Security Analysis and Portfolio Management
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Lecture 26
Equity Valuation - III

So, welcome back, let us quickly recap the important points that we discussed before the break.

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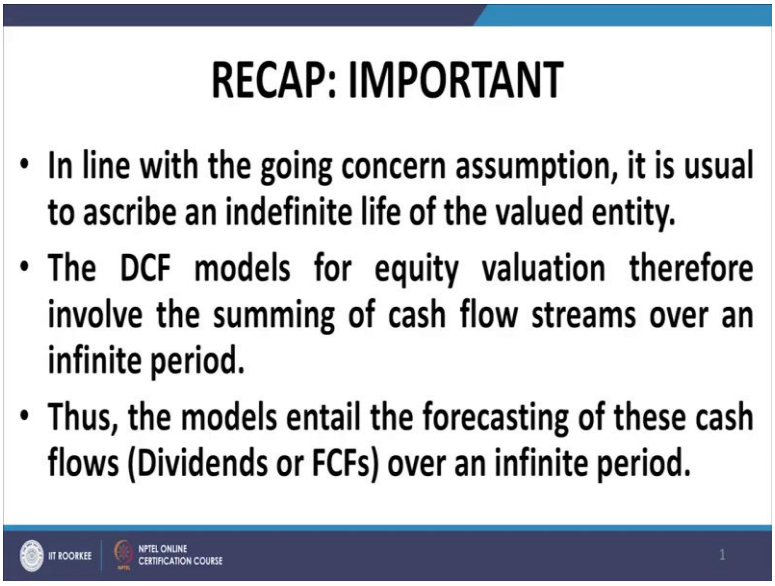

Number one, in line with the going concern assumption, it is usual to ascribe an indefinite life to the valued entity. Number two, the DCF models for equity valuation, therefore, involve summing of these cash flow streams over an indefinite period naturally. Therefore, the models entail forecasting of these cash flows over an indefinite period.

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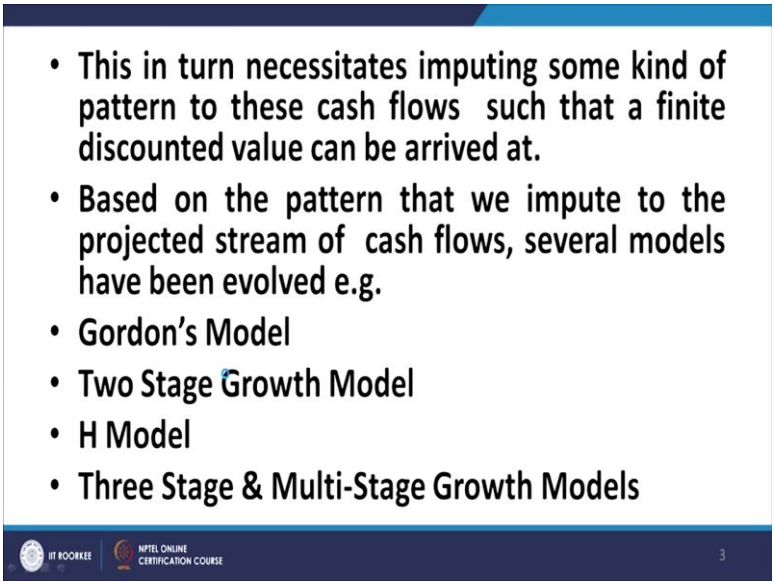

This in turn necessitates imputing some kind of pattern to these cash flows, such that a finite discounted value can be arrived at. Based on the pattern that we impute to this projected stream of cash flows, several models have been evolved. Then Gordon model we have already discussed, it assumes and upward constant growth perpetuity, we have a two stage growth model, which I also alluded to briefly. The H model, three stage and other multi stage models.

As I mentioned, you can have any number of stages which you feel appropriate compatible with the exercise of valuation that we are planning to do. There is no restriction, there is no impediment on us, you have to use a one stage model or a two stage model or a five stage model, you can use as many stage models as your, as your understanding of the problem as your perception of the problem dictates.

So, the important but the important point that operate to the sustainability and robustness of these model models, as I mentioned just now, is that the inaccuracies, although the inaccuracies tend to increase with a period of forecasting, you can obviously forecast with greater accuracy, the cash flows one year hence compared to the cash flows twenty years hence.

Hence, but the contribution of that one year cash flow is going to be much more significant, when, when you determine the present value of the, aggregate present value of all cash flows compared to the contribution of the twenty year cash flow. In other words, with the increase

in the discounting periods, obviously, the worth of 1 rupee at that future point in time, the further you go into the future is less in terms of its present value.

So, we now quickly look through the through stage model, the most basic multi stage model is a two stage DDM in which we assume, the company grows at a higher rate for a relatively short period of time. And then it has, follows a long run perpetual growth rate which is much smaller, which is compatible with something like the industry average. Now, the length of the high growth phase, which we call, usually we also call it the explicit forecast period.

The length of the high growth phase is a function of the visibility of the company's operations. In other words, it tells how far you are able with the data that is available to you with the nature of operation, nature of the business, industry, economy, all these things taken together, how far the analyst is comfortable with doing explicit forecasting on an year to year basis. The more comfortable the analyst is in doing the year to year forecasting, the longer should be the growth period, if he has confidence in doing this particular exercise.

Because at the end of the day, the blanket forecasting is not going to hold a homerun on the, on the nuisances of that particular, of the various features that need to be considered while the mean, while calculating the present values or calculating the DCF value. So, the important thing is when you see, when you are using a blanket rate or a uniform growth rate, you have to make some kind of a blanket approximation. And obviously blanket approximations are more approximate, then approximations that are made on a systematic singular basis from period to period, that is the normal situation.

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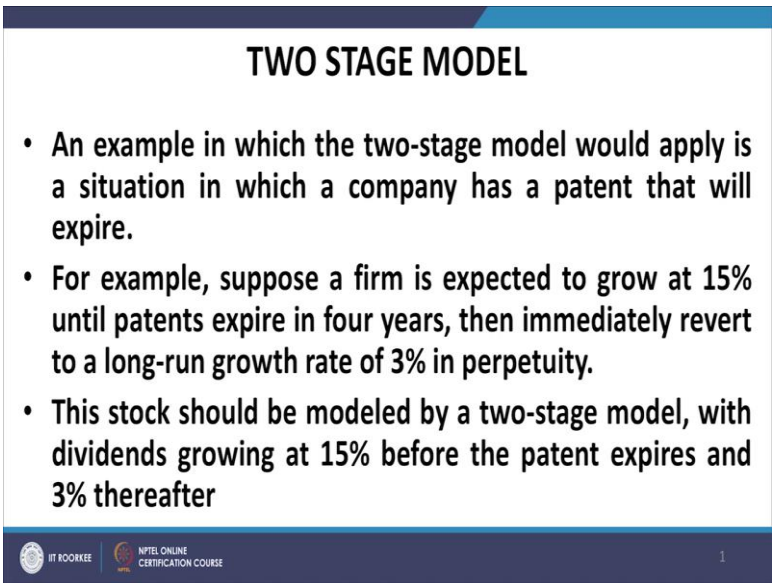

An example where the two stage model would be useful, would be worthwhile is a situation where a company has a patent going and say it has a remaining life of four years, after which patent would expire and thereafter the company would come down to the level of other firms operating in the same industry.

So, in that case, you can have a high growth period for those four years while the patent is in place. Thereafter, when the patent, the value of the patent goes out, or the contract periods or patent validity period expires, then you can go back to the industry average growth rate.

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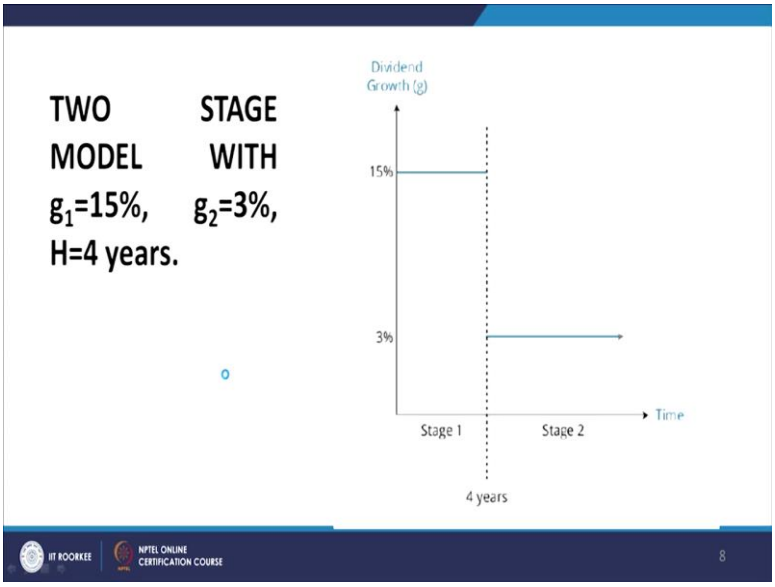

And this is our diagram that represents the two stage growth rate, we have a high growth rate for an initial period of four years and then of 15 percent over that initial period of four years, and then you have a growth rate, a sustained growth rate of 3 percent.

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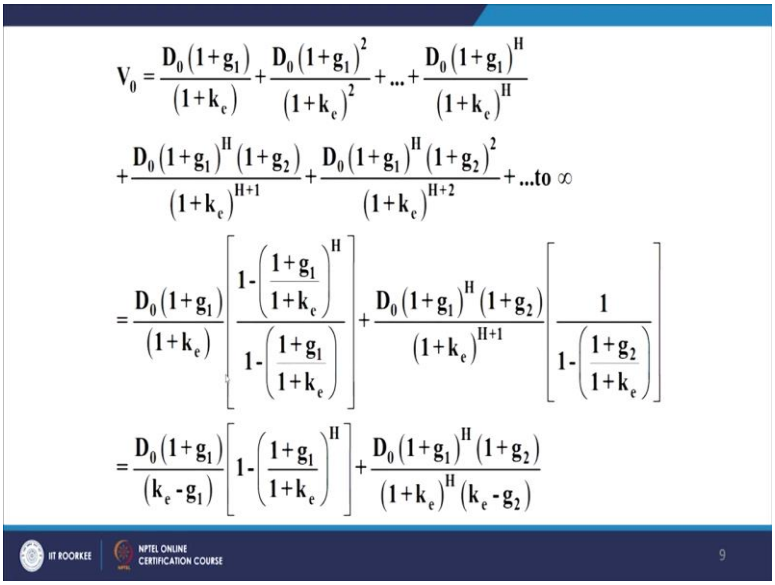

This, this is the working or the summation of the series involving two growth rates, a one finite growth rate, geometric progression, and then the second constant growth rate perpetuity. Again, this is simple algebra, I will not spend much time on it. But this is the formula, I would like to emphasize here one thing, that I personally am not very comfortable with, I am not a fan of memorizing these kinds of formula.

I think it is much easier to work out this summation of a geometric progression given the nuisances, rather than plugging in the values into this formula, which you memorize. Because there is a greater chance of making mistake, when you memorize a formula rather than summing the entire GP and having the basic GP summation knowledge and algorithm in place. Then we have the H model.

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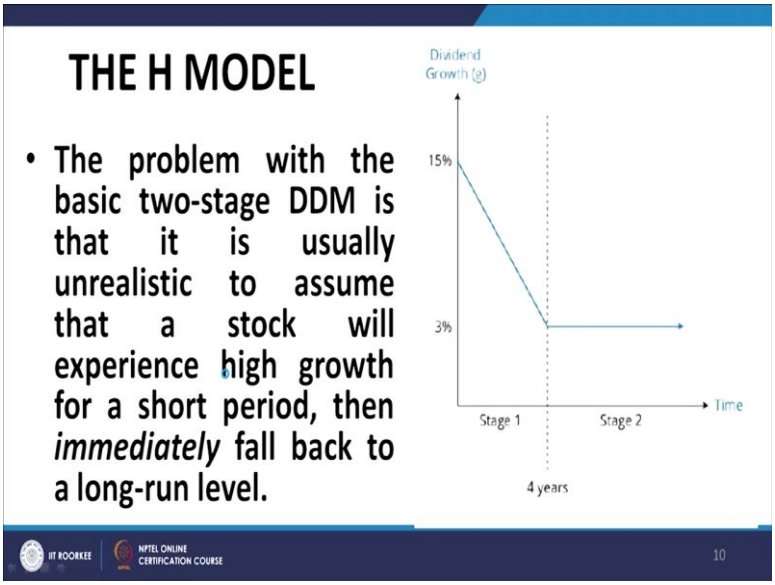

The H model differs from the two stage growth model in one significant way, as you can see in this diagram. In this, in the H model, what happens is that the growth rate gradually decreases during the finite growth period or during the finite period. In the two stage growth rate, we just have the two growth rates. The let us say, from the previous example 15 percent for four years and 3 percent thereafter.

There is a certain, certain discontinuous jump or discontinuous fall at the end of four years from 15 percent to 3 percent. The H model remedies the situation because, the sudden fall is really not realistic, the fall has to be gradual and the H model takes account of that fact. The H model considers the gradual fall from the higher growth rate to the lower growth rate over a given period of time.

So, we started 15 percent here and we gradually moved down to the growth rate of 3 percent over four years. This, in other words, the growth rate does not show a discontinuous fall from a high growth rate to a low growth rate as is the case in a two stage model. In the H model, the fall in the growth rate is at a uniform rate. So, this is the H model. And as an example, you can consider a firm that generates high profit margin, faces little competition from within its industry.

And say it is constant, currently growing at 15 percent. It, the analyst might forecast that over the next four years, as more and more firms enter that industry, the company competition grows gradually, this growth rate will come down to the industry sustained growth rate of 3 percent. But this decline in growth rate to the industry sustained growth rate would take place

over a period of four years. And accordingly, this amortization of 15 percent minus 3 percent would take place over 3 years on a regular basis.

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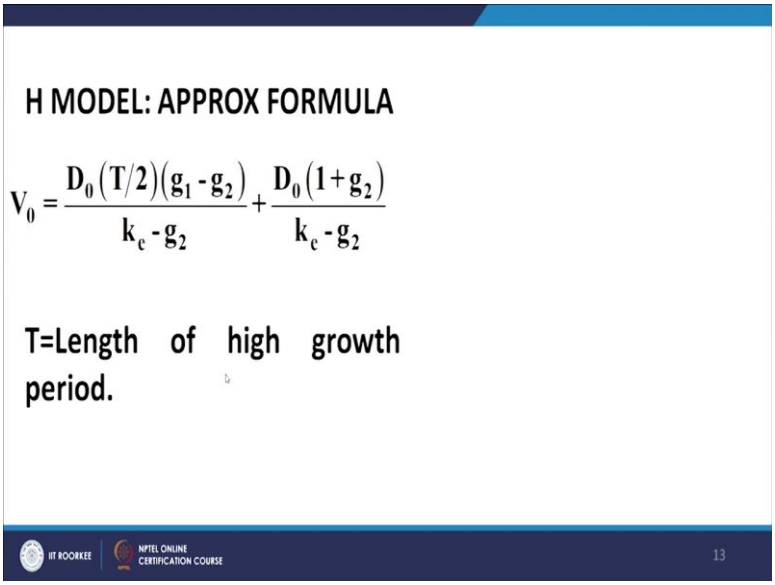

This is the approximate formula that we have for calculating the DCF value of a firm that follows the H model of cash flows. Then we have the three stage model, which is an extension of the two stage model. We have three different growths, as I mentioned you can have as many number of growth rates as you like, this is a case where we have three growth rates, g 1 over n1 years g2 over n2 years and then g3 over the remaining life of the company, which is assumed indefinite.

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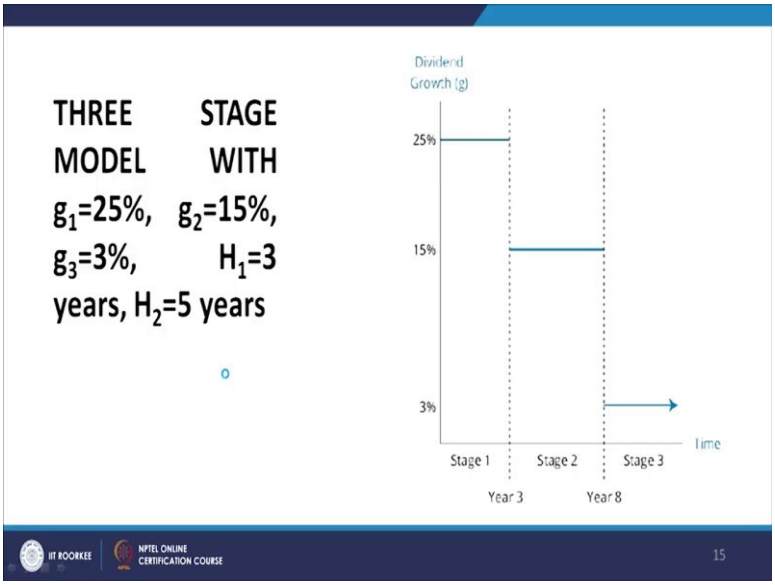

And this is the diagram for the three stage model.

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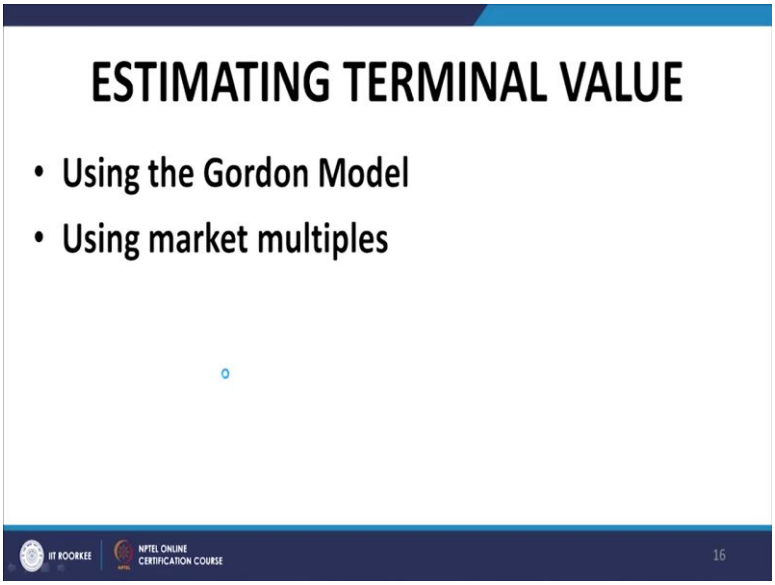

So, we come to the important point, the estimating the terminal value. This is important, because at the end of the day, the explicit forecast period has to end somewhere. We cannot continue the explicit forecasting indefinitely. It really makes no sense forecasting hundred and fifty years down the line. So, we need to forecast for some rational finite period, say three years, five years, seven years or ten years, depending on the nature of the industry, nature of the company and the economy forecast.

So, that being the case, we need to end the sequence somewhere of explicit forecasting. And when we end the sequence of explicit forecasting, we need to have some valuations that will

repeat, that will depict the, the remaining worth of the company at that point in time at which the explicit forecasting ends, that is called the terminal value. But there are two common approaches to the (term), to the estimation of terminal value.

One is that we use the, use an appropriate growth rate, which is compatible with the long term industry average growth rate. We use that for the sustained growth rate of the company over the extend, over the remaining indefinite period of time. And on that basis, we sum an infinite perpetuity, constant growth perpetuity and to arrive at the terminal value at the end of the explicit, explicit forecast period.

The other is that we work out some kind of a multiple, an estimate of a multiple that we believe would be existent, as on the end of the explicit forecast period. For example, we could estimate the PE ratio, that we expect to prevail for this particular company at the end of the explicit holding period.

And then we also forecast the earnings that would, that would be prevalent at the end of the finite growth period or the explicit forecast period, that would be achieved by the company, the EPS that would be achieved by the company. On that basis, we can arrive at a price or the market price or market value of the company. And the projected market value of the company at the end of the explicit forecast period, which will give us some estimate of the terminal value of the company.

So, these are the two common methods, that we use for the estimation of terminal value. One, is that we ascribe constant growth rate perpetuity and value the remaining work of the company at the end of the explicit forecast period on that basis. The other is that we work out the estimated value of some multiple, like the PE ratio. And then also work out the relevant earnings per share at that point in time at the end of the explicit forecast period.

Which enables us to ascribe a market value to ascribe a market value to the firm as on the end of the explicit forecast period, which again gives us an assessment of the terminal value. Now, how to, what is the common procedure? What is the common procedure? Again, I repeat, this is the common procedure.

This, again, this based on the, on the understanding of the analyst, on the perceptions of the analyst, on what growth rates he believes the business could achieve over the life of the company? How many stages he wants, and how many, what kind of growth rates, he feels that would be achievable in each of those stages.

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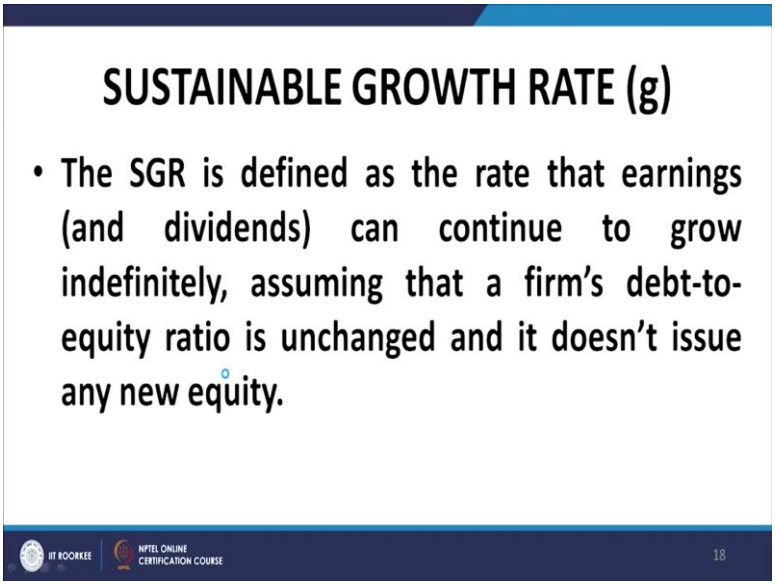

But the sustained growth rate is the, is the specific growth rate that may be defined as the rate that earnings and dividends can continue to grow indefinitely, assuming that a firms dept-to equity ratio is unchanged, and it does not issue any new equity. This is the definition of sustained growth rate. This is usually the growth rate, that is used when we work out the, the Gordon's valuation or the valuation on the basis of the Gordon's formula. This is usually the G value, the growth rate value that we input into the Gordon's constant growth perpetuity formula, this is called the sustainable growth rate.

And this is the growth rate in dividends are earnings, that is achievable with the present dept-equity ratio and, and the present dept-equity ratio and no further input of equity. So, obviously, you can, if you want to grow further, and you need capital for that, you can input fresh funds by virtue of dept.

But, but keeping the dept equity ratio constant, in other words, in relation to the amount of profits that you decide to return in the business, you can issue further dept to, to enhance or to add on to the capital assets of the company. How do we determine this sustainable growth rate? The sustainable growth rate is easily determined by multiplying the average retention ratio by the average return on equity. Average is being taken over a reasonably sustained period of time.

In other words, G is equal to RR, that is the retention ratio into the return on equity. Now, by the analysis that, we call the DuPont analysis, we can write the return on equity as a product of the net profit ratio and the asset turnover ratio and the financial leverage. And that is the

amount of assets financed out of equity or the number of times the assets are of the equity capital of the company.

And that is easily seen in fact, return on equity is what? Return on equity is the profit after tax divided by the equity, the net worth of the company. And when you look at the right hand side net profit ratio is what? It is the net profit divided by sales, asset turnover is sales divided by assets.

And then leverage is the assets divided by equity and the net worth of the company. So, we end up with the return on equity. So, the bottom line is that the sustainable growth rate is the product of the retention issue and the return on equity, it is easily explained. This formula is easily explained.

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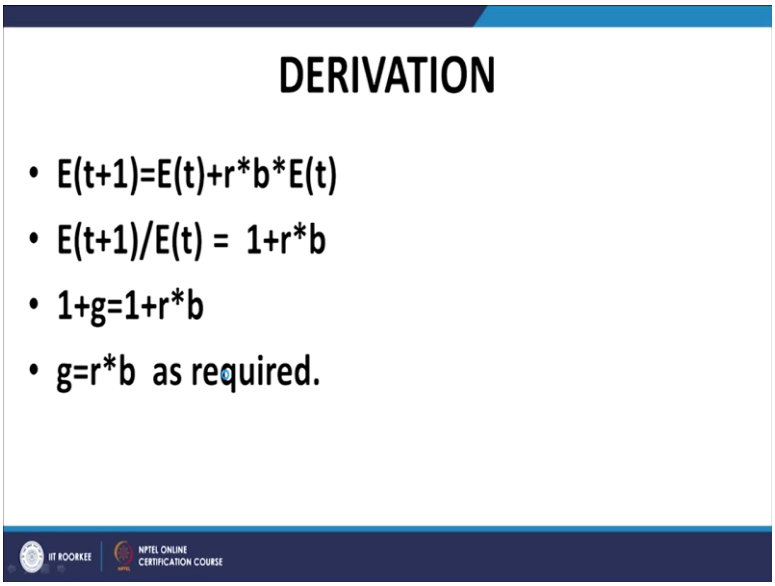

And suppose in the ET, we have an earnings of ET, out of which we retain, we have a retention ratio of B. So, we will, the retained earnings or BT in the next year, the next year earnings will then consist of the earnings of year T plus the earnings that accrue or the incremental earnings that arise due to the retained profits of the previous year.

The retained profits of the previous year were B into ET. Therefore, the profits that arise on these retain profits in the year T plus 1 would be equal to R into B into ET. So, the total profits for the year T plus 1 will be equal to ET plus R into B into ET and that simply gives us a growth ratio of B into R. So, the major limitations of DCF model, well, I have already alluded them.

The DCF model valuations are very sensitive to estimates of growth rates and terminal values, and required rates of return. So, these are, these are expressions, so these are quantities which are very subjectively estimated, which are, which cannot be estimated with any massive degree of precision. And therefore, the valuations that we arrive at are pretty much could, could well pretty much be divergent across the spectrum of analysts, contrary to the valuation of bonds, that we have discussed earlier.

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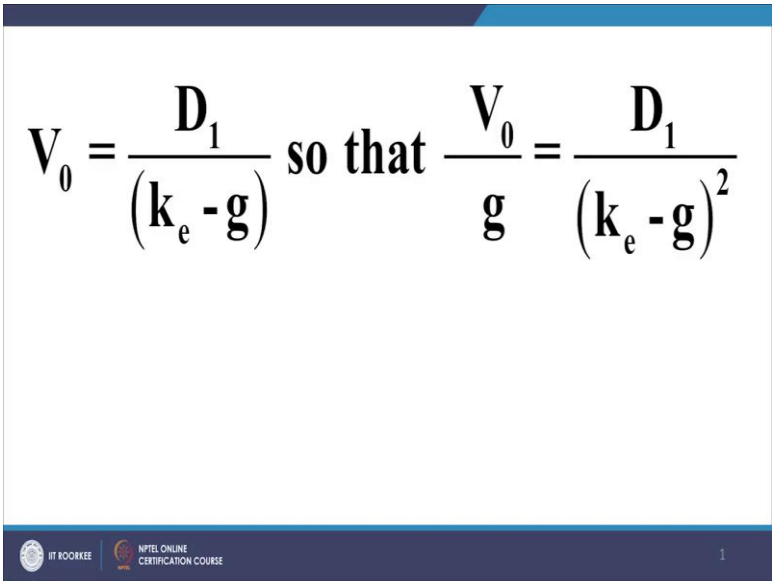

In fact, this is seen by taking the derivative of the DCF value with respect to the growth rate and we find that it varies as the inverse square, inverse square of ke minus g and please note ke and g are both very small quantities, ke may be of the order of 10 to 20 percent or in between 10 to 20 percent, g may be between say 5 to 10 percent or thereabout. So, if you are varying in inverse proportion to the square of these quantities, any inaccuracies in this valuation are going to affect the value significantly.

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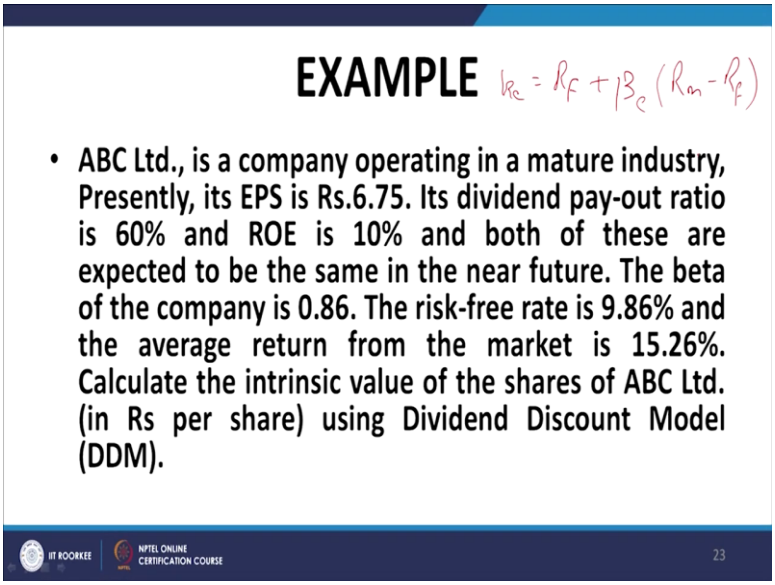

Let us take up an example. So, ABC limited is a company operating in a mature industry. Presently its, EPS is rupees 6.75. Its dividend payout ratio is 60 percent and its ROE is 10 percent. And both of these are expected to be the same in the near future. The beta of the company is 0.86. The risk free rate is 9.86 percent and the average return from the market is 15.26 percent.

Calculate the intrinsic value of the shares of ABC limited in rupees per share using the dividend discount model. Now, before I get into this problem, I would like to emphasize that this for, this problem uses the CAPM model for estimating the required rate of return on equity, which we shall talk about in a later section of this course. For the moment, let me give you a brief touch on this model.

The cost of equity ke is equal to Rf, where Rf is the risk free rate plus beta e, well beta e is a regression coefficient basically, but let us call it beta e. Beta e is specific to the to the equity that we are talking about. So, in our case the beta is given as 0.86 into Rm, Rm minus Rf. So, this is the outcome of the CAPM formula which is the capital asset pricing model, which was developed by William Sharpe for which he was awarded the Nobel Prize in Economics.

Now, but we will talk about it later on, this is the formula that we used for calculating ke which is the input into the dividend discount model. We are given all the quantities explicitly, we are given the risk free rate, the risk free rate is 9.86 percent. The beta of the security that we are valuing is 0.86. And the market return is 15.26 percent. So, that is all that we require for estimating ke.

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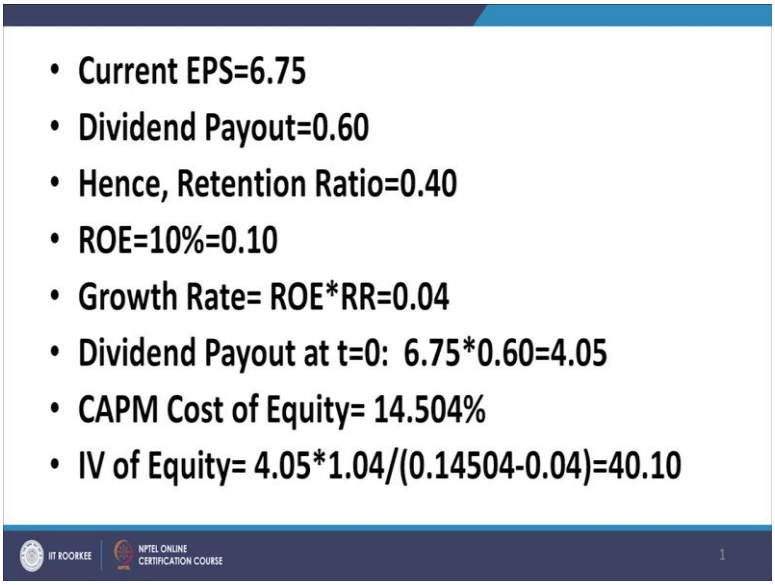

And the estimate of ke that we get is 14.504 percent. So, ke is equal to 14.504 percent. The current EPS is 6.75, and the dividend payout is 0.60. So, the current dividend is therefore 4.05. This is the current dividend, this is D0, this is not D1, this is the last dividend that has been declared. So, when we work out D1, we have to multiply by 1 plus G, what is G? G is the product of the retention ratio and the ROE.

We are given the, we are given the payout ratio as 60 percent. Therefore, the retention ratio is 40 percent or 0.40. The return on equity is given as 10 percent therefore, the growth rate is 10 percent into 0.40, that is 4 percent that is 0.04. So, we now have all the inputs for the dividend discount model. We have D0, which is 4.05, we have G which is 4, 4 percent. We have ke, which is 14.504 percent.

So, all the inputs are there, and when we input everything into the formula, we get value of the share as 40.10. Please note, in this multiplication by 1.04 in the numerator, this is to convert D0 to D 1. We assumed that, the growth in dividend is at 4 percent. Therefore, if D0 is 4.05, D1 would be 4.05 into 1.04. So, a simple problem this was.

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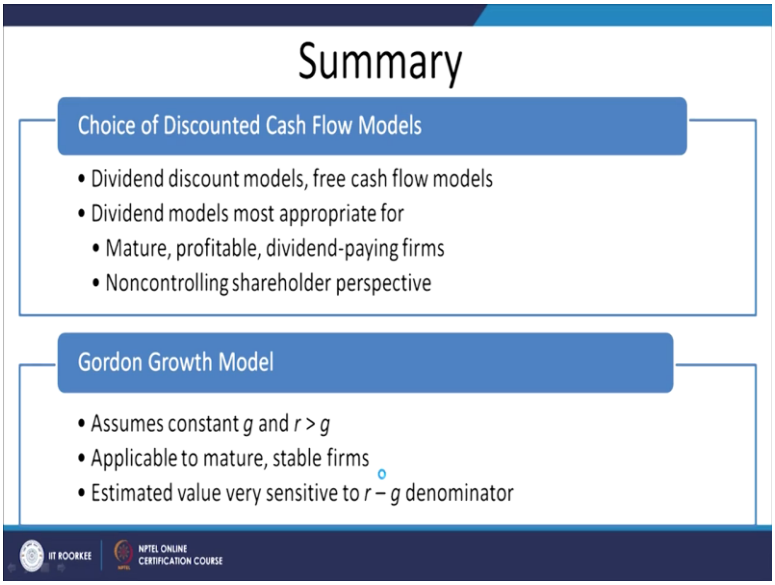

A quick summary here, dividend discount models, free cash flow model, these are two, these are two models. Dividend discount models are most appropriate for mature profitable dividend paying companies with non-controlling shareholder's perspective. Then we have also discussed the Gordon model in a lot of detail. Now we, to talk to, we move to the free cash flow based models.

There are certain variants of the free cash flow based models, we shall talk about each of them. But let us first get acquainted with the terminology, we have the enterprise DCF model or the free cash flow to the firm discounting model. We have the equity cash flow model or the free cash flow to equity discounting model, then we have the adjusted present value model. And finally, we have the capital cash flow model.

So, these are the four common variants of the free cash flow models. Let me repeat, the free cash flow to the firm discounting model, the free cash flow to the equity discounting model, the adjusted present value model and the capital cash flow model. So, what is the first model the free cash flow to the firm?

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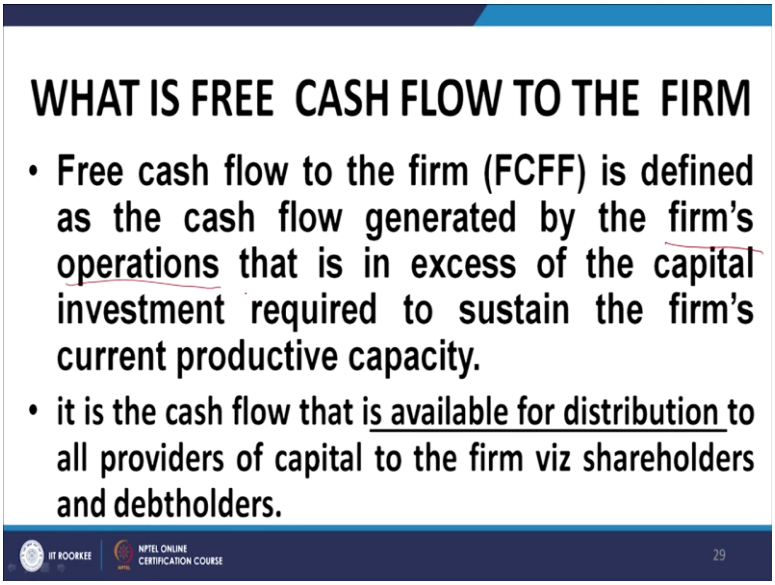

What is free cash flow to the firm? The free cash flow to the firm is defined as the cash flow generated by the firm's operations. And this is important, please underline this firm's operations. That is, its routine business activities and is an excess of the capital investment. Capital investment means, or includes both investment in fixed assets and working capital, required to sustain the firm's current productive capacity.

In other words, you can say, that it is the cash flow that is available for distribution. Now, I have underlined this available for distribution, this is very important. This is the cash flow, it is not the cash flow that is actually distributed, it is the cash flow that is available for distribution in contradistinction to the cash flow that is actually distributed to the various capital providers of the firm.

So, now, when we talk about capital providers here, we talk about capital providers in the broad sense. That means, all providers of long term capital to the company, which includes the equity shareholders, the preference shareholders and the long term lenders. Please note, we are including long term lenders here.

So, when we talk about free cash flow to the firm, we are talking about the cash flow to the firm, from the perspective of the, all the capital providers all the providers of long term funds to the firm, not only equity shareholders, I emphasize this four points strongly. So, there are two points, which need to be emphasized with reference to this definition. The first point, the first important point is that it is the cash flow, that is available for distribution.

It is not the cash flow that is actually distributed, it is the basket of money, which is from which you can distribute. You may distribute all the money; you may not distribute all the money. It is the money that is available for distribution. This is one fundamental point, one emphatic point. The second emphatic point is that; it is the perspective of this basket of cash flows is that of the providers of all the long or all the providers of long term funds to the company.

All the providers of long term funds to the company including long term lenders, preference shareholders and equity shareholders. We are not considering only equity shareholders, as long term providers of capital. It includes preference shareholders, it includes people or companies or lenders and financial institutions, banks, who have lent money to the company on term loan basis or long term basis.

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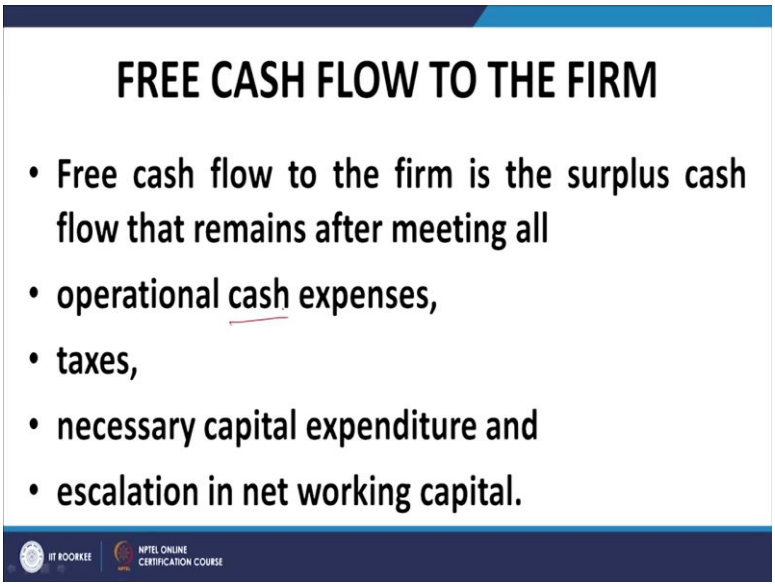

So, how do we calculate this free cash flow, free cash flow to the firm? We calculate the free cash flow to the firm as the surplus cash flow that remains after meeting all operational cash expenses, cash is important. So, it does not include a precision please note this. So, free cash flow to the firm is the surplus cash flow that remains after meeting all operational cash expenses.

Number two, taxes, number three necessary capital expenditure and number four, escalation in net working capital. So, whatever is the increase in capital assets and whatever is the increase in net working capital, that has to be met out of the cash flow, that is generated from operations and taxes have to be paid. Whatever remains is the free cash flow to the firm FCF.

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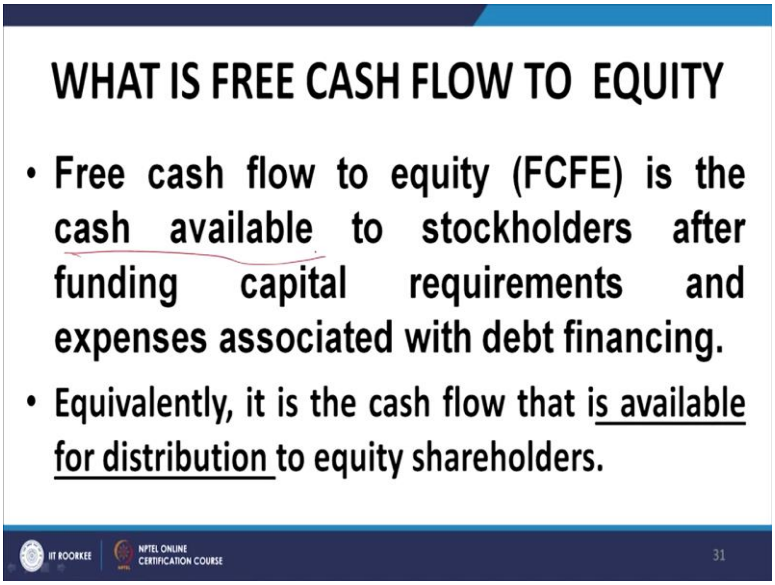

Now, we talk about free cash flow to equity. What is free cash flow to equity? The free cash flow to equity is defined as the cash available, please note this word again cash available, it is not the actual cash distributed, it is the cash available to stockholders for distribution to stockholders after funding all capital requirements and expenses associated with a debt financing. So, now, the perspective has changed.

Now, the two, two things have changed, both the things have changed. Number 1, we are talking about the available cash flows, which is similar to free cash flow to the firm. There also we talked about the available money, available cash flow, the basket of money that we have. Here again we are talking about the basket of money that we have. We may we may distribute less or we may distribute all the money that is a separate issue.

But the important thing is it is not the actual distribution, it is the amount that is available for distribution, to distribution to whom? Now the perspective has changed. Now, it is not all the providers of long term firms, it is only the equity shareholders. So, the money that is available for distribution to the equity shareholders of the company is called the free cash flow to equity. So, now, here is the difference between the free cash flow to the firm and free cash flow to equity.

Free cash flow to firm means, amount available for distribution to all the providers of long term funds, dept preferred equity. Here we have free cash flow, which is available for distribution only to the equity shareholders. So, the claims, the prior claims of the long term

lenders and of the preferred shareholders need to be taken care of before we arrive at the cash, free cash flow to the equity.

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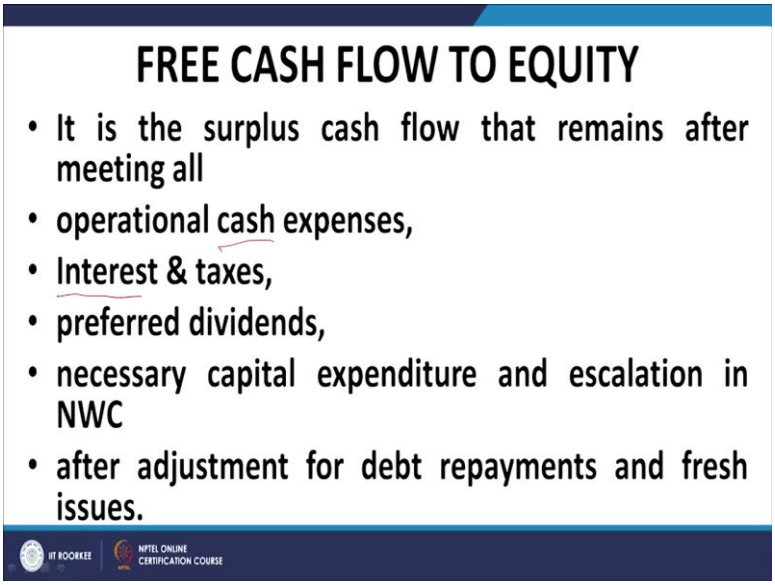

How do we calculate free cash flow to equity? Well, it is the surplus cash flow that remains after meeting all operational cash expenses. Please note the word cash here. So, again, the depreciation needs to be taken care of. Interest and taxes, now, here is the important point. When we calculated the free cash flow to the firm, we did not consider interest.

Here we are we are excluding interest, because we are looking at it from the perspective only of equity shareholders. So, the claims of the lenders need to be settled for. So, interest as well as preference dividends have to be paid out before we arrive at the resources that are available for distribution to equity shareholders.

Then of course, necessary capital expenditure that and escalation in a networking capital, that needs to be, had to be arranged for, for the sustenance of the company. Then, and if there is any change in the dept, if there is any debt repayment or further acquisition of dept by the company, that also adjusts, that also changes the amount of cash flow that is available for distribution to equity shareholders. And therefore, that will also need to be considered when we arrive at the free cash flow to equity.

Now, enterprise discounted cash flow value versus equity discounted cash flow value. Enterprise discounted cash flow value arrives at the value of the firm as a whole. In other words, the total worth of all the providers of the long term funds to the company. In other

words, it is the total value of the lenders, the preferred shareholders and the equity. And how do we get it?

We discount all future cash flows to the firm, so please note this, this correlation or compatibility. On the one hand, we are calculating the free cash flows to the firm or as the gross cash flows that are available to the distribution to all the long term providers of capital and the valuation that we are getting is also of the entire basket of long term providers of the firm, that is the, the long term lenders, the preferred shareholders and the equity shareholders.

The total value of all this will be generated on the left hand side and on the right hand side the inputs that we are using, is the free cash flow to the firm which is also computed on the basis that it is the gross cash flow that is available for distribution to all the these three categories of people or investors. So, we take the gross cash flow and we work out the present value of all future free cash flows to the firm.

Every year whatever free cash flow to the firm is generated by the firm, we calculated the discounted value, we calculate the discounted value of all these future cash flows, at what rate we work it out at a weighted average cost of capital. Weighted average cost of capital, where each of these three providers of long term funds, the long term lenders rather the preferred stakeholders, preferred shareholder and the equity shareholder, each of them has a CA when we workout the weighted average cost of capital.

So, we discount all future cash flows to the firm at the weighted average cost of capital, and the value that we arrive at is the gross value of the firm, the value of the long term lenders, the preferred shareholders and the equity shareholders. Of course, if you deduct the value from this gross valuation of the firm, if you deduct the value of the lenders and deduct the value of the preferred shareholders, we get the net value of equity.

Which is, now this method that I have just alluded to is called the indirect method of equity valuation, where you first arrive at the gross value of the firm and from the gross value of the firm, we deduct the value of the, of the lenders and long term lenders that is and the preferred shareholders and we arrive at a value of equity. The other method is the direct method, where what we do is we calculate the free cash flow to equity of the firm, for each of the, for that life of the firm.

And on that base, on discount on everything, all the entire stream of future cash flows to equity, at what rate? At the rate of equity, at the cost of equity. Now, please note the

difference, in that enterprise DCF we were discounting at the weighted average cost of capital. Here we are discounting at the equity cost of, the cost of equity rather. And the left hand side valuation that you will get here is the direct value of equity shareholders of the company.

So, again note the compatibility the right hand side uses as an input the free cash flows to equity, the discounting is with the cost of equity. And the valuation that we get on the left hand side is the value of equity, the intrinsic value or the discounted cash flow value of equity. Now, this is a very important point, very, very important point.

The free cash flow based valuation of the firm that I just alluded to a few minutes back, gives you the value of the firm operations, operations of the firms or the constituent of the normal business activities of the firm. For example, if a firm is manufacturing a particular product, and as a side, it has made some investments of surplus, surplus cash in marketable securities or it has a surplus piece of land available with it.

Then that, the value of these assets, the surplus piece of land or the marketable securities in which it has invested short term funds is not a part of this valuation. This will give you the value of the manufacturing operations, if the firm's manufacturing operations in totality excluding this, these other activities is calculated or is transferred, then the value that should be attributed to that on this DCF basis is what is the output of the free cash flow to the firm discounting DCF value.

And, if you want to work out the entire value of the firm, then you need to value this non-operating assets, like the marketable securities that is said and the piece of land, the surplus piece of that, you, you need to work out these, the values of these kind of non-operating assets separately and add this to the value of the firm's operation that is the DCF valuation of the free cash flow to the firm.

Then you will arrive at the total value of the firm, the total worth of the firm. So, please note this important part that DCF valuation, whether it be the equity valuation or the or the firm valuation gives you the value based on the firm's routine operations, not the valuation that is of the total assets of the firm.

Because there may be significant assets, which are non-operating, which do not contribute either directly or indirectly to the, to the business operations of the company. So, those assets

need to be valued separately and then added on to the value of the operating assets to arrive at the total value of the firm. We shall continue from here in the next lecture. Thank you.