Security Analysis and Portfolio Management

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Module No. # 01

Lecture No. # 22

Introduction to Portfolio Management (Contd.)

In the last class, we talked about the portfolio management– what exactly the portfolio is, and how we can construct the portfolio, and, basically, whenever we define the individual security or whenever we talk about the portfolio, what is the basic difference between these two, and what we have seen from there, that portfolio is nothing but it is the composition of the different securities.

And, basically, whenever the investor wanted to invest in a portfolio, the basic objective of the investor is always to maximize his return or to minimize the risk, but why the portfolio can maximize the return or the portfolio can minimize the risk? Why the individual security cannot do? So, that is the question sometimes comes to our mind, and the second question also comes to our mind that whenever we define the concept of the portfolio, what exactly the different characteristics of the portfolio, and how the portfolio can be constructed.

So, these are the different fundamental questions always comes to the mind of the investor and the common people, that whenever we think of the portfolio, that how, generally, the portfolio can be constructed, or if we construct the portfolio, what is the different strategy or the different ways the portfolio should be constructed, by which the risk minimization or the return maximization can take place.

In this context, the first or the Nobel work has been done by Markowitz, who first talked about the how this portfolio can be constructed and what should be the different ways the portfolio can be made, and gradually, the different other people have started talking about these. So, whenever we then we talk about the modern portfolio theory, so always, the modern portfolio theory starts with the concept of the Markowitz portfolio theory.

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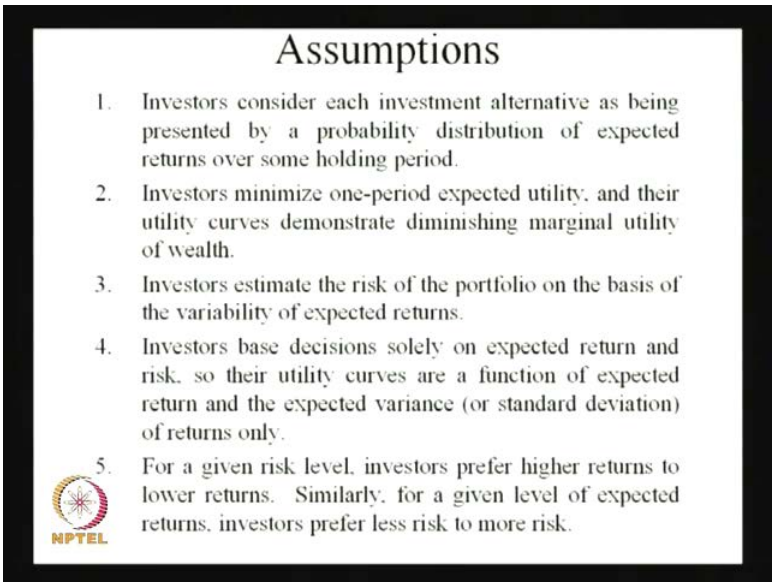

So, in this context, whenever Markowitz has given his concept of portfolio, first he has started this theory taking certain assumptions. So, if you observe this certain assumptions, what are those assumptions Markowitz has taken? First assumption– Markowitz has taken that the investors consider each investment alternative as being presented by a probability distribution of expected returns over some holding period.

If you remember, in the previous class, we talked about how to measure the risk and how to measure the return, and there are certain things we discussed. And here, what we have seen, that whenever we talk about the expected return, and the concept of expectation comes to into the comes to the picture.

Whenever we talk about some probability key function, what exactly this probability distribution in this case is– the probability is– whenever we talk about whether we can get a return of 10 percent, or whether we can get a return of 20 percent, depending upon the different scenario, maybe this scenario assume the basis of the market situation, or the scenario may be on the basis of the investor risk appetite. So, all these things, whenever we talk what, generally, we have seen there that always, the investor is thinking about the probability distribution of expected return, so for some holding period, because he has certain objective in his mind, that up to how much he wants to keep that particular investment.

Then, second assumption what Markowitz has taken that the investors minimize one-period expected utility, and their utility curves demonstrate diminishing marginal utility of wealth, you know, means, whenever we take something, or we want to invest something, or we want to spend some money on something. So, the basic objective of the investor is to maximize the utility, and whenever you talk about maximize the utility, what does it mean? It basically, that the satisfaction what we are going to get either in the monetary term or in the non-monetary term.

But here, the Markowitz has taken, gradually, whenever in the same thing we go on, go on investing in a particular asset, or we always take the same investment philosophy, sometimes the marginal utility or we can say the utility basically declines what do you mean by the marginal utility the marginal utility is nothing but it is basically the additional utility what you are getting whenever you consume one extra unit of that particular product.

So, whenever you talk about the product or any of the consumer goods. So, basically it is the satisfaction we get whenever we consume one extra. So, in the same philosophy, or same manner, in the financial market, whenever we spend some extra money or we take some extra investment into our portfolio, so how this particular utility will be changed? So, the extra amount of the utility, whether it is a positive way or negative way, is going to be changed in that manner, is basically defined as the marginal utility.

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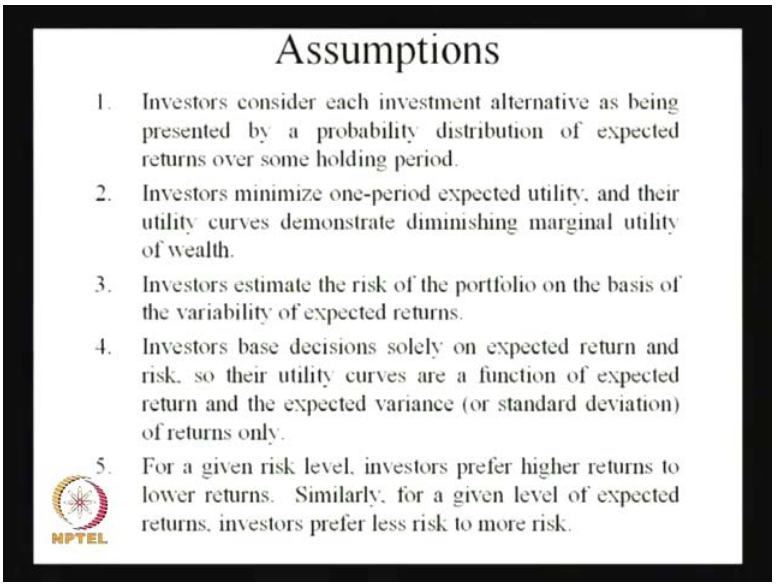

So, what basically this investor feels, that if, gradually, one investor invests in a particular stock continuously, then he always observes this concept of marginal utility of the wealth. Then, third point, investors estimate the risk of the portfolio on the basis of the variability of expected returns.

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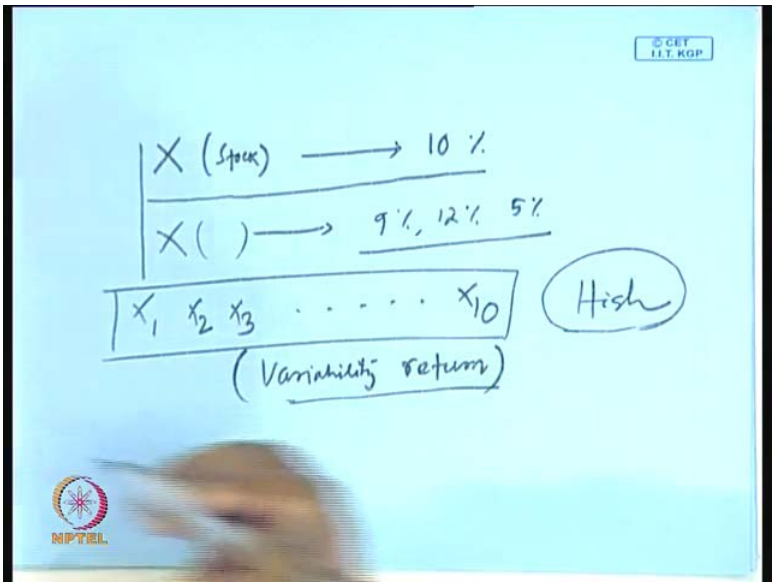

What it basically means that, for example, we started investment in a stock X. If you started investment in a stock X, so gradually, this stock X was giving a return of 10 percent today, but if you observe this behavior of this stock over a period of time, depending upon the different situation, stock X can give you 9 percent return, stock X can give you 12 percent return, and it can also give you 5 percent return.

So, what basically, the investor, whenever they invest in the market or the investor wants to invest in the market, what they see how this particular variability, or what is the variability of that particular stock, or if it is a composition of the stock. Let you have X 1, X 2, X 3, up to X 10. There are 10 stocks in your portfolio, then the investors always feels that in this composition, how this variability of the return is happening?

If the variability of a return is, basically, is one of the factor, the the investor always consider to make the portfolio. For example, you say the variability is quite high, then, obviously, the investment strategy or inclusion of the stocks in the portfolio changes.

So, that is why the basic assumption, or the presumption, always, investors takes that whenever he start started investing in a particular stock, always, he estimates the risk of the portfolio on the basis of the variability of the expected return.

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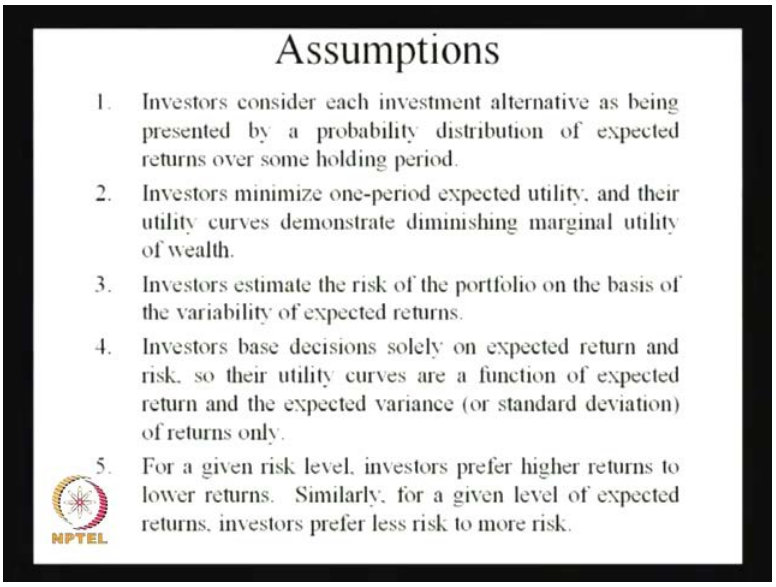

Then, the investors base decision solely on expected return and risk. So, their utility curves are a function of expected return and expected variance of the returns only. It is a very clear-cut thing. It, basically, whenever we see that, whenever we say that the basic goal or basic objective of the investor is to maximize the return or the minimize the risk. So, already what we have seen in the previous classes, there is always a tradeoff between risk and return, and if you are going to take more risk, their return will be more, and if you are going to take less risk, then, obviously, the return will be less.

So, in this context, what basically the investor feels, or generally, what we can say that the utility or the satisfaction what that investor is trying to draw from that portfolio allocation, that portfolio allocation, which gives the satisfaction to the investor and the level of satisfaction, basically, depends on the expected risk and return what is going to derive from the portfolio.

Because basically, you see some investor– one investor you take the example. So, one investor wanted to take 50 percent risk. So, if you wanted to take 50 percent risk, maybe he is expecting 70 percent return.

But one another investor, maybe, is reluctant to take 50 percent risk. He can take, let 10 percent risk, then obviously, the return will go down, and in that context, the utility of what this investor is deriving– who was going to take or was ready to take 50 percent

risk– is not exactly the same, the what the utility, or it may be same what the utility this particular another investor is taking whenever they maximum they can take up to 10 percent risk. So, here, what we can say that the utility level of those investors may be same, because the risk appetite of the two investors are different, and their expected return from their investments, also, are different.

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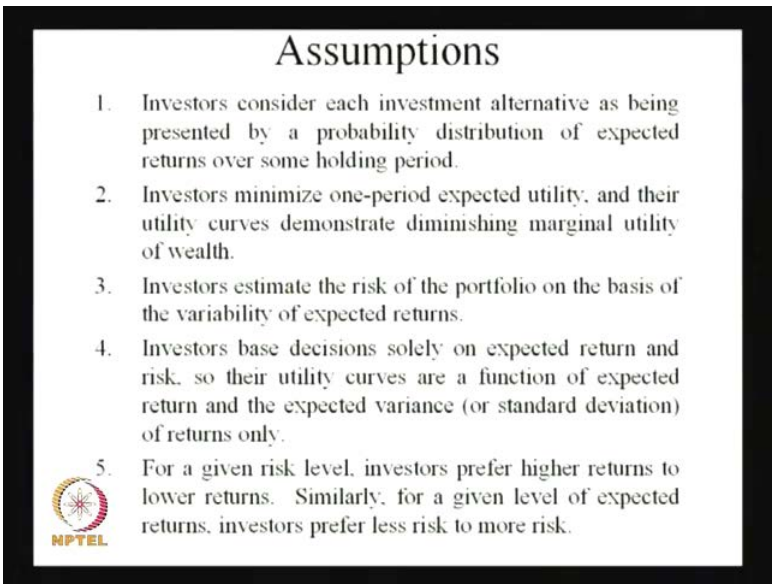

So, therefore, what Markowitz, from the beginning, has taken the assumption that the utility curves or the function utility function of the investor is, basically, a function of expected return and the expected variance of the return, which is nothing but the risk. So, another assumption what Markowitz has taken, that for a given level of risk or for a given the risk level, investors prefer higher returns to lower returns. Similarly, for a given level of expected returns, investor prefer less risk to more risk. So, basically, what here we can assume, the investor is a rational investor. So, always, he prefers more return to less return, and always, he prefers less risk to more risk.

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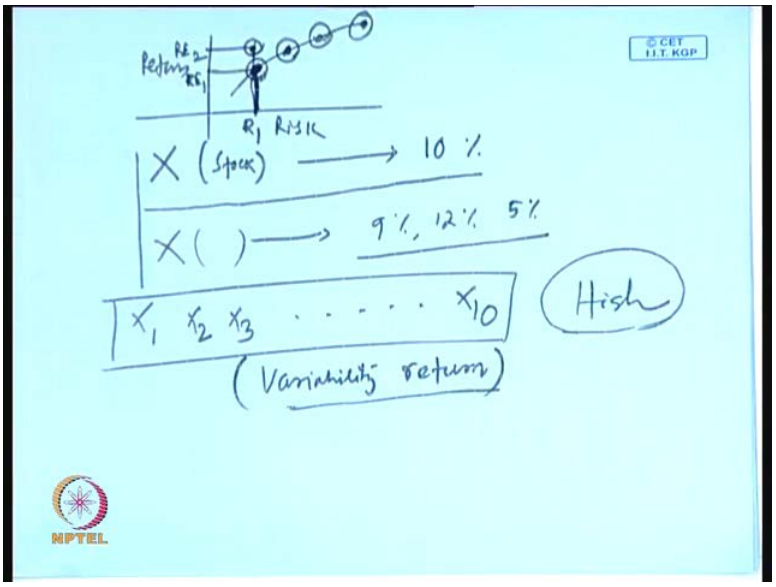

So, here what basically the investor was trying to do, for example, if you you say that there is a utility function of the investor, always, what they can see that if a given level of risk, if he is deriving more return, for example, you take this is the risk and this is your return. What investor say that if this is your portfolio; this is another portfolio; this is another portfolio; there are different type of portfolio.

Then, what this investor can feel, always, that this– if this portfolio– whatever risk is taking, let the R 1 and here, he is deriving this return of let R E1. Then, what you can see, in the same level of R 1, level of risk if is able to deriving able to deriving added to amount of the return. Then, obviously, he will prefer this portfolio.

So, here, what generally basic assumption, what the investor always takes or what we can take, that, always, the investor is a rational investor. Always, he prefers more return to less, and as well as if he wants to, his basic objective is not to maximize the return. His basic objective is to minimize the risk; always, he wants to, for example, 10 percent returns he wants to get. And to get this 10 percent return, in some cases, in one portfolio is able to face 7 percent risk, and another portfolio is is is facing 5 percent risk, then, obviously, he will prefer the second portfolio, which generally gives you the 5 percent risk.

So, that is why as a rational investor point of view, what you can feel that, always, either they want to prefer a particular level of the portfolio, which gives you the maximum possible return or the minimum possible risk. So, that is the basic assumption what Markowitz has taken from the beginning.

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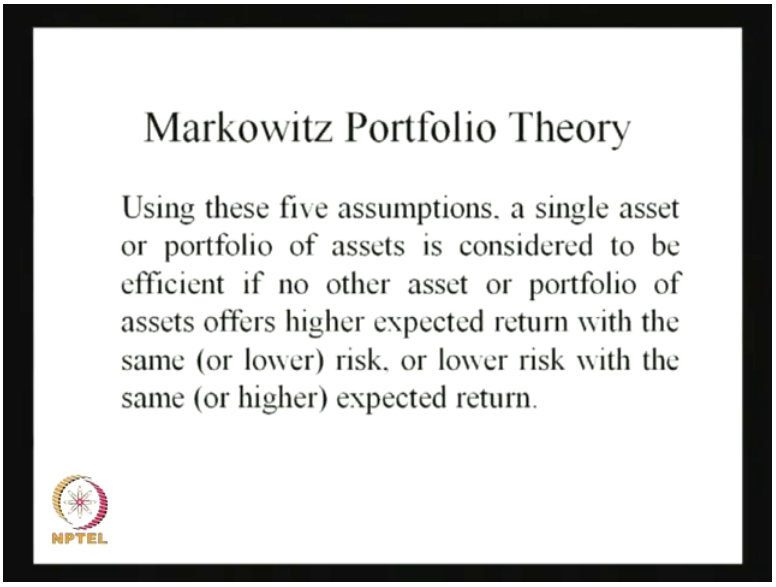

So, these are the different assumption what Markowitz has taken, and whenever they take this assumption, and if you assume this all those five assumption what we have now discussed, then a single asset or a portfolio of assets is considered to be efficient, if no other asset or portfolio of assets offer higher expected return with the same or lower risk, or lower risk with the same expected return.

Just now, we talk about, you remember, exactly, this particular word, what we call it– what we call it– efficient. If you see, this is, basically, this efficient concept what we are using this efficiency is a is a phenomena, is particular concept which is used very widely

in the portfolio management literature. What here, what we what we can see that this particular upward portfolio will be an efficient portfolio, if no other asset or the portfolio of the assets offers the higher expected return with a given level of the risk or the same level of risk, or lower risk with the same level of expected return.

So, this is the maximum return he can gain out of the risk, what he is facing out of this portfolio, and it should be the minimum risk to get this given level of the return. So, that concept is, basically, we defined or Markowitz has defined in his theory, what we call it efficient portfolio. So, using this concept of efficiency, or using the concept of efficient portfolio, Markowitz has started his discussion on the portfolio theory.

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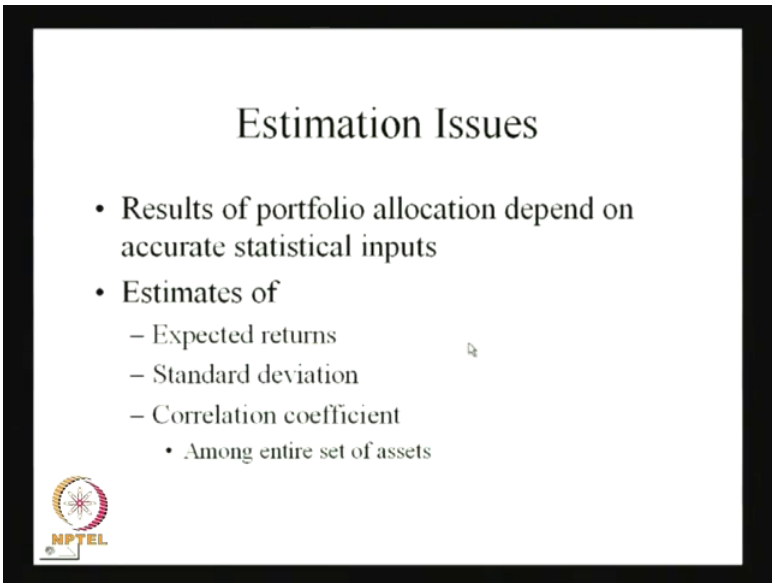

Then, gradually, what we can see? You just see that what are those different issues involved in this, or what are those different variables we want to use the Markowitz portfolio theory, or to use this concept of the Markowitz theory, to define our portfolio or to construct our portfolio.

So, here, if you observe very minutely what this particular issues or the we can say estimation issues or the calculation issues involve these issues involve, basically, the results of portfolio allocation depend on the accurate statistical inputs, and which are the inputs due to the expected returns of this particular portfolio, or they expect returns of the individual assets which has been included in that portfolio, then the standard

deviation, then, already, we have seen the correlation coefficient among the entire set of assets what you are going to include in your portfolio.

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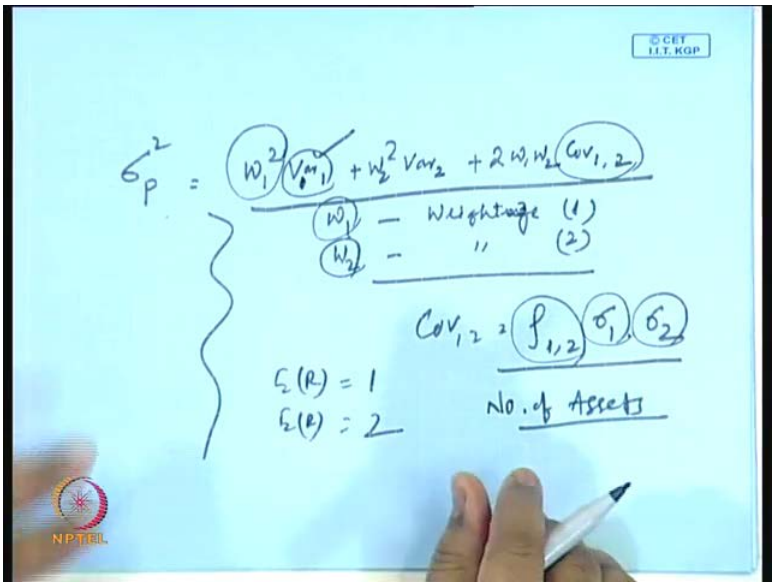

You go back to our calculation what we have done in the previous class. You just see what what do you mean by this risk of the portfolio? Already, we have seen it is nothing but W 1 squared this variance of asset 1, variance of the asset 1, then it is W 2 squared the variance of asset 2, plus 2 W 1 W 2; then we have the covariance of asset 1, covariance between asset 1 and 2. What here, exactly, this W 1 means W 1 means the vertex what we have given to asset 1, vertex what given to asset 1, and W 2 is the vertex given to asset 2.

So, here, what we have seen that you see, this is the variance. This is the variance what we have taken for asset 1; this is the variance for asset 2. So, therefore, what he said, if it talk about the standard deviation, you just take the square root of these.

So, here, what are those different variables we are, we are using? We are using this variance of this particular return of this particular stock, and as well as to calculate this variance or to make a tradeoff between the risk and return, we also need this expected return of that particular stock, and as well as whenever you talk about the covariance, already, you know that the covariance thing is calculated from the correlation and the standard deviation of these two stocks.

So, whenever the covariance of 1, 2, is nothing but the correlation of 1 and 2 multiplied by standard deviation of 1 and standard deviation of the 2. So, whenever we take this, what, generally, we have seen here that, basically, these are the different inputs what we want– standard deviation of this stocks or standard deviation of the assets, correlation between the different assets, then we have the weightage, and we have the the expected return of this stock 1 and expected return of this stock 2.

So, here, generally, what, generally, we can see gradually over the period, whenever we go ahead with highlighting the different theories or different phenomenon of this particular portfolio management process, what, basically, we see the basic objective is, always, our botheration is to calculate this W 1 and W 2.

Then, as well as also, our botheration is to calculate the expected return, and as well as also, you have to calculate the number of assets– which number of assets can will be the maximum return– which can you can derive from your portfolio, or we can say that this concept is defined as the optimal portfolio.

In future sessions or the further sessions, we will be discussing about thing is very rigorously, that what exactly this optimal portfolio is, and how those variables will be, always, all those variables will be calculated by the different theories, because portfolio management theory, basically, involves that various process– the different process– who try to give the answers of all those variables, or they give show you the way, as they will show you the different methods by which these variables or that this particular phenomenon and can be calculated.

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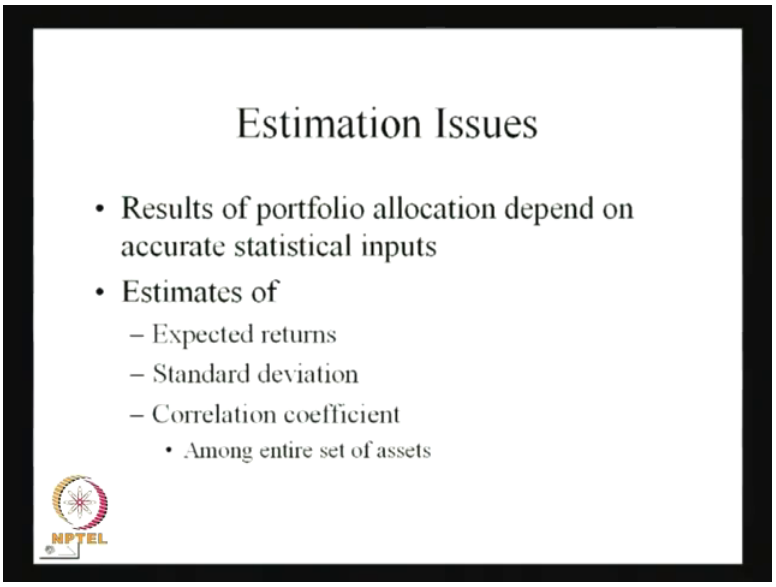

That is why, what this Markowitz said that these are the things, always, we should know before going to make the tradeoff between the risk and return, or before going to decide that how much stock we are going to take, or how much assets we are going to take, or we can say that what is the different kind of weightage we can given to different assets, which can be incorporated into our portfolio.

But estimation, basically, whenever we refer any calculation we make it, basically, there are some potential errors, and those errors always we try to minimize by the different methods. That we will see in further sessions.

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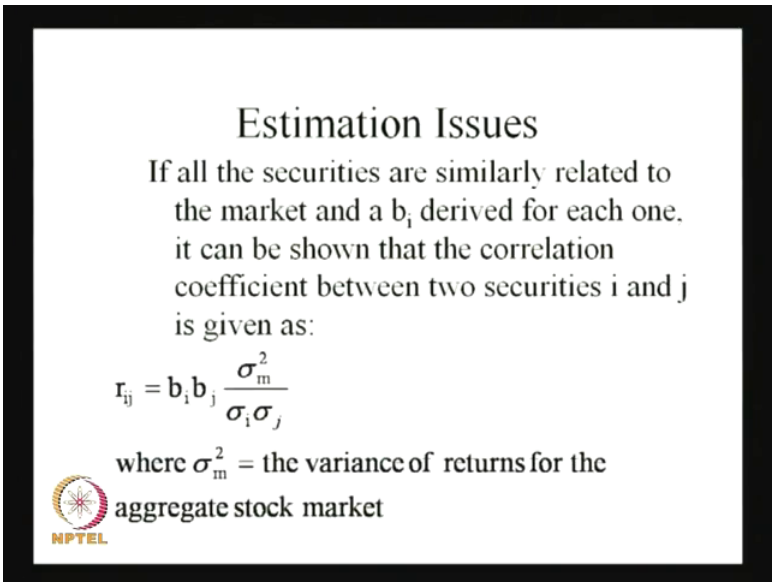

So, here if you observe one particular case that what generally we can, we sometimes observe that if all the securities are similarly related to the market, and a particular correlation coefficient what you are deriving from each one, then it can be shown that the correlation coefficient between the two securities, let i and g, is nothing but it is the b i b j– the variance of market portfolio, divided by standard deviation of the i stock and the standard deviation of the j stock.

So, this is the way, generally, correlation coefficient can be calculated between the two stocks using the market or aggregate market stock market, but basically, what exactly this market portfolio is in, what do you mean by this aggregate market, etcetera– that, actually, we can see in the further session.

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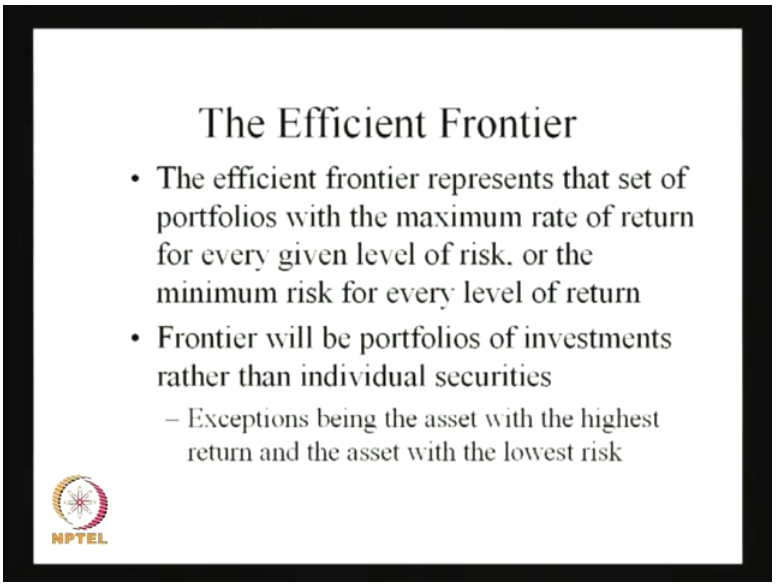

So, now, we will come back to a very important concept, what, basically, Markowitz has given, or was this is the best contribution. One of the best contribution what Markowitz has given to the portfolio literature, that what, basically, the Markowitz was trying to say, or he has given the concept of the efficient frontier.

Already I have, I explained you this– what do you mean by this efficient portfolio, and already, also we have seen that when we can say that one portfolio is efficient or not, but here, whenever you talk about the efficient frontier, the efficient frontier is nothing but– it the set of portfolios with the maximum rate of return for every given level of the risk, or the minimum risk for every level of return.

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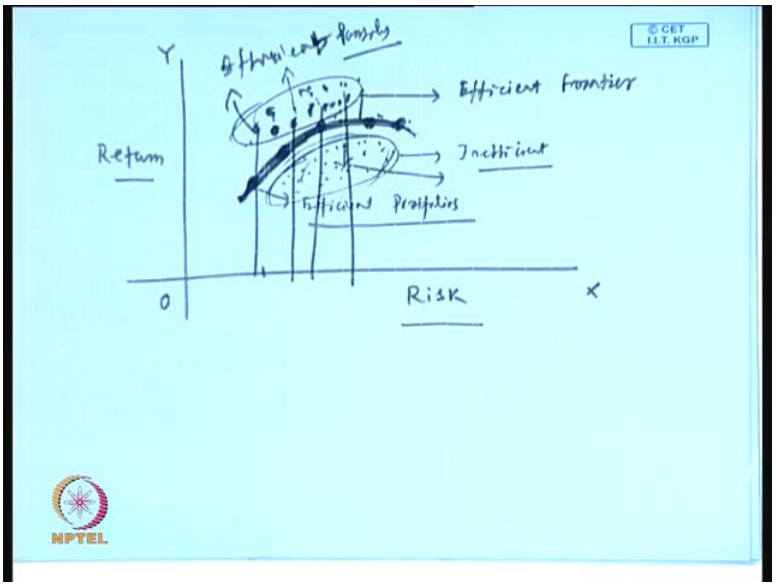

So, frontier means, it is, basically, a curve. So, here, if you say that this is your risk and this is your return, what Markowitz was trying to say that you must be deriving certain stocks. You must be deriving certain stocks, which can give you to different level of the return with given level of the risk, or we can say that different level of the risk with a given level of the return.

So, in this context, if you make this tradeoff between risk and return, then you will have the different portfolios in various points, and this different portfolios in various points are, basically, nothing but these are all the efficient portfolios. These are all efficient portfolios, and already, you know what do you mean by this efficient portfolio, that this efficient portfolio or the particular portfolio on which we can maximize our return with a given amount of the risk, or we can say that the… we can minimize our risk with a given amount of the return.

So, if this is basically the set of all those portfolios, and if you join this, so this particular curve is defined as the efficient frontier. This particular curve is defined as the efficient frontier.

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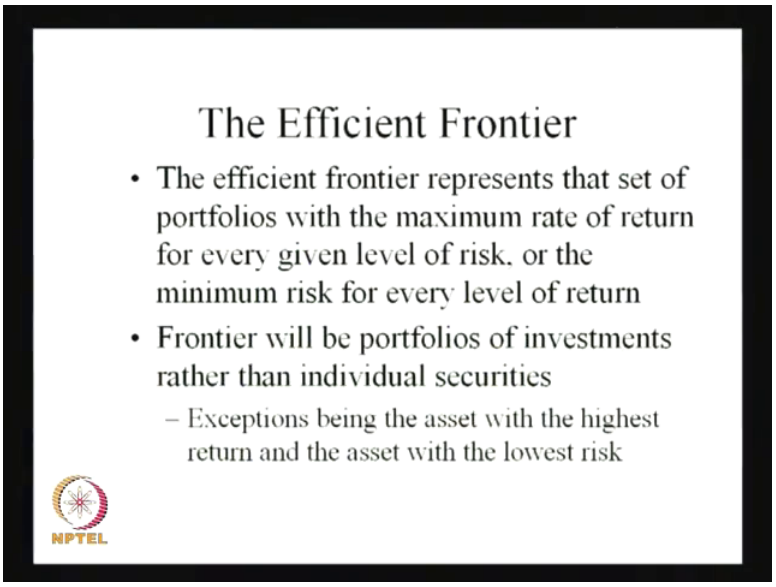

So, frontier will be the portfolios of investments, rather than individual securities, or basically, it is the portfolios, already, we said that expectation being the asset with the highest return and the asset with the lowest risk.

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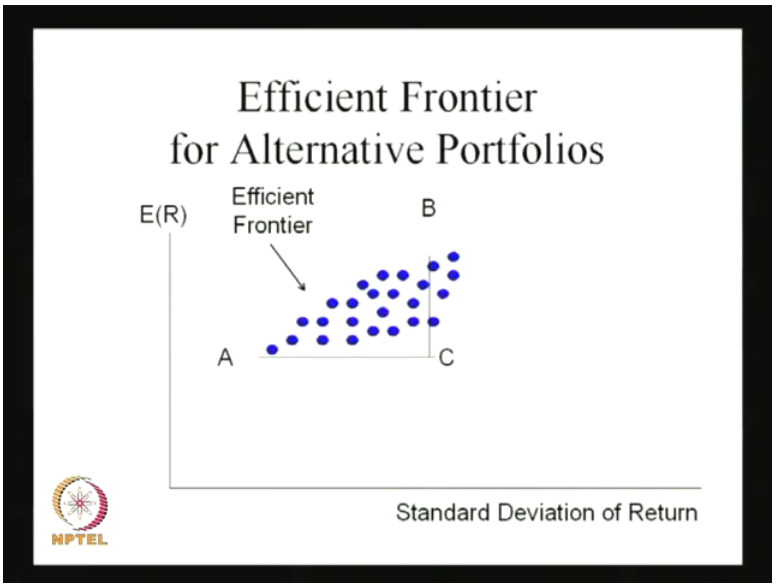

So, this is if you see that they already I have drawn this curve. Maybe, you will find some of other portfolios here. There are certain portfolios here, but very difficult to find the portfolio in that side if you find this, then, obviously, these are the better. These are the the concept of efficiency will be more, in this case, than this.

So, more things you will be get in the lower side of this. So, what you can see, this is, basically, the particular risk and return if you make, then you will find a graph like this, and which is basically the efficient frontier of the alternative portfolios. So, any portfolio, if you see, this is your efficient portfolio. Already, we have said these are the efficient portfolios and this is your efficient frontier, but what Markowitz has said that any portfolio that lies on the upper part, already, at what I have told you, that any portfolio which lies in the upper part of the curve is efficient– these are all efficient.

These are also efficient portfolios. So, these are any curve any particular portfolio which is above the curve these are all the efficient portfolios and it gives the maximum expected return with a given level of the risk.

So, better you should identify that certain portfolios, which can, with a given level of the risk, it can maximize your return. Then any portfolio, which are below this particular line, like these, or this cluster, is basically inefficient. These are not the efficient portfolios. These are can defined as the inefficient portfolios.

So, rational investor will only ever hold a portfolio that lies somewhere on the efficient frontier. The maximum level of risk that the investor will take and determines the position of the portfolio on the line. But always, rational investor tries to find out a particular portfolio on the efficient frontier. It is because on the basis of the risk appetite, on the basis of the risk appetite of the investor, on the basis of the market situation, this is the best available combination– these are the best available combination– what the investor has, as compared to the other assets, whatever they have.

So, that is why they always prefer to have the portfolios on the efficient frontier than any other place, to derive their maximum utility from that portfolio allocation process, and already, what I have told you that from this risk-return tradeoff, you can have the different combination of the assets, and from the different combination, you have different level of the risk and return.

But, if you have the different level of the risk and return, what, generally, what we can see from there, that how this particular level of risk and return, and on the basis of the risk and return, whatever portfolio you have taken that can maximize your utility, or your utility can be maximized on the basis of that level of risk and return.

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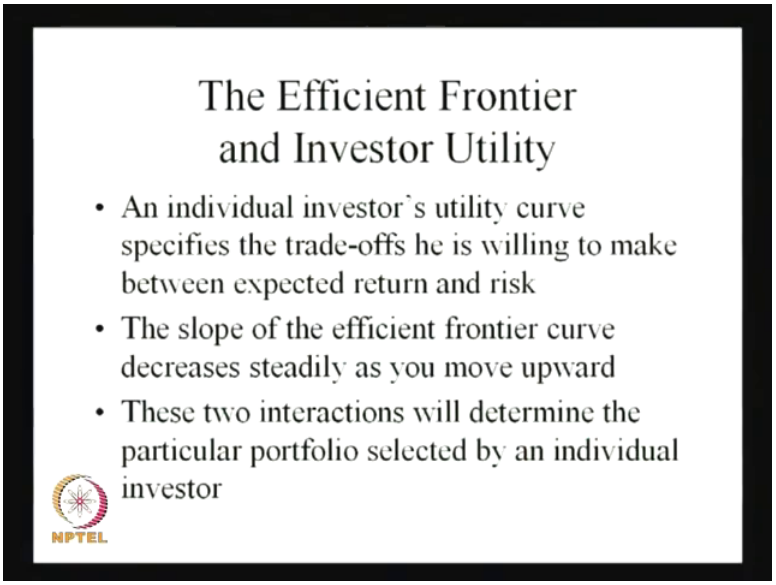

So, in this context, you have to make a relationship between the efficient frontier and the investor's utility function. So, one investor, particularly, if you see the investor's utility curve specifies the tradeoff is willing to make between expected return and risk.

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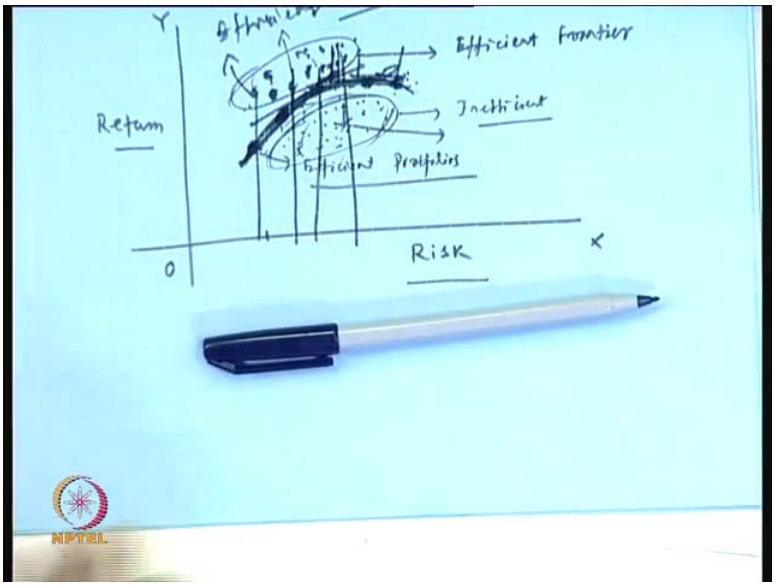

So, the slope of the coefficient frontier curve decreases steadily, as you move upward. Definitely, whenever you move upward, definitely, you will find that the slope of this particular frontier curve will go down, because these are the different slope what we always calculate. So, in this, if you see these different slopes, this particular slopes goes down over the period of time. And these two interactions will determine the particular portfolio selected by an individual investor.

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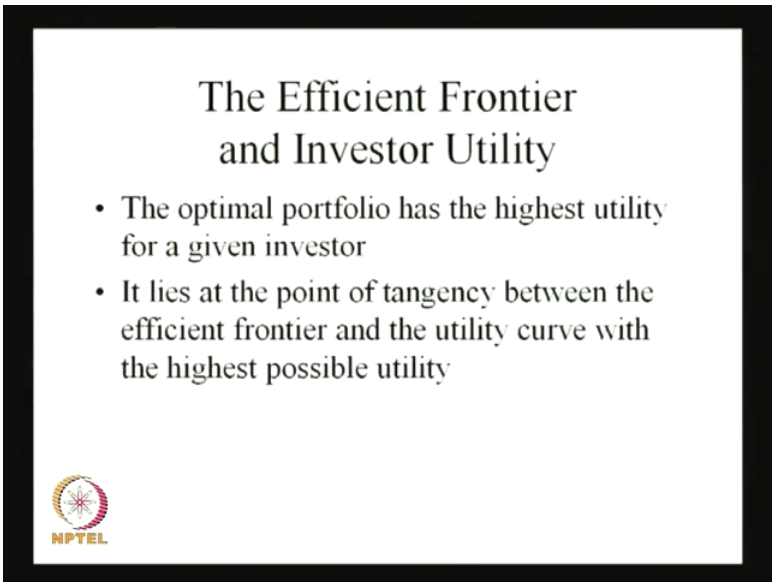

It will more clear if you see the graph, what are the curve what you can draw. So, let us see that what are the other things happen, that the optimal portfolio has the highest utility for a given investor. Already, I told you the concept of optimal portfolio, which is popularly used in the investment management literature or the portfolio management literature, and it lies at the point of tangency between the efficient frontier and the utility curve with the highest possible utility.

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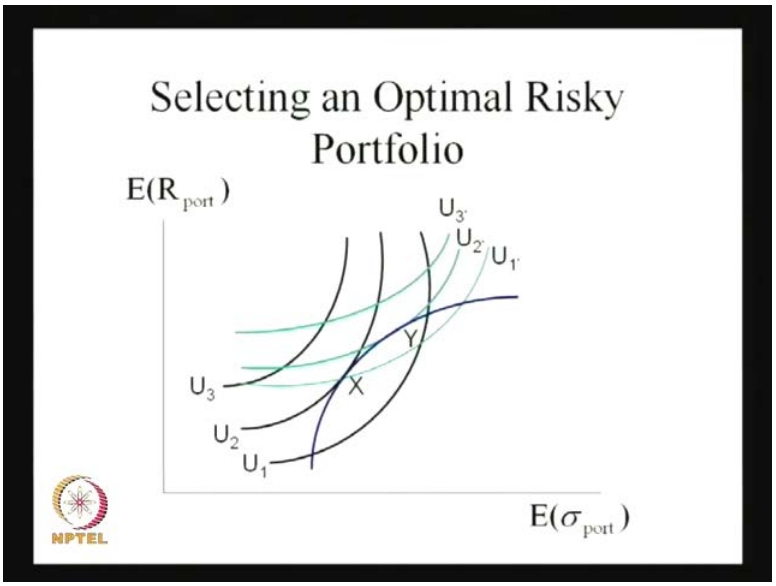

You just see this graph, which can give you the fair idea what, basically, we are trying to explain. Here, if you see, this is your expected return from the portfolio, and this is your expected risk from the portfolio, and if you are see that the various investors or the various consumers which are available in the market, these are the different utility curve they have, or satisfaction curve they have, on the basis of the tradeoff between the risk and return.

So, these are the three curves– the U 1, U 2, U 3. Then, what you can see from these, that this is three curves, and another three curves is here– U 1 prime, then U 2 prime, then U 2, U 3 prime. Then, if you say this U 1, U 2, U 3 curves, what this particular investor has on the basis of the different level of the risk and return tradeoff.

Then here, if you see, and this blue line, basically, tells you this efficient frontier, and what generally, basically, we have observed here that in the first case, whenever the utility curves will be U 1, U 2, and U 3, then the optimal portfolio we can get at the point X, because here the efficient frontier is tangent to the maximum utility you can derive here, but gradually, this utility goes down. So, that is the concept of marginal utility, what we talk about diminishing marginal utility. If you go on increasing in this line, then your utility will be declining.

So, that is why, if you add more and more money on this in this different portfolios, whatever we have in this efficient portfolio, efficient frontier, then what we can see that gradually, this particular level of utility goes down. But here, if you observe, this is the maximum utility what you can derive at point X, whenever your utility curves are U 1, U 2, and U 3, but for example, if your utility curves are U 1 prime, U 2 prime, and U 3 prime, you just see that again, second case, if you see your utility– maximum utility– were deriving at point Y, and in this case your expected return will be more, and as well as the expected risk also will be more from this particular portfolio.

So, that is why, once your expected risk as increased, obviously, the expected return also has increased. So, therefore, X and Y, in this case, are the two optimal portfolio situations on the basis of the different utility curves of the investor has. So, here, what we can conclude from here, the investor can maximize the utility, when this efficient frontier will be tangent to the utility curve of that particular investor. So, always investor tries to achieve this point.

But how this point can be achieved? That is the problem, actually, the investor faces, always, in the market in the practical manner. So, this is, basically, the investment strategy what generally we always follow, and two investment strategies are followed to arrive, or to attend this particular point in the market, in the practical manner. That we will see further, when you talk about the investment strategy.

So, in the efficient frontier, if you have the different portfolios and all the portfolios are the efficient portfolios, but the investor will prefer to attain these or this portfolio, depending upon the utility curves. It is because this is the maximum utility you can derive, on the basis of the risk-return tradeoff or the on the basis of the risk appetite what the investor has, and as well as the how much return can make him happy, or make him maximize the level of satisfaction, whatever he wants to derive.

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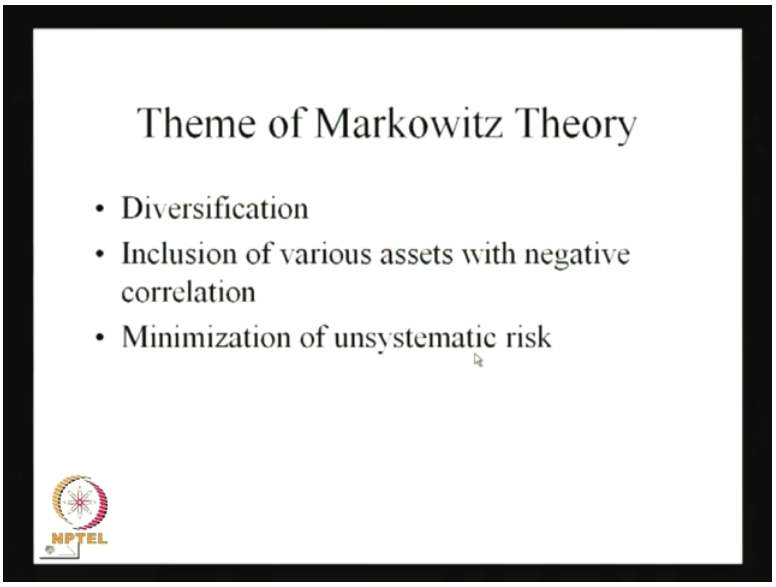

So, therefore, using this concept, if you want to really read the this central theme of the Markowitz theory, the central theme of the Markowitz theory is, basically, nothing but Markowitz is always talk about three important things– one is your diversification. Then, how we can do the diversification? So, the basic way of making diversification, according to Markowitz, is inclusion of various assets with negative correlation.

So, you decide those assets what we can include in our portfolio, which are negatively correlated, and what risk you can minimize through that. That, actually, Markowitz has said over through this diversification, we can make our unsystematic risk zero, sometimes, or it may be we can minimize, or we can say that we can minimize the unsystematic risk from this diversification process.

So, what according to Markowitz theory, that the basic philosophy of Markowitz theory is, you can make your best allocation of the portfolio on the basis of the diversification. So, if you diversify your portfolio or you have varieties of assets in your portfolio, so, then, you can minimize your risk. And how you can make the diversification? The diversification only can be made by identifying those assets, which are negatively correlated, or they do not have… they do not move together, or if they move, they move in the opposite direction. So, those are the things Markowitz has given, and through this diversification, how you are minimizing the risk, and the risk minimization is possible only when you can minimize your unsystematic risk.

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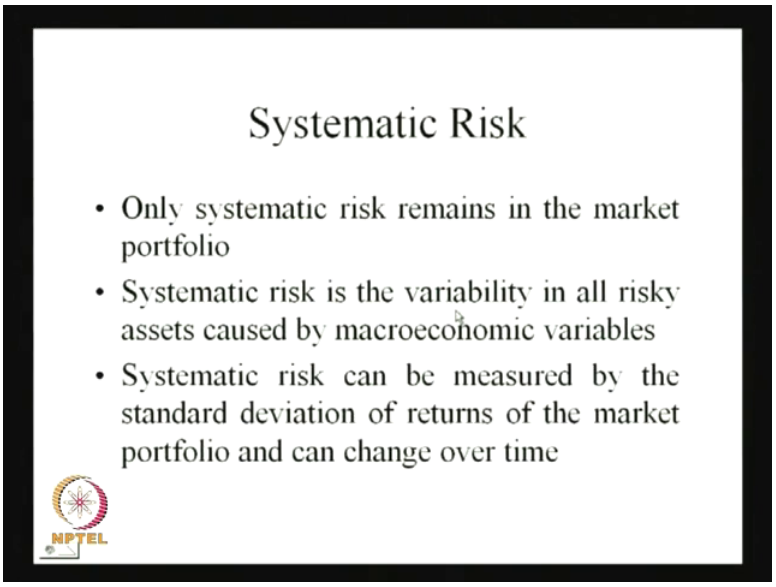

So, then the question arises– what do mean by the unsystematic risk, and what do mean by the systematic risk? I hope, some of you must be aware about these things, but still, I will just give some brief idea about that what exactly the systematic risk and unsystematic risks are.

Systematic risk, basically, nothing but the market risk, or we can say the risk which is available to all the assets, which are available in the market. So, according to Markowitz, the systematic risk remains in the market portfolio, because why, why the systematic risk remains in the optimal portfolio or the market portfolio? It is because that we do not have any control. We do not have any kind of mechanism through which this market or the systematic risk can be minimized, and because it is driven by certain factor, so, which is out of control of the investor, or out of control of the individual company. So, basically, it is driven by certain factors which is macro specific, or we can say the macroeconomic variables like growth rate of the G D P, like your inflation, like your interest rate– these are the different variables what, basically, affects the risk level in a macro sense means, what I mean, it affects to all the stocks– it affect to all the assets– whatever available in the market.

So, therefore, if anything can be done, or any kind of strategy can make, we can make only the strategy which can be removed, specifically, for that particular stock, or for that particular company. But if all the companies are affected by certain variables, we all the

companies are affected by certain regulations by the government. Certain variables are regulated or affected by the liberalization process of the country; if you take the example in the case of India, then certain variables are affected by, or the certain stocks are affected by change in inflation rates.

Or. So, and. So, factor which are basically macro in nature, whole economic in nature, then all the stocks are affected. If all the stocks are affected, or all the assets are affected, then nobody can do any kind of thing with that.

So, therefore, we have to face that risk, and how that risk can be minimized? Markowitz has not talked about that, and it is not possible, also, to minimize that particular level of the risk. So, in this context, what Markowitz said that we should…, we cannot minimize the systematic risk.

So, systematic risk is the variability in all the risky asset caused by macroeconomic variables. What I already told you, a systematic risk can be measured by the standard deviation of returns of the market portfolio, and can change over time. So, that particular part, we will see further in a detail manner, what, exactly, and how the systematic risk can be measured, and how… what is the basic role of the systematic risk in the portfolio management process.

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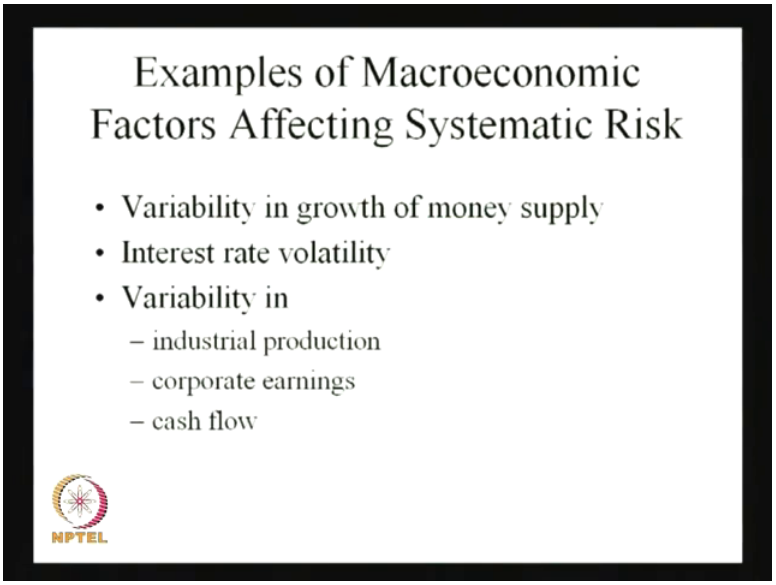

But here, what basically, in this context, we are trying to show that which are those factors which can affect the systematic risk. Already, I told you that variability in growth rate of money supply, interest rate, volatility, variability in the industrial production, corporate earnings and the cash flow, and as well as the inflation also– that part is not mentioned here– but you remember that another part is inflation.

All of you know that if you increase the money supply, the price level increases. Through money supply, basically, again the we are bringing the price stability or price into the picture.

What, generally, we can say here that if you increase the money supply, then the price level will increase. If the price level will increase it has the larger impact on whole economy. So, if it will have the larger impact on the whole economy, obviously, all the stocks all the assets will be affected by that.

Therefore, we can say that one of the major factors, which can affect the systematic risk, is variability in the growth rate of the money supply. Then interest rate volatility– in general, always, we what we say that interest rate is not administered, or the regulator does not determine the interest rate. Basically, interest rate determined by the market.

So, the demand supply force, which determines the interest rates, and if your interest rate changes frequently, then it is the most vulnerable risk, or we can say, the most unpredictable risk what the investor always face in the market. The investors always feel that the there is a expectation that the invest… the interest rate will go up, and there is another expectation interest rate may go down. So, depending upon that, nobody can predict that how there are certain prediction process, there are some forecasting method through which, you can say, whether the interest rate go up or go down.

But it is so unpredictable, or the expected behavior of that particular interest rate is so unpredictable. That it is very difficult to predict that what is the direction of the interest rate, or how this interest rate is going to be… going to behave in the future. Therefore, what we can say that we cannot do anything with that, although we take some precautionary motives on that. We take some precautionary steps on that, but still, it is very difficult to predict the interest rate in an exact direction, in the definite direction.

If it is difficult to forecast the interest rate in a definite direction, then it is very difficult, again, to talk about how this interest rate will behave. So, therefore, if once the interest rate will be changing, then your different assets, like your bond, like your stock, everything will be affected.

And once this all the stocks and all the bonds will be affected by the change in the market interest rate, what we are talking about, then, obviously, the risk level of all those assets will be changed. If the risk level of all those assets will be changed, then, obviously, what will happen that the investor will be in the dilemma of what to do, what not to do.

In that context, what we are trying to say, that we should take the precaution before, but that risk cannot be avoided there, because that the prediction, the direction of this particular change in interest rate is very difficult to predict in the market.

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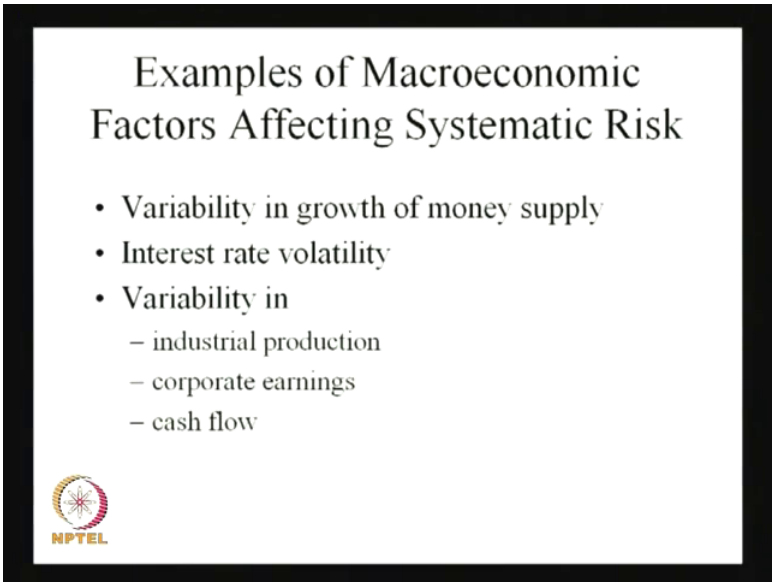

And the variability in the industrial production– already, we know that because industrial production is directly a link to the stock market performance, or we can say that our corporate sector performance. So, industrial production rate is one of the important factors. If there is a change in industrial production, obviously, all the companies will be affected. If all the companies will be affected, then, definitely, what we can say that all

the stocks and all the assets will affected by that. So, obviously, we cannot do anything with this.

Corporate earnings– you know that– what do you mean by the corporate earnings? It is, basically, the return earnings of the corporate savings, which is the major part, or which should be the one of the most important source of finance for the company, but sometimes, because of some external factors, or maybe because of the own companies, some kind of situation, the corporate savings goes down, and it is… if it is for the macroeconomic factors like political instability, or like international market failure, etcetera, then we cannot do anything with that.

Then, another thing is a cash flow, which is, basically, the total macroeconomic sense how the cash is coming and going, or we can say the FDI investment, FII investment, etcetera. Then, all the assets must be affected by that. So, therefore, again those kinds of things is not in control of this particular company, or the issuer of that particular… the issuer of that particular instruments. So, therefore, what we can say, those are the different major factors which determine the systematic risk in the market.

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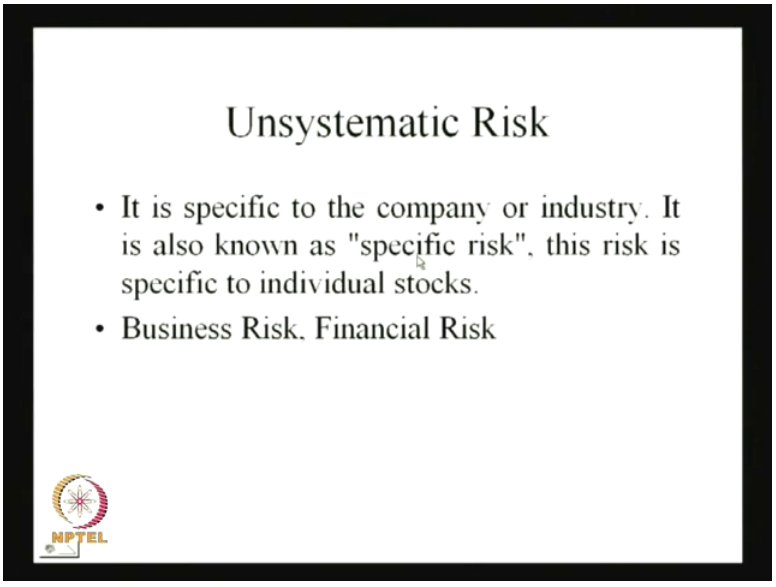

Then, another type of risk– already measured broad type of risk– is the unsystematic risk. What do you mean by this unsystematic risk? It is, basically, the sometimes we call it the specific risk or very individualistic risk or individual risk– all that different names

people use to analyze this unsystematic risk. It is, basically, it is specific to the company or the industry. It is also known as specific risk. I already told you the risk is specific to the individual stocks or individual company.

So, here what happens that, for example, there are certain risk or certain things which happens to the company, which are specific to the company itself, for example, you take the case of… recent case of any of the company– let one company is acquiring another company. You take the example of Tata acquiring Jaguar; you take the example of the company like a Tata and Corus; you take the example of Arcelor and Mittal.

For example, this is the case. So, because of the acquiring process, because of the merger and acquisition, if you take the one example, in this case, what is happening if some risk this company is facing or some kind of the benefit the company is getting? Particularly, we are we are we are talking about the risk– that is why, we always focus on the risk part. Whatever risk the company is facing, it is basically the specific to that company. It is no… No other company is going to be affected by that.

So, in this process, what here the we, as investors, are trying to see that if I want to take a position, or I want to invest on this Tata stock, or it is Arcelor Mittal stock, etcetera, etcetera, then what we have to see that, if I will predict that something is going to happen with that, then I should take the position in other company, which not in the process of merger and acquisition.

So, then in that process, what I am saying, whatever risk I am going to face because of this, that risk can be adjusted in another stock what I am going to invest. Here, what, generally, other type of risk you say, that even the unsystematic risk is related to some of the particular any kind of situation, any kind of things which is happen to that particular company, but which is not in other cases. Maybe another example– let you take the leverage. The debt ratio of Lehmann Brothers was quite high, but the debt ratio of another company is not. So, the financial risk what the particular company is facing– so, that particular risk is not available to another company.

So, if I will have a position in another company, which has the low debt ratio or the financial risk level is very less, because debt ratio is the major source of the financial risk. In that way, what I can do, I can minimize my risk by taking a position in another

stock. So, therefore, what we can say, these are, basically, the unsystematic risk which are specific to the company. Even some people say, if some kind of management changes has happened, for example, the CEO has resigned. Then, if the CEO has resigned, it has the impact on that particular stock. It may not have the impact in other stocks.

You just take the example of any kind of risk which is related to the sales. You about a company– let this is a company which is very seasonal. One particular season, the company sales are more, that is why the balance sheet quite strong. If the balance sheet or the property loss account is quite strong for that company for a particular period, it may not possible in the next next time, or maybe because of some natural calamities, this particular profit has been hampered, but it is not happening to another company.

So, the risk what that company is facing, the same level of risk the other company is not facing. So, therefore, what we can say, the risk is specific to that company, because of the less sale of that particular product, or this particular product what the company is producing is not saleable, or the demand for the product has gone down, or maybe, the financial point of view what you can say, the leverage has gone up. That is why, it has more financial risk, but another company, which has leverages very low– that, we can say, the financial risk is very low.

So, even any of the times, any of the very peculiar characteristics, sometimes, which happened to the company, or it may not affect to another company. Therefore, what the investor can do, if the investor is making the portfolio in such a way that if he has the position in those kind of companies, or he is investing in those kind of companies, what sometimes, will happen that he will take the position in such a way that he should have the position in those stock, and as well as another stock, to minimize his risk in such a way, because if it is facing more risk here, that risk can be minimized in other places, or that can be adjusted in other cases. But, if he will have the same kind of assets or same kind of companies in his portfolio, or the same type of risk every company is facing, then he is not able to minimize his risk or minimize…, or you can adjust the risk in that particular case.

But even if this CEO is resigning, or even if this debt he could receive is more, and even if the sales figure is quite high, and the another company, which have does not… which

does not have this kind of characteristics, but they cannot free from the market risk, because the market risk what the just now we have we have discussed, they are not free from that kind of risk, because they are within the system.

And if the system or the economy is changing in that direction, then they have to follow that, and all the company will be affected in the same manner. Therefore, what Markowitz said that always this investor objective is to minimize the unsystematic risk. So, unsystematic risk can be minimized; systematic risk cannot be minimized.

So, therefore, to remove the unsystematic risk, we have a very straight forward novel strategy, that is, the diversification and the over diversification is, we have to take some kind of stocks or some kind of assets, which are negatively correlated. If there is a negative correlation process, say, happens in that, and if you find the stocks, or find the assets which are highly… they do not move together, or they can say that even if they move together, they move in the opposite direction, or fortunately, if any kind of investor can get a negatively– highly negatively correlated stocks or negatively correlated assets, then it will be beneficial for him. It is because of this logics or these arguments, what we have just now discussed, because of that they can minimize the risk.

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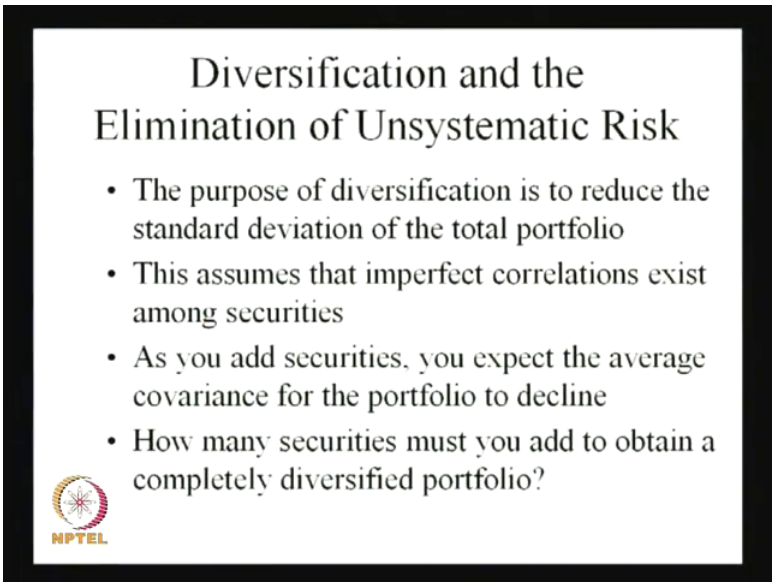

So, in this context, if you see that how this happens, it happens in this way– the purpose of diversification, therefore, is to reduce the standard deviation of the total portfolio, and how it happens? It happens that the imperfect correlations exist among the securities, therefore, if one stock is increasing, another stock is declining. So, if the that way, generally, somewhere the risk can be adjusted. So, as you add on securities, you expect the average covariance of the portfolio to decline.

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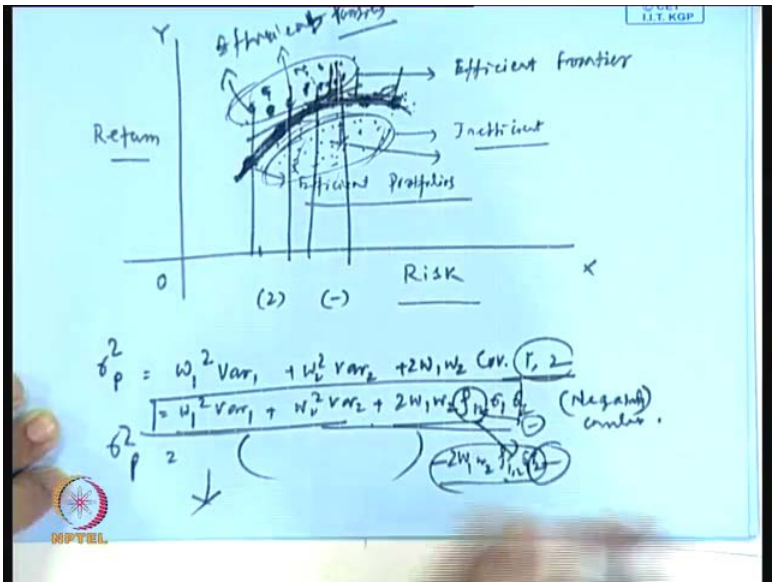

It is very easy to say where it is. Already, we have seen this, because this is your variance. What we have said, for example, you have two stocks in your portfolio, which are negatively correlated. Then, your variance of 1, and W 2 square of variance of 2, plus 2 W 1 W 2 covariance of 1 and 2.

So, there what we have seen, for example, these two are negative. If these two are negative, r and 2 are negatively, negatively correlated. Then what we can see, it is basically W 1 squared variance 1, plus W 2 squared variance 2, plus 2 W 1 W 2 correlation 1 and 2, then the standard deviation of 1 and standard deviation of the 2.

But here, if this term will be negative, then even if these two will be positive and this will be deducted from this, then obviously, what will happen? The total portfolio– the value of the portfolio– will go down, because this part will be minus 2 W 1 W 2 rho 1 2, and standard deviation 1 standard deviation 2. Therefore, if this part we can make it minus, then, in overall portfolio, the total risk can be minimized.

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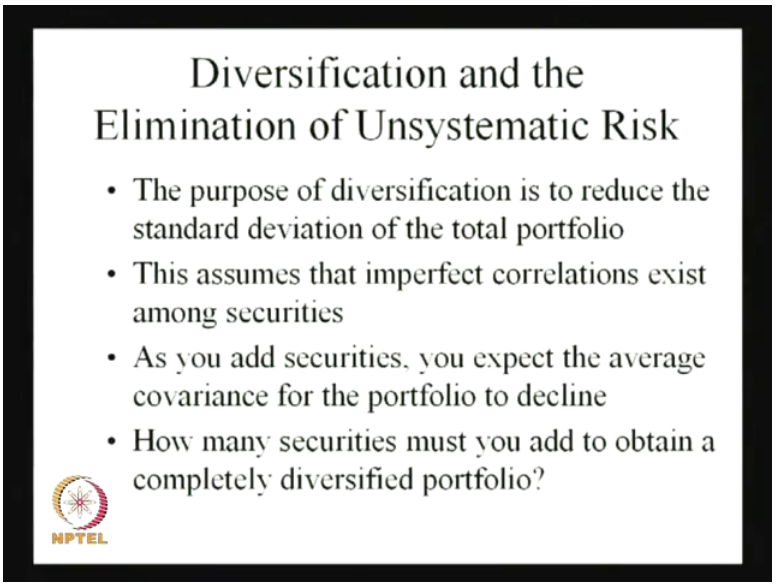

That is what what Markowitz was trying to explain. So, as you add on securities, we expect the average covariance for the portfolio to decline, because they are negatively correlated. So, the question is– how many securities must you add to obtain a completely diversified portfolio? That we will see in the further session, whenever you discuss about the optimal portfolio.

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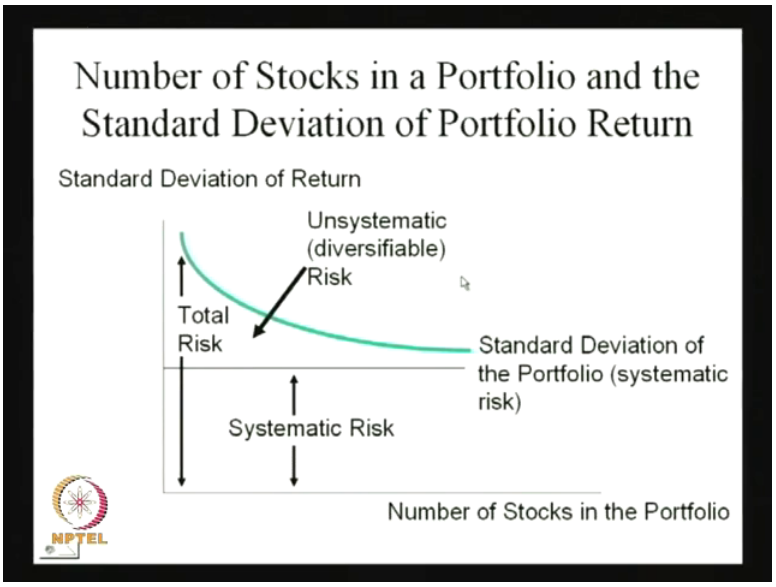

So, here, if you see this diagram, it will be more clear for you. What you can see here are the number of stocks in portfolio and the standard deviation of the portfolio. So, here, it is basically the number of stocks what we have taken in the X axis, and this is your total risk or standard deviation of the returns.

So, what we have seen that this part will be your systematic risk. What we have seen, that the systematic risk cannot be eliminated. Whatever we have now discussed, that this is because of the macroeconomic variables, because it it affects all the stocks.

Then, you have the standard deviation of the portfolio, whatever we have over the period of time. So, this is the total risk, whatever we have. So, in the beginning, whenever we have, only single asset– this much risk we have. You go on adding another asset, then the risk level has go down, go down, go down, go down. Then, if you add on number of stocks, according to Markowitz, if you go on, number of stocks you add on, then you find that sometimes, your risk level will go down if it perfectly merged with this line. Then, you can say that this is the maximum level of risk what you can eliminate. So, here, still this particular grid line is not touching to this line. That means, still some level of risk is involved– some level of unsystematic risk is involved in this case.

So, therefore, if you go on adding another some amount of the stocks if you negatively correlated stocks, maybe you can make it possible, which can correlate, of which can

merge with this particular line, because this much risk we must have, because this part, basically, talks about the systematic risk.

So, ideally, if you ask the question that how many stocks are required, so, according to the study what Markowitz has made, there are 25 to 30 stocks which are ideal, which can minimize the risk, or which can minimize, which can make you optimal portfolio, where the… if you perfectly get some thirty stocks which are negatively correlated, then you can diversify the total unsystematic risk, and only the systematic risk part will be there, which can give you the best possible returns.

But, there are other issues involved in this case. So, what we can see, basically, here we can conclude that Markowitz talks about the diversification theory, and through diversification, we can minimize the risk, but we can we cannot minimize that this level of risk, which is involved in terms of the market risk, or we can say this systematic risk.

So, finally, what we can diversify that is your unsystematic risk, which is specific to the company, maybe another company is not affected by that. In that case, if you go on adding the number of stocks in the portfolio, then this particular line will be merging to the systematic risk line, somewhere. By that, we can say that the all the unsystematic risk has been eliminated from these, and we can get the best possible portfolio, in this case.

So, therefore, what here we can say, this is the theory what the introduction to the portfolio theory what Markowitz has given. Then finally, and gradually, we will be talking about the different other concepts which is related to the portfolio, like your different capital market theory and the other theories, which talks about the different factors, different variables, which can affect the return of the portfolio, as well as the individual securities. Thank you.