Investment Management
Prof. Abhijeet Chandra
Vinod Gupta School of Management
Indian Institute of Technology, Kharagpur

Lecture - 27
Market Efficiency (Contd.)

Hi, there. So, we are discussing about Market Efficiency as a concept that can be applied for portfolio construction as well as undertaking a decision to buy or sell any financial security. In this session, we will continue our discussion on Market Efficiency and we will see what advantages it has for an investor to understand the market efficiency the concept.

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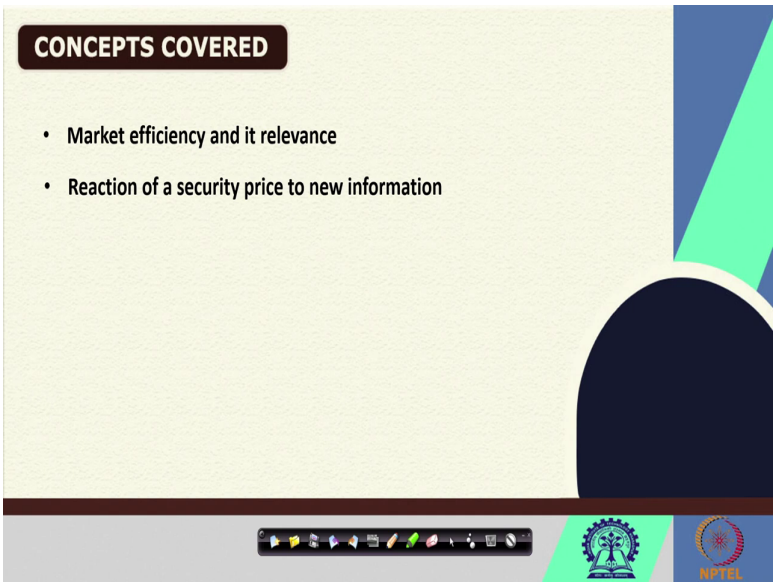

Basically, we will talk about market efficiency and its relevance. We will also see how a security prices react to the new information and what tools can be applied for understanding this or testing this market efficiency as a tool.

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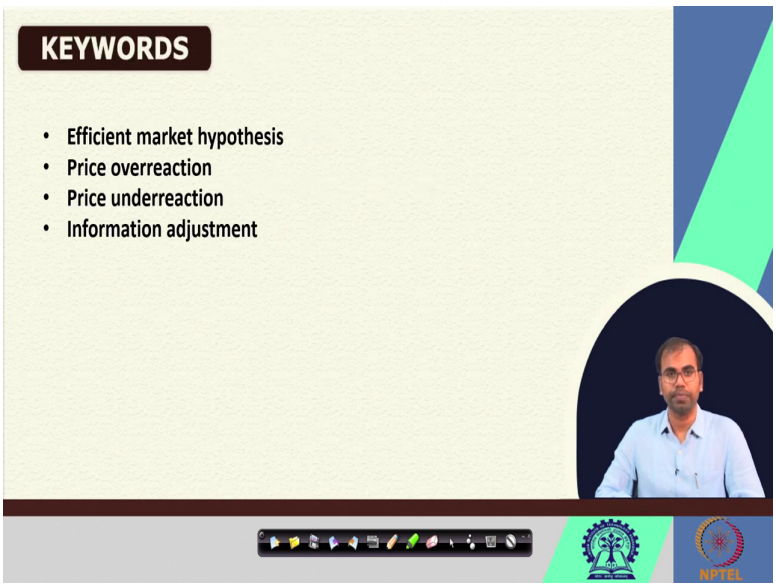

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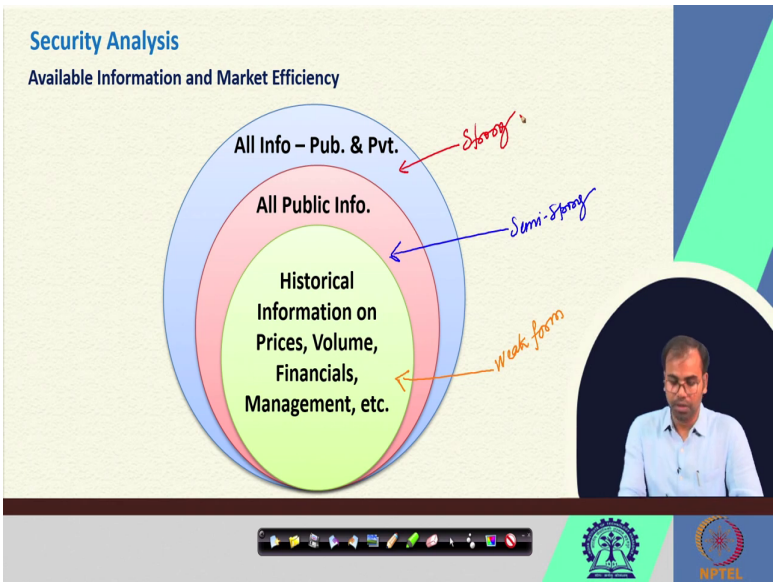

When we talk about available information and level of market efficiency, essentially, we talk about information that are historical particularly in terms of the price data. Let us say the price of a security, the trading volume, financial management and other information related to a particular security and this can be considered as the basic information or the bare minimum level of efficiency in terms of information absorption in the security prices.

When it comes to the next level of efficiency, we have all publicly available information including historical information on prices, volume, financials and management. When it comes to the next level of efficiency, it includes not only historical information on prices, volume, financials, management, governance etcetera, but also all the publicly available information.

And privately available information also or rather I would say the implications or impact of any information that can be seen only in future which means the market should be able to cause the effect of any information coming in the future. Now, these three level of information can be considered as three level of efficiency. We can call this as weakly efficient, weak level of efficiency or weak form of efficiency.

We can consider this particular sphere as semi-strong form of efficiency and this particular space can be considered as strong form of efficiency.

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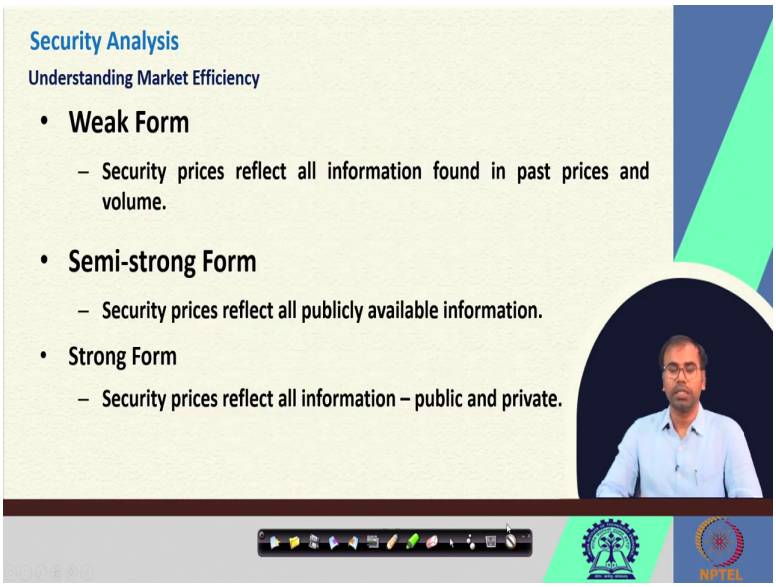

Now, we have already seen previously that the markets can be of three level of three level of efficiency they can follow three level of efficiency particularly the markets or the securities that reflect only the private, the only the historical information on prices and volume are

known as weakly efficient market which means in such market security prices reflect only the past information or historical information on share prices and trading volume.

In second level of efficiency that is strong semi-strong form of efficiency of the market. Security prices reflect all publicly available information and finally, strongly efficient market where security prices reflect all information both public and private.

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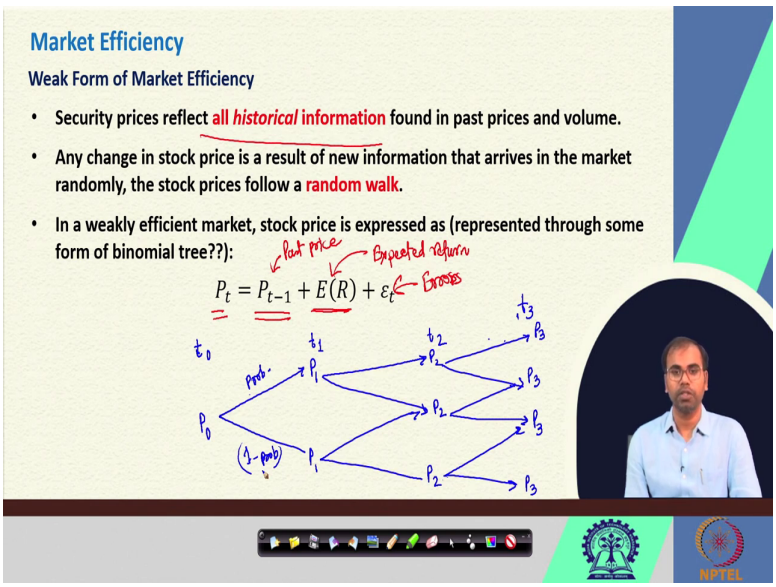

Now, when we talk about weak form of efficiency or weak weakly efficient market, we have seen that in weakly efficient market, security prices typically reflect all historical information which means the information that are available from the past on prices trading volume that should be reflected in the security prices and any change in stock price is a result of new information that arrives in the market randomly.

We do not know when the prices might react to any new information because we do not know when the new information comes to the market and that information can be about anything that may be remotely related to the stock or security. For example, the information about change in a president in some other country can have some implication for businesses in India and that information coming to the market at a random point of time will result in a random reaction of the stock prices in Indian Stock Market.

And, that is why we call a stock prices following random walk particularly in the financial market. We can also understand by this argument that in a weakly efficient market stock price is expressed as the following equation where we have price at time t that is today is basically nothing, but price at time t minus 1 that is yesterday for example, plus expectation of return or expected return and some error term some error.

So, basically the price today is past prices or historical price plus expectation of return or expected return and plus some error in terms of expectations. And, these three constitute together the price today. If you want to understand it through some or some form of binomial tree let us say most of you must be familiar with the binomial tree and you know that in the context of stock prices if we have different time points let us say t 0 and t 1 and t 2 and so on.

So, if price at t 0 is price 0 and price at t 1 can be it can go up or it can go down. Similarly, at price at time 2 it can go from here to here or it can go from down. Similarly, if price 1 was here at time t 1, then it can go to this level or it can go to this level as well. Similarly, in case of time 3 we know that if price at time 2 was P 2. So, it can go upward at this level or it can go to this level.

Similarly, it from if it were at time 2 at this level P 2, then it can go from here to here or it can go further down at time 2 if the price was this much, then it can either go upward or it can go downward and so on. And, this way we can forecast the prices at time t n and if we know by any means the probability of prices going up or down, we can assign certain probability and we can use this approach to understand the price that can be; that can be determined today.

So, with this approach we understand the price today is nothing but some deviation of price yesterday and subsequently we can determine the prices as well. So, but this is typically expectation in terms of weakly efficient market where we know that the prices will reflect only the historical information or any change in price of a security is basically a result of any new information coming to the market at some random point of time and that is why we call stock prices to be following random walk.

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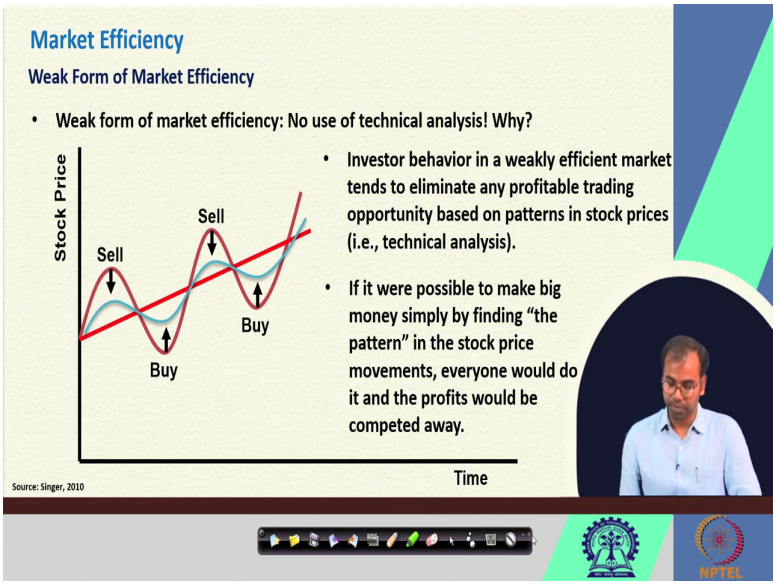

Now, if we already know that in weak form of market efficiency, we do not have the ability or we do not have any advantage of using technical analysis. Basically, the reason is investor behaviour in a weakly efficient market tends to eliminate any profitable trading opportunities based on pattern of the stock prices.

So, if we know that the pattern is going to be repeated, we typically use technical analysis to take advantage of some pattern. So, we know that there are different tools of technical analysis that can be applied to understand or identify trading strategies based on the historical trend.

But, if the stock prices reflect all the information related to or coming from the historical information, historical data then there is no point of having any technical analysis based strategy that is using the historical data. Because all those historical information have already been incorporated in the stock market. And, technical analysis use this argument of trends historical trends being repeated. So, it uses or it proposes trading strategies based on historical information.

But if we believe that current prices are reflecting the historical information that are already available then there is no advantage of using technical analysis for the profitable trading strategies. Because if it were possible to make big money simply by finding the pattern on the historical data in terms of stock price movements, then everyone would already do it and the profits would be competed away and there is no point of applying any further technical analysis in here.

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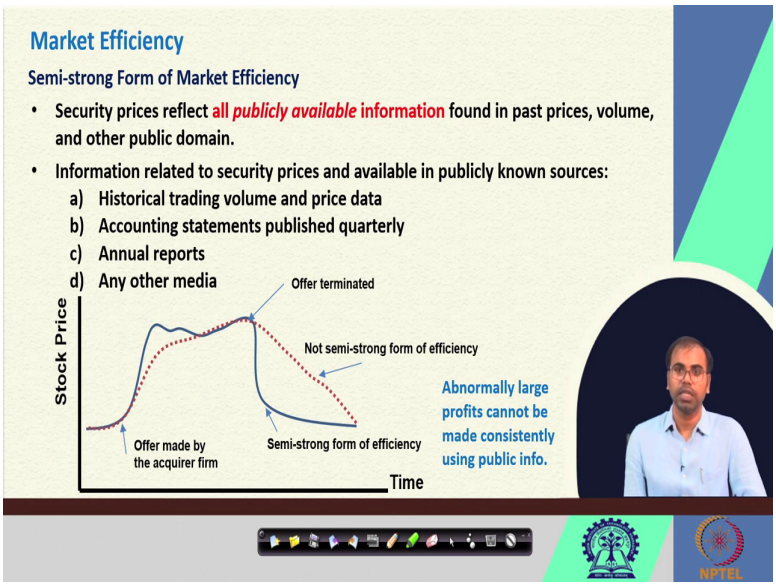

Similarly, if we talk about semi-strongly efficient markets or semi-strong form of market efficiency, it reflects basically all publicly available information related to past prices, volume and other public domain.

And, when we talk about other public domain for information pertaining to us a financial security any information related to security prices and available in publicly known sources such as historical trading volume and price data, it can be available in terms of accounting statements which are public published quarterly by companies.

It can be annual reports; it can be any other media that are making data or information pertaining to a stock available for the public. When we talk about the semi-strong form of market efficiency, we know that the prices react the historical as well as the publicly available

information and there might be some time gap in terms of reflection of those information in the prices.

So, what happens in semi-strongly efficient market is suppose we have a stock which has certain price and there is some sort of event or some sort of announcement to some sort of you know activity happening with respect to the price. Let us assume that this activity is a takeover or an announcement by a competitor to take over or to merge with a particular company.

So, this is the company and the stock price of this company will react to such an announcement in this way. So, the moment when the offer is made or the announcement is done by the competitor for acquisition, we know that if we assume that this offer of acquisition is favourable for the current company's shareholders, then the share prices will react positively to this news which means share prices will shoot up.

Because, investors or traders or the financial market in general see a positive value in the announcement made by the acquirer firm which will be which will assume that when the acquisition happens then shareholders will have additional value in terms of more income in the future. And, that is why the share prices reflect sharply and it grows for certain point of time.

But, let us believe that or let us henceforth assume that the offer is terminated which means the offer is not executed not honoured which means the deal of acquisition does not happen at the end of the day. So, the moment it this announcement about offer termination is made, then stock prices should react sharply and then it will go to the equilibrium which you can see that it was more or less at the same level because of the acquisition announcement the stock prices reacted sharply.

It held it for some time and then the when the offer was terminated when the deal does not happen when the acquisition does not happen then stock prices go back to the normal level and it should react sharply because the information about deal not happening or the

announcement about offer being terminated is happening at this point of time and here the stock prices should react sharply.

If anything, other than this scenario happens, then we can say that this is not a semi-strongly efficient market which means suppose the stock prices move in this fashion. So, which essentially implies that stock prices does not react sharply when the announcement of acquisition was met, it reacted in a slow way.

And, similarly when the announcement about deal not being honoured or deal being terminated or offer being terminated, then the stock prices does not react sharply rather it took certain time to react and that is where the stock prices move slowly downward to the equilibrium level.

So, anything around this line will be qualifying this market as or this situation as semi-strongly efficient and we can say that this particular scenario is semi-strong form of efficiency in the market, and this particular scenario is not semi-strongly form of efficiency in the market. With this understanding of semi form of market efficiency, we can go to talk about strongly efficient markets.

But we know that in semi-strong form of market efficiency an investor cannot make abnormally large profits consistently using the information that are already in public. So, whenever there is this historical information coming to the market and being reflected in stock prices and publicly available information also making impact on the stock prices in terms of sharp reaction, then we can say that it is semi-strongly efficient form of market.

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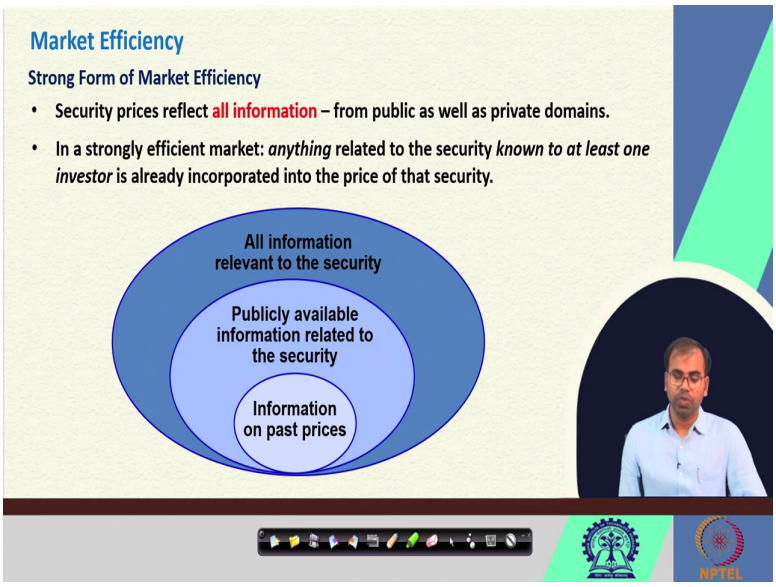

When it comes to strongly efficient market, we know that strongly efficient markets are those markets where security prices reflect all information from public as well as private domain. It essentially implies that in a strongly efficient market anything any information related to the security and known to at least one investor is already incorporated into the prices of that security which means there is no advantage for that investor to exploit on that information and make abnormal profit.

So, in strongly efficient market people cannot make abnormal profit because of the information that is known to anyone else. So, based on this we can say that if we have information on past prices and that information is reflected in the security price security prices or stock prices. This is weakly form of efficient market.

If it is about publicly available information related to the security as well as the information on past prices then we can qualify this market to be semi-strongly efficient market and if all information relevant to the security be publicly available or privately available or any information for which the implication is yet to be yet to be calculated is understood by the market or reflected in the in terms of price changes, then it is called strongly efficient market or strong form of market efficiency.

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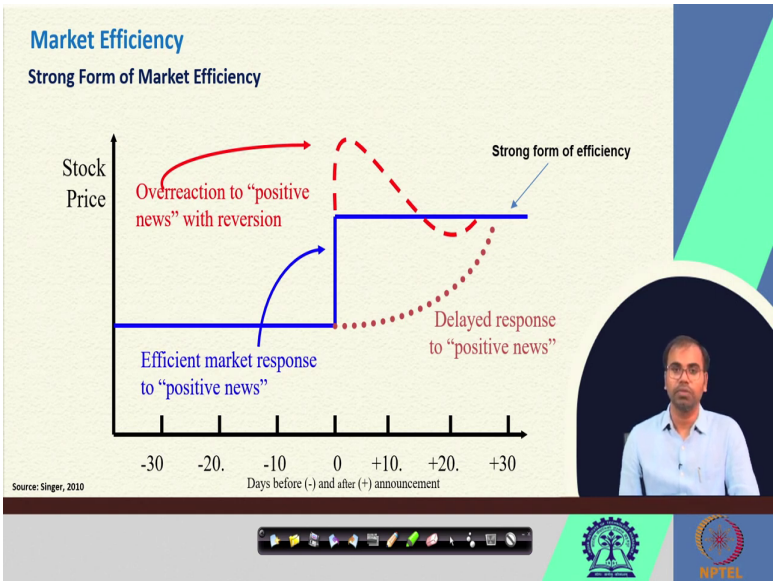

With this understanding, if we try to understand from the previous example where we had a stock which price for which the prices are moving in this fashion till the time when the announcement was made. So, if the announcement is made at this point of time, then we know that if stock prices reacts sharply and it move up to this level and then remains at that level, then we can call this market to be strongly efficient.

And, any deviation from this path would be considered as market inefficiency in terms of semi-strongly efficient market or weakly efficient market. For example, if it is over reaction to the positive news and then there is a correction there is a revision in the prices then also, we can call it non-efficient market or non not strongly efficient market.

And, if the prices react very slowly in a very delayed manner to this positive news, then also, we call it not strongly efficient market. Only this path can be considered to be the situation where we can say the market is strongly efficient or market follows strong form of efficiency.

With this ah example we know now that strong form of efficiency or market efficiency understanding market efficiency for an investor is important because based on the response of stock prices to any new information investor can make money by investing in stocks which reacts slowly, and make money in the process. And, if the market is strongly efficient then there is hardly any chance for any investor to make abnormal profit.

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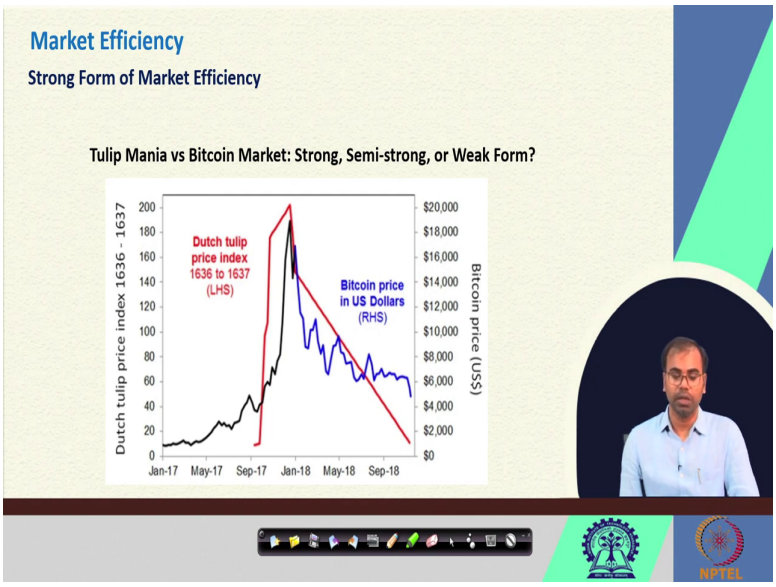

There are situation where we can consider a particular market to be strongly or semi-strongly or weakly efficient. For example, if we see the following graph where we have two major assets one is related to 1637 Tulip Mania where the prices of Dutch tulip or the market tulip market in ah Europe the prices shoot up to that level from where it just fell down on a particular day when the tulip prices tulip was not traded sufficiently and we can see that the market reaction was very sharp the prices fell quickly and subsequently it went down to negligible level.

Similarly, in a different context and a recent example is about the Bitcoin prices where we can see that Bitcoin prices shooting up very high and suddenly with within a couple of days the Bitcoin prices fell so much because of some information some news coming to the market.

So, with these two examples or these two illustrations where we have seen that the stock prices the prices of security be it bitcoin or the tradable asset tulips in Europe the price is reacted sharply because of some news coming to the market on a random day on a particular day when the prices fell down significantly.

Can we call these markets to be strongly efficient or semi-strongly efficient or weakly efficient market? It is another matter that these markets that the markets for these assets for example, tulips as well as bitcoins were having some sort of bubble being formed and that is why the prices went to that level, but the point of discussion here is whether the prices reacting sharply to any news.

For example, a set of countries banning bitcoins or trading in bitcoins coming the this news coming to the market resulted in sharp decline in the prices of bitcoin. Similarly, in case of tulip mania we know that the moment the news came to the market that tulips are not being traded, suddenly the price fell and there was a crash in the tulip trading market.

Whether it is a strongly efficient market or semi-strongly efficient market or weakly efficient market we need to discuss we need to understand further with the help of certain tools that we will discuss later.

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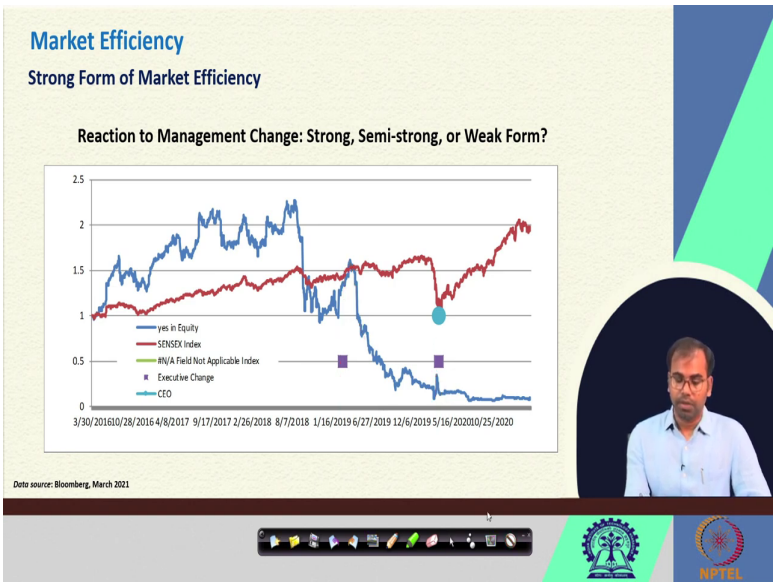

Similarly, a news with respect to management change for example, a change of CEO or retirement of a CEO or for that matter CEO being kicked out of a company can also result in some sort of price reaction that we have seen in a recent example in Indian stock market where we have a company a banking company in case where there were certain time there were periods during which the change of top management or the change of executive happens, and we can see the reaction of the stock price for that particular company.

So, we know here that there are change in executives at this point of time and this point of time at this point of time the CEO also is changed. So, we can see that at this point of time soon after the change announcement the stock prices fell down and at this point of time also the stock prices were picking up, but the moment CEO were changed there is a sharp reaction of the stock prices and it fell down further.

And, we can again debate whether this is a case of strong or semi-strong or weak form of market efficiency. But, the point in focus here is whenever there is a new information coming in the market the prices should reflect the economic value of that information in terms of change in prices and that is what we see in most cases where some event, some information coming to the market some event happening with respect to the company and stock prices reacting to that information or that to that event in a particular way.

And, that shows us the level of efficiency that we have in the market.

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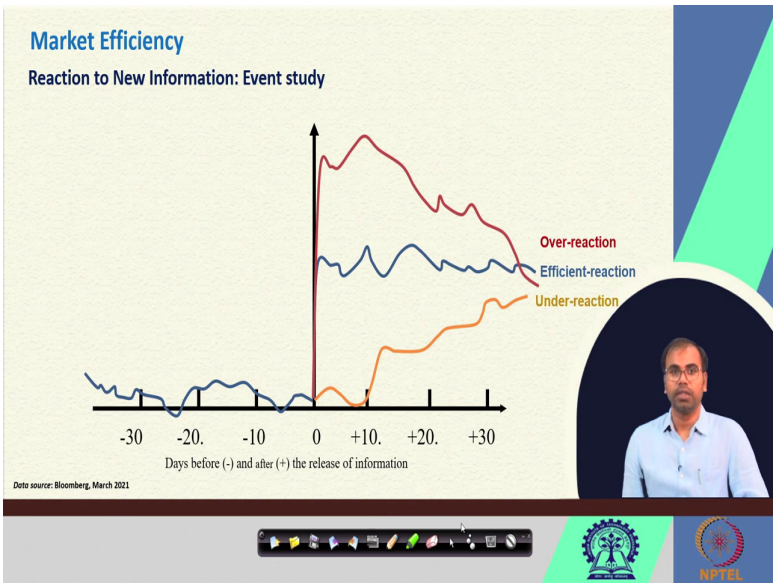

With this, I go to one situation where we have scenario through which we can test how test the reaction or test the level of market efficiency by understanding the reaction to the new

information. So, suppose there is a situation where on day 0 some information is coming or some announcement has been made with respect to the company or with respect to the asset.

Now, if the asset the stock let us say for example, this is a case of a stock and the stock is being traded previously and the price was moving in this fashion where the price was moving in a very random way, very stable sometimes going down, sometimes going up and so on and suddenly on day 0 the announcement is made.

The moment the announcement is made, the stock price can react in different ways and the reaction of stock prices to this announcement that is made on day 0 here let us say on this particular day will tell us whether the market is weakly efficient or semi-strongly efficient or strongly efficient.

So, if there would be a situation where stock price should react in a very efficient fashion, in a very efficient reaction which means if we know that this news is positive and it will have implications for investors in positive way, in positive terms. For example, let us say more future value for shareholders or better revenue or better profitability for the company in future.

So, it means the stock prices should react positively and then it will remain around that level following certain random walk subsequently. If the stock price react in a completely different way where the stock price goes upward, but in a very slow moving fashion then we can call it under reaction which means the information has come to the market on day 0, but stock prices did not react quickly rather it reacted very slowly.

But, eventually may be after a month or so, the stock prices went to the level where it should be which means it should add it should reflect the added economic value of the news of the announcement for the shareholders. But this is under reaction because it is reacting in a very slow, very delayed manner.

Similarly, if stock prices reacted too sharply it went to a huge level, but over the period of time in next few days maybe let us say 2, 3 weeks or 1 month the stock prices corrected

subsequently and reversed to the level where it should be. In all three cases we can see that the economic value of the news, economic value of the information has been incorporated in the stock prices.

In one case it is immediately on day 0 or day 1 for that matter, in another case it is taking very long time to absorb the economic impact of information and reflect it in the prices in an under reaction manner and in case of overreaction the stock prices went to unjustifiably high level. And, subsequently for next few days it went back, it reversed and it got corrected and eventually ended up being at the level where it is it can be justified by the positive impact of the new information coming on day 0.

There could be any other scenario as well and we know that this kind of test can be done to understand the level of market efficiency or the time of or the speed of information adjustment in and reflecting in the prices with the help of event study that we can discuss in any other session subsequently.

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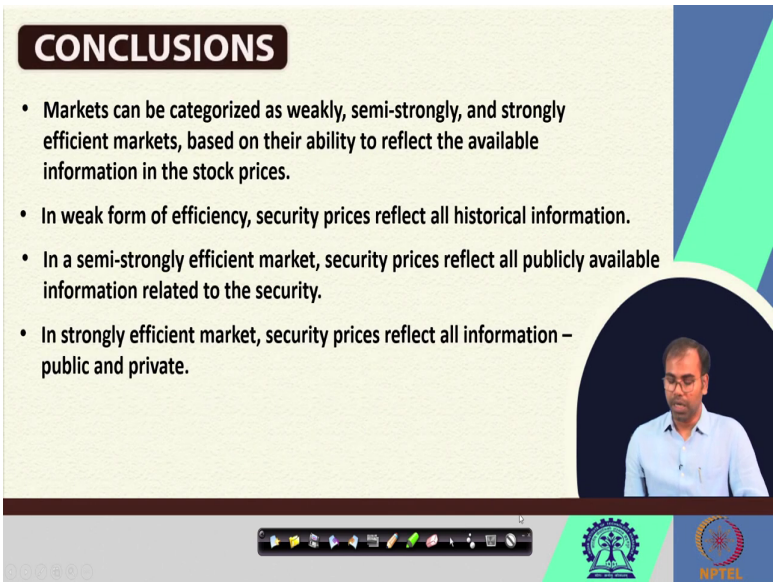

With this we will like to conclude and we have seen here that markets are known to be informationally efficient, but at three different levels it can be weakly semi-strongly and strongly efficient market, but this qualification depends on the speed of information adjustment and how quickly or slowly the prices reflect the underlying information or the new information coming to the market.

In a weak form of efficiency security prices reflect all historical information. So, there is no point of having technical analysis. In a semi-strongly efficient market, security prices reflect all publicly and publicly available information and strongly efficient market security prices reflect information both private and public. And, the test of efficiency can be done using event study that we can discuss subsequently.

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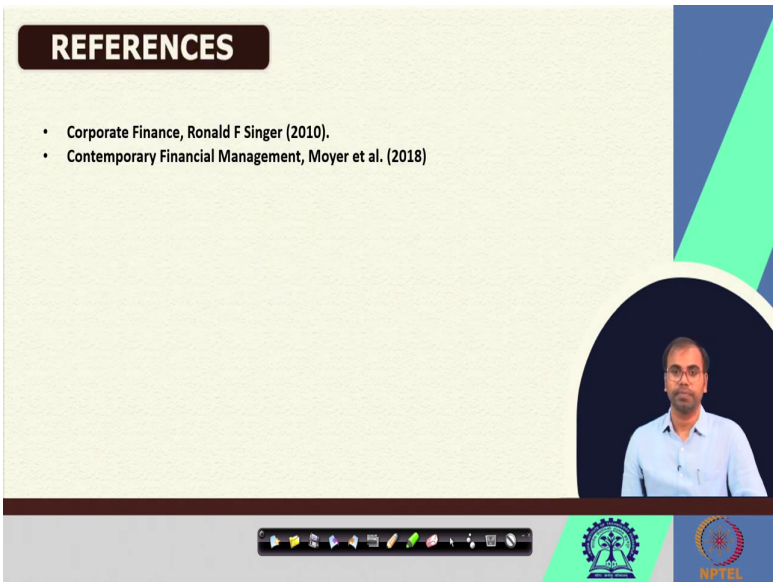

With this I end this session.

Thank you very much.