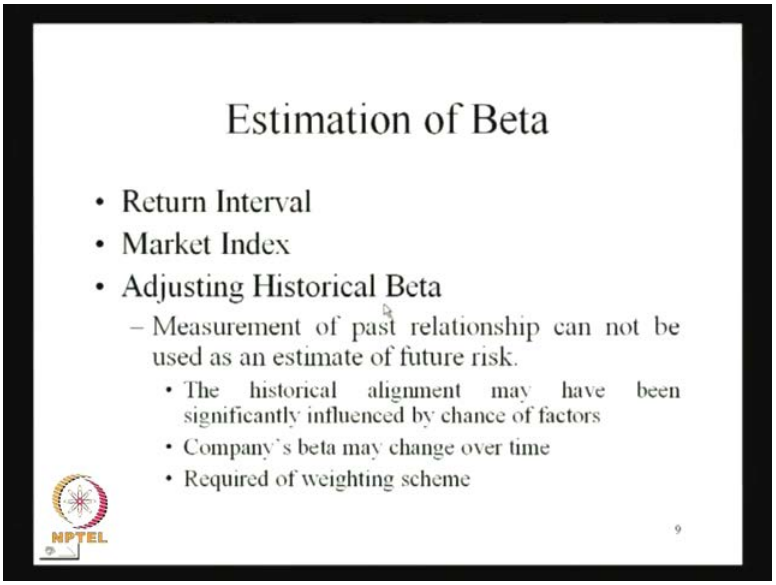


Then how this estimation of the beta is done? There are various practical issues. Already, I told you that you take this one column, you take the return from the asset and another column, you take from market return, and you have on the regression between these two, and whatever regression coefficient you will have, that basically calculates the beta of this particular stock.

But there are certain practical issues involved in this case; what are those practical issues involved in this case? That first of all, what is the data? How you can calculate this data? What is the period of study, and how much interval you should take; whether we should take a daily data, or we should take monthly data, or we should take fortnightly data, or we should take yearly data– that is the fundamental question always comes to mind of the investor, that what should be the return interval? The interval should be either daily or monthly or quarterly.

Then, next one is the market index– which index we should use? In India also, whatever we have– we have BSE Sensex; we have NSE Nifty; we have other also other indexes, whatever we have, but here, the question arises does those indexes really reflect the market portfolio or out of this six seven indicators whatever we have which indicator is the best indicator. So, that confusion always there in the mind of the investor– what particular market index will be used for the analysis to calculate the beta.

And second question is the fundamental question– already, what we have raised that out of these four, five indicators, which one is the best? That is number one. Number two:

whenever we use those, either of these five, six indicators, which one, whether really is the best indicator of the market portfolio, and does this all these six indicators, and out of these six indicators, any of them is really reflecting the market portfolio?

So, these are the fundamental questions always comes to the mind of the investor in practice, whenever they calculate the beta using this– a regression concept– or using any of the formula based way, through which always we want this variance of the market portfolio as well as the return of the market portfolio.

Then, another one is your adjusting historical beta– what do we mean by this adjusting historical beta, because sometimes the measurement of past relationship cannot be used as an estimate of future risk. The historical alignment may have been significantly influenced by chance of factors– company's beta may change over time required of weighting scheme.

You see, these are very important points, but just see this particular case: we are using the return of a particular stock or we are using certain things to calculate the beta historically, but the companies, or what we talked about the unsystematic risk of the company, varies from time to time.

If the unsystematic risk of the company will be varying from time to time, then how, generally, those things will be adjusted into this particular data, because whenever you talk about the beta of the particular stock of this particular period is this much, but the whole of the period is not uniform, because there are certain things which was happening one year back, and the same thing is not happening now, or in a particular level, the unsystematic risk was quite higher for this particular company. Therefore, the return was affected; maybe that unsystematic risk is not prevailing now.

So, how those factors will be incorporated? Whenever we do the beta calculation, that is number one question; number two question that even if those calculations will be done, then how this can be incorporated into the market? How this adjustment can be made? Because this changes over time, which basically reflects on the data set; it has the reflection, but actually, how we can derive this reflection? That is practically is not feasible.

Therefore, some of the people have highly criticized how we can incorporate this. If you want to incorporate this, then how this adjustment can take place, and if you want to do the adjustment, then for the different periods, to calculate the beta the different weighting– weighting scheme should be given– the weighting assignment should be given, but what is the criteria to provide this weightage? That identification of that criteria will be quite difficult.

If once the identification of the criteria will be difficult, and first of all, the identification of the incident also will be difficult, because over the period of time, so many things is happening to the company– so many events; so many incidents; so many different type of risk. What different types of risk the company is facing? Then, how this adjustment can be made, and how this weighting scheme can be decided? So that… these are the different questions basically comes to the mind of a… the investor, and as well as the researcher or the people or the academician to how to adjust this beta.

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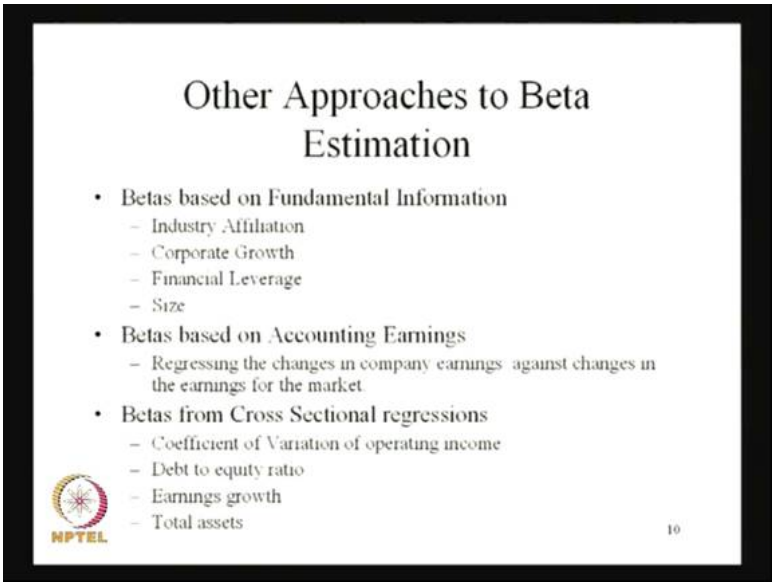


So, therefore, sometimes we face the problem regarding that, but it is always is required to do that. What are the other approaches to beta estimation? Other approaches are: beta is based on fundamental information– you just talk about the industry affiliation; you see that what is the industry beta of that. For example, here is a company belong to manufacturing company. So, you just see what is the beta of this particular industry in the particular period.

So, that beta can be used as a proxy for that particular company, but which is not (( )) accurate. So, it is… it is approximation data what you can calculate on the basis of the industry affiliation.

Corporate growth– you just see that which one is the high growth company; which one is the low growth company; and then, the beta of a high growth company is this much and the beta of the low growth company is this much. Then, we can consider, always, that is one of the ways through which you can anticipate– you can say– that this much should be the beta, because this much beta is prevailing for other company, which is a high growth company.

Financial leverage– you see, leverage is a major factor who affects the beta; that is why, you always call it. There is a levered beta; there is a unlevered beta. So, if your beta– your levered value– will increase, or debt by equity ratio will increase, then the beta may increase.

So, therefore, what we can say that always we should consider, then how much leverage the company has, and if the leverage is increasing, how this particular beta value is increasing for this particular company? That is also one of the indicators, always, we should see. Then, the size– that means, the beta is determined by the size; the beta is determined by the growth of the company. Beta can be also determined by the leverage of the company and as well as size of the company.

There are various factors; that is why, the formulations can be made; a model specification can be marked out. Whenever we define this beta, whenever we calculate this beta, and accordingly, this particular beta can be used to calculate the expected return of the equity in a capital asset pricing model. Another way of calculating beta is beta is based on accounting earnings.

What does it mean? Basically, regressing the changes in company earnings against changes in the earnings for the market, so, whatever company earnings we have, you just regress it with the changes in the earnings for the market– in the whole market. What is the… how this the earning percentage is there, and how the total company earnings is changing in aggregate, and what is the earnings this particular company is giving.

So, you all… sometimes, through accounting way, also, we can calculate a beta by regressing these two variables, but again, it has certain limitations, because all the companies in the market are not affected by the same degree because of certain changes in the market, and the particular company, which is affected by a certain variable, maybe other companies they are not affected by that. Betas from cross-sectional regression– how, generally, we do it?

The coefficient of variation of operating income, debt to equity ratio, earnings, growth and total assets– basically, (( )) company– what do we mean by the cross-sectional? It is, basically, the over… the over the company is how this particular beta is changing, and over the companies which are the variables, which is affecting the beta; it is basically the operating income or the risk, variability of the operating income or the volatility of this particular company, as well as the financial position of the company, which is or the financial leverage of the company, which is measured as a debt-equity ratio.

And as well as also you have the earnings growth; how much prospects are there; how the company can go further. That is also another variable which can calculate your beta, and finally, the total assets– how much is the fixed assets; how much is the variable assets; how much is that actual physical assets, and how much is the intellectual capitals, or what we can say, this knowledge based capital whatever the company has.

So, these are the different variables which also determine the beta in a company's case. So, you should observe one particular thing here: you just see that to calculate the expected return of the equity we need capital asset pricing model, but whenever we talk about the capital asset pricing model, there are certain inputs we need; there are certain variables we need to use this capital asset pricing model, and what are those particular inputs are: the inputs are either it is systematic risk or the beta or it is, we can say, market risk premium or it is the risk free rate.

So, already I told you, risk free rate you can take any of the proxies; either it is a government bond rate or it is treasury bill rates, etcetera, etcetera, but whenever you talk about the risk premium, there are certain variables which affect the risk premium, like anything that is your variability of the market, variables like price, like your growth– growth rate of the GDP, industrial production, etcetera.

But again, whenever we come back to the beta, there are certain thousand variables– the some variables specific to the company, like your size, like your profit, like your growth, like your leverage, but there are certain variables which affects by the industry, and there are certain industry dynamics has a lot of impact to performance of the company or the systematic risk to measure the systematic risk of the company.

And as well as also, we have the other variables like… certain variables like your whole macroeconomic scenario, like in the same variable, like in place in GDP, etcetera, also play the significant role. So, we have certain variables which are company-specific or the firm-specific. There are certain variables which are industry-specific; there are certain variables which are macroeconomic-specific.

So, we have to incorporate all those variables to calculate the beta and we have incorporated certain variables to calculate risk premium. Then finally, whatever risk free rate– whatever we have– then only the capital asset pricing model can be used to know the required rate of return from a particular risky asset.

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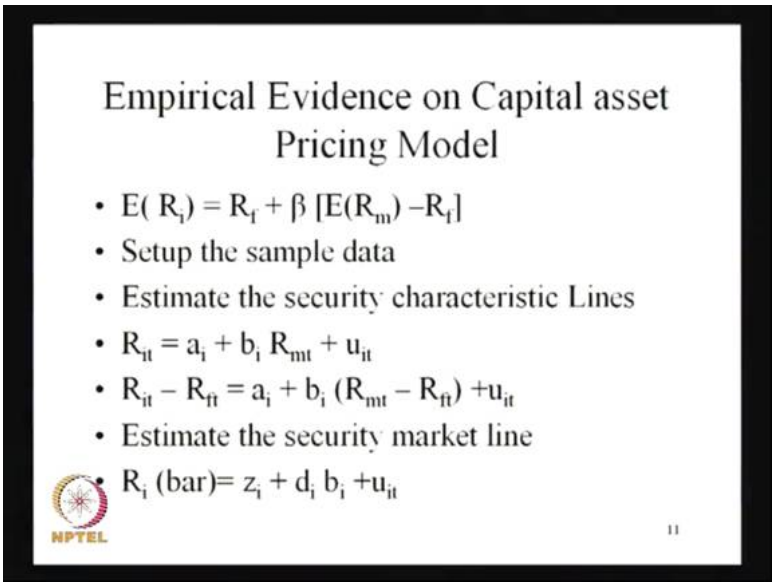


So, this is the way what I have explained that first of all, what we do that we first… this is the model; whatever we have that if your expected return is equal to R f plus beta into expected return from the market minus R f, which is your risk premium, and this is your systematic risk and this is your risk free rate.

Then, now, what we can do? The first step is set up the sample data. First, we can set up the data; then, we estimate the security characteristics line, which we… this is the function R i t is equal to this is the intercept, and this is the regression coefficient, which basically gives you the beta; then this is the u i t; then once the beta value will be calculated in the times risk part for all the companies.

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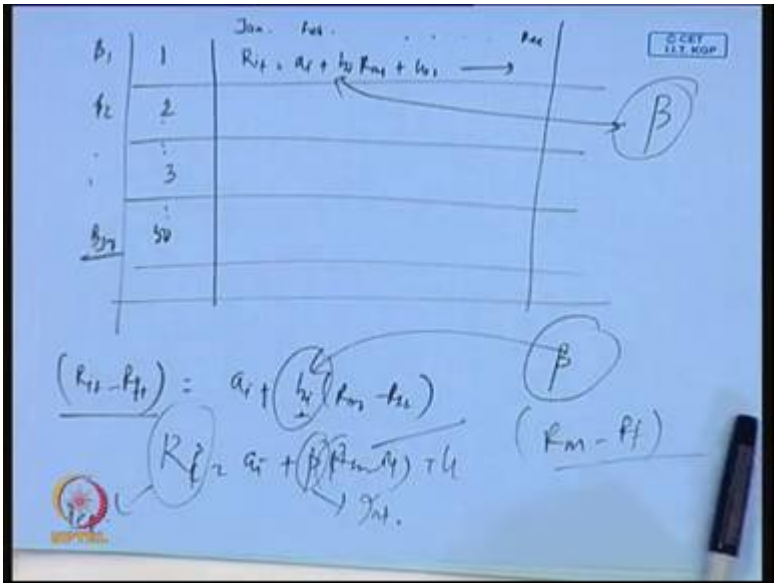

For example, we have 50 companies in our set– 1 to 50. Then, whatever we have, we have: let data for monthly data we have for one year– January, February, to December. Then, what we do first? Our first company, we wrote this regression R i t is equal to a i t plus b i R m t plus u i t– this is the characteristics line for the two company. Again, we run it three company; again, we run it like that; on the fiftieth company also, we run it.

After running this, from this regression, we can calculate your beta, which is your b, and once these betas are calculated, these betas will be used as the independent variable in the second equation. In the second equation, what we do, we calculate your R i t minus R f t is equal to a i plus b i into R m t minus R f t. So, this beta– whatever we have– this we use in the second equation in the cross-sectional way. So, you have beta 1, beta 2, to beta 50.

So, this beta 50 will be… you can use this, or you can also use this function R f R i is equal to a i plus beta R m minus R f plus u. So, once the second regression we run– the

second step regression we run– here, your beta is equal to your independent variables, and R i is equal to your dependent variables. So, therefore, whatever coefficient, you will find that coefficient is basically R m minus R f; that is basically the… the risk premium.

So, in the first regression, which is a time series part over the period, we have to run this regression in the company wise, and second part, whatever we are doing, we have this series of a beta, once what we calculate from this regression, and this beta will be used as the independent variable in the second step.

And therefore, if you run this regression, whatever coefficients will you derive from this, that coefficient is nothing but that is the risk premium. So, this the way, generally, if the total risk premium– whatever we can calculate from here– that will be, really, exactly equal to the risk premium what is prevailing in the market. Then, that particular thing is defined; then we can say the capital asset pricing model holds good.

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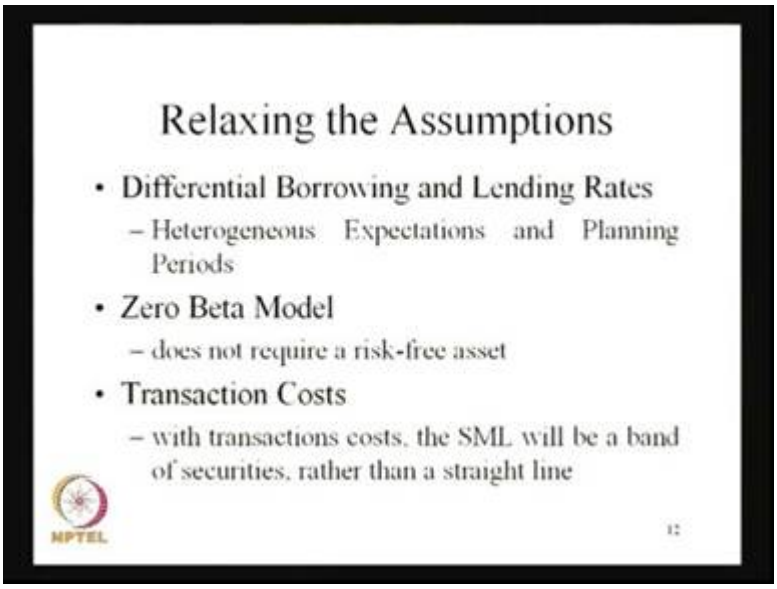


Then, after discussing these things, already, what I told you there are. So, we can also relax certain assumptions from this, because already we have seen that the borrowing and lending rate are same whenever we use the capital asset pricing model in the beginning, in the assumption what we have taken or we discussed in the previous class, and that borrowing and lending also takes place at a risk free rate.

And also, what we have taken that the… the expectations are homogenous. All the people expect in the same direction, and their expectation levels are same, and also, the planning horizon– the planning period– will be same, because everybody wanted to invest in the same period. The time horizon is constant over the investor, but here, in practice, if you see that always, we have differential borrowing and lending rates, and the expectations cannot be same by the different investors, and the planning periods also will be different.

If the borrowing and lending rate will be different than what we have, we can see, once your borrowing and lending rate will be different, you may not find a line like this; you may find a line like this. We may find two lines: one line for borrowing; another line for the lending, because if the lending and borrowing rates are different, in this case. Like that, the expectation levels are different, then from a single asset, all the investors may not expect that whatever return they are going to get or they are going to expect; it is same.

So, that is why once the expectation level will be different and the lending and borrowing rate will be different, then whatever way we have defined the capital asset pricing model or the capital market line, the same way it cannot be defined because already, the functions may be non-linear also. In the beginning, we have assumed that is a linear relationship between beta and the expected return of the stock, and beta is the factor who affects the expected return, or the risk premium, which affects the expected return, or it is the risk free rate who determines the expected return, but that relationship may not be linear. Also, that may be some non-linearity is existing; there must be some dynamism is existing to calculate the expected return from that particular stock.

Therefore, once your heterogeneous expectations should be there, and it varies from investor to investor, once the planning period– the time horizon– will be different, then obviously, what will happen? This capital asset pricing model may not hold. Then, we have another model, what we call is a zero beta model and here, the zero beta means it does not require a risk free asset in the particular case, and all the assets– whatever we are talking about– that basically talks about their risky assets only.

Then here also, what assumption we have taken? There is no transaction cost, which is very unfair to assume, because any investment– whatever we make in the market– that

basically involves a transaction cost. If we incur the transaction cost in the each investment process, then if you ignore the cost which is (( )) transaction cost, which is very difficult to do, because that is the major invest– that is the major cost– all that we face in the market.

So, therefore, with transaction cost, the SML or CML will be a band of securities, rather than a straight line. So, if there is a transaction cost, then obviously, the cost part will be changed. So, it may not be a straight line; it may not go for a band. So, therefore, what we can say, once we relax the assumptions, whatever way the capital market theory– whatever way the security capital asset pricing model is defined– the same way, it cannot be defined, or there are certain limitations about that and there are certain unrealistic assumptions, whatever we have taken that basically is not, practically, feasible.

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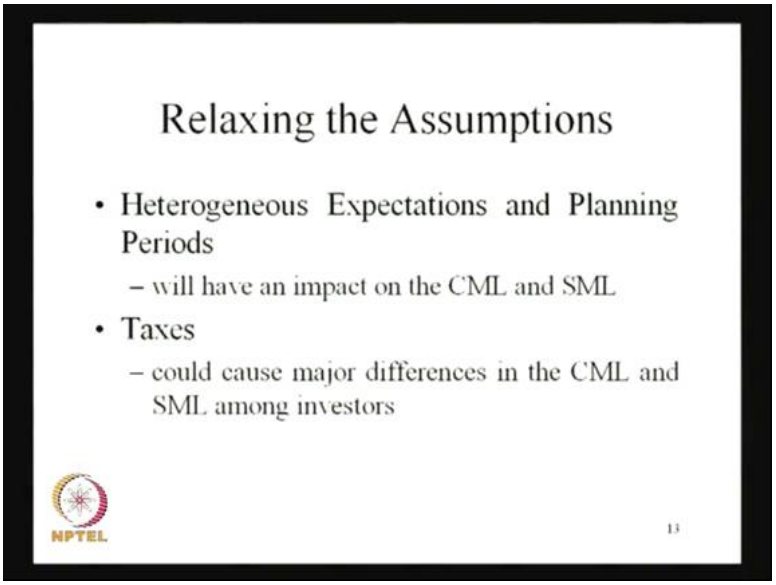


So, it will have the impact on the CML, SML. Already, what I told you that because the expectations will have the different implications of the people, and it could cause the major differences in the CML and SML if the tax structure will be there, because if the there are different tax structure, sometimes, we need dividend; sometimes, we need capital gain if there is a difference between the tax structure.

So, sometimes when a particular period if some relaxation will be given for a particular level of income in terms of the tax, then people also the expectation level will changing;

the time horizon will be changing, and depending upon that, the expected required return from that particular asset or the particular portfolio also will be changing. Therefore, tax will have the more impact, also, on the process.

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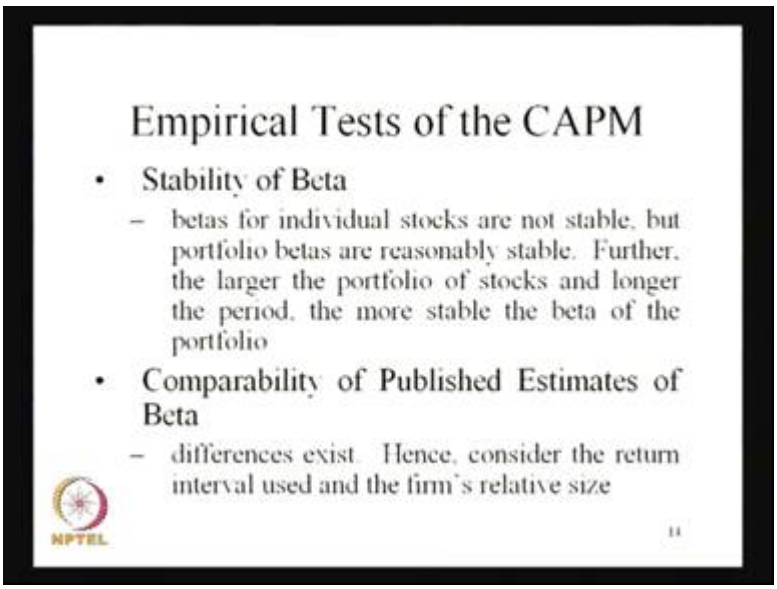


So, there are various people throughout the world have done this empirical testing with the capital asset pricing model; then what kind of relationship and what kind of results they got? if you observe those results, basically, what we have seen that the betas for individual stocks are not stable, but portfolio betas are reasonably stable. Further, the larger the portfolio of stocks, the longer the period; the more stable the beta of the portfolio.

Already, I told you in the previous class that longer the period– longer the time horizon– we have the accurate results. The accuracy of the results will be more if you have sample size will be more if your time period will be more lengthy, because in the equity market, basically, always we deal within the long run phenomena, or we should expect that some good return from the equity market or the stabilization of the equity market, if you want to stay in the market for a longer period of time.

But if you cannot stay in the longer period of time, if you do not deal with a long run concept of the equity market, then it is very difficult to calculate the required rate of

return, or we can say, the stability of this particular return or the stability of the systematic rates what we are going to get whenever we take it for our investment use.

So, that is why the stability of the beta– the beta– what do we mean by the stability of the beta, because beta is determined by certain factors, whatever we have seen, and those factors keep on changing in the short period, but in the long period of time, if you observe, or the periodically, if you observe, then there are certain variables which affect always beta, which always determine the beta, uniformly.

Therefore, we can say, there is a stability in the beta for a long period of time, but that stability is missed out– that stability misses whenever we talk about the certain phenomena. Then, comparability of published estimates of the beta– it is there is a… because we have let the published data in a various form, maybe monthly or quarterly or weekly beta.

So, whether these are really relevant to be used or not, so that differences– that opinion differences are existing. So, therefore, we consider the return interval used in the firm's relative size, or you can use also your own beta calculation– you can do the beta calculation on your own– and after that, those beta can be used for your investment reasons. You may not rely on the publishable data because they may not use the philosophy or the expectation what you are trying to use.

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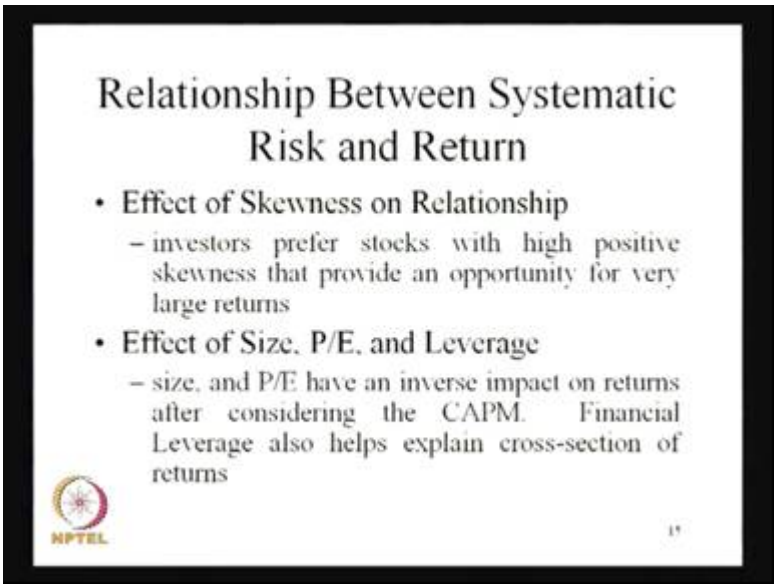


So, there is relationship between the systematic risk and return. If you see that the effect of skewness on the relationship, investors prefer stocks with high positive skewness that provide an opportunity for a very large return. Sometimes, the investor's expectations are also very peculiar, because sometimes, if we… they will observe the one particular return is skewed positively, then they always feel that that particular momentum will go on for this particular stock and they are going to get more return out of this.

And accordingly, the other systematic risk and the return also will be affected. Once the return will be… the expectation will be changing, it will have the impact on the risk and return. So, there are other people, also– they will have some decision making process in terms of the size of the company, the price earnings ratio, and the leverage, because size and price earning have inverse impact on the return after considering the capital asset pricing model, and financial leverage also helps explain cross-section of the returns.

That means, the other factors, which could have the impact on the return, already we have seen in the various models; what we will discuss, extensively, further, in other sessions, that we have the variables like size; we have the variables like pricing ratio; we have the variables like leverage, which also could have the impact on the expected return of the stock, and those variables are not incorporated in capital asset pricing model, and therefore, certain investors also decide those variables while investing, but it was not there. So, therefore, what we can say, these variables also play the role for the calculation

of the expected risk and return for the particular asset or particular portfolio. So, that also should be taken into consideration, whenever we deal with those kinds of assets.

So, therefore, always we have seen that or in USA context, whatever we have seen the larger size companies always perform slower than the small size companies, or we can say, the companies which have low price-earning ratios, they performs better than the high price-earning ratio, so that particular things also can be prevailed in the context of other countries like India, and we can check it out those things also. So, whether the same phenomena is really prevailing in this particular market or not, or is there any other phenomena, which is prevailing here.

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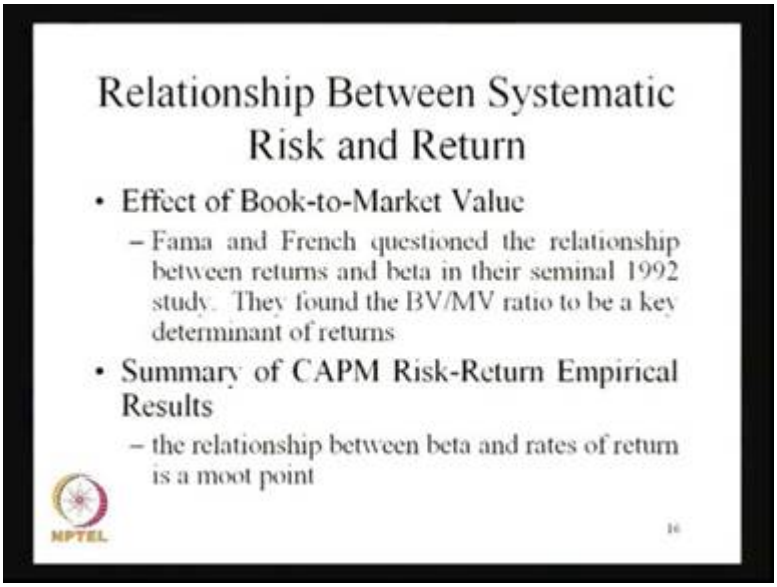


So, that is the matter of discussion, or the matter of issues to be discussed in… in various cases. Then, another variable, also what we discuss in the further classes, but here, I will just give you the hint that Fama and French questioned the relationship between the return and beta. In their seminal 1992 study, they found that in the book value of the stock to the market value ratio to be the key determinants of the returns, like your size, like your price-earning ratio, like your leverage; we have also the other variables, whatever we have.

The other variables are nothing but these are variables what we talk about; these are basically the market value to the book value or book value to the market value. These are

also and the important determinants which affect the equity return on the particular stock. So, that Fama has explained in further, whenever the multiple, or we can say that the arbitrage pricing theory or the multifactor model, we will read now; we will discuss. Then only, we can come to know in the detail what exactly the Fama is trying to say and what could be the real important variables, which have the impact on the expected return of the equity.

So, the relationship between beta and the rates of return is a good point, or the beta is a factor, but still the debate is going on whether beta is the only factor or there are other factors and beta is one of the factors; that thing we have to see further.

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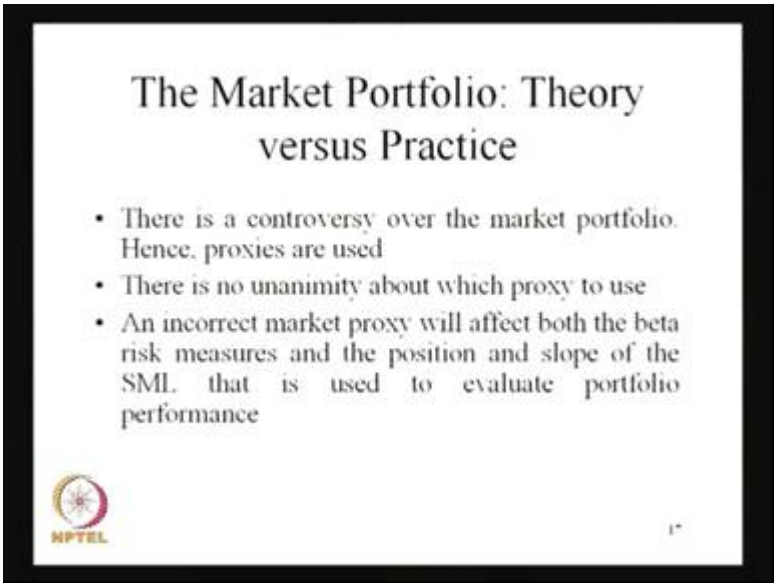


So, the market portfolio– what generally we have discussed– and there is a… there is a theory versus practice. There is a controversy over the market portfolio; which proxies should be used– that, already, I told you. There is no unanimity about which proxy should we use, and incorrect market proxy will affect both the beta and the risk measures, and the position and the slopes of the SML that are used to evaluate the portfolio performance– that, already, we have explained in a larger extent.

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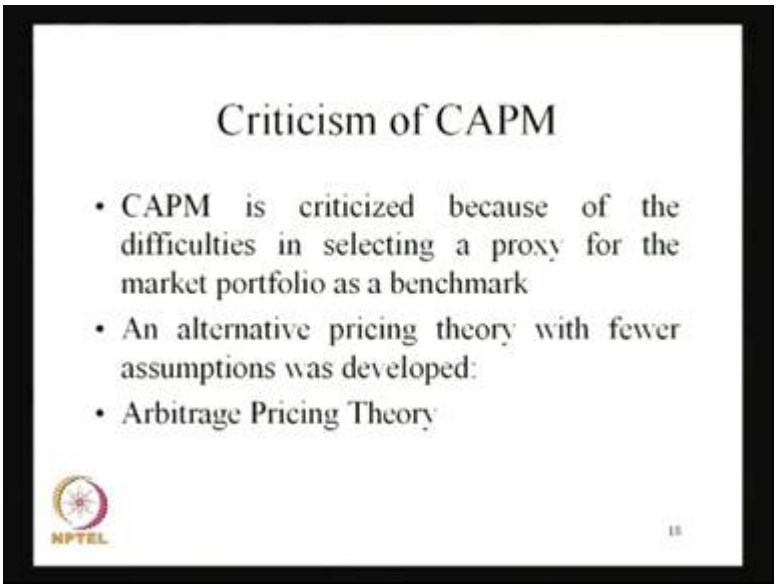


Then, the criticism– already, we have enough; we have also discussed little bit in other slides. It is criticized because of the difficulties in selecting the proxy for market portfolio; it is also an alternative pricing theory with fewer assumptions was developed, because most of the assumptions were very much unrealistic.

And sometimes, also, in the market, we have arbitrage opportunity– what do we mean by the arbitrage opportunity, where we sometimes, we take position in the two different markets, and that two different markets, whenever we take in one market, if you take a position and where the price level is low, in other market the price is higher, then what we can do? Somewhere, whenever it is a low, we will sell it; we will buy it there, and we will sell it whenever the price is higher.

So, in that case, what will happen that without any risk, we get some return. So, that we consider it– we call that arbitrage pricing, and that part plays the significant role for the expected return of the equity, and here, what we can see that most of the market, it happens, or we can say that within the market, where the law of one five does not prevail, that market is, basically, there is a arbitrage opportunity is prevailing in that market. So, that part also should be taken into consideration whenever we talk about the calculation of expected return of their equity.

So, these are the various issues emerged from the capital asset pricing model, but whatever it may be, maybe there are huge amount of limitations the capital asset pricing model has, but this is the most significant theory. More prominent theory, which is the founding theory, which talks about… which still helps us to calculate the expected return of the equity.

Maybe the advancement of theory– it is prevailing, but still, we are using, in most of the cases, the expected return of the equity is calculated using the capital asset pricing model, but once we talk about the limitations of this model and how the other models really helps to remove these problems, that we will see in the next sessions. Thank you.