Security Analysis and Portfolio Management
Professor J. P. Singh
Department of Management Studies
Indian Institute of Technology Roorkee
Lecture 25
Equity Valuation - II

Welcome back! So let us continue from where we left off, but before we do that a quick recap about yield curves, which we did in the last lecture yesterday.

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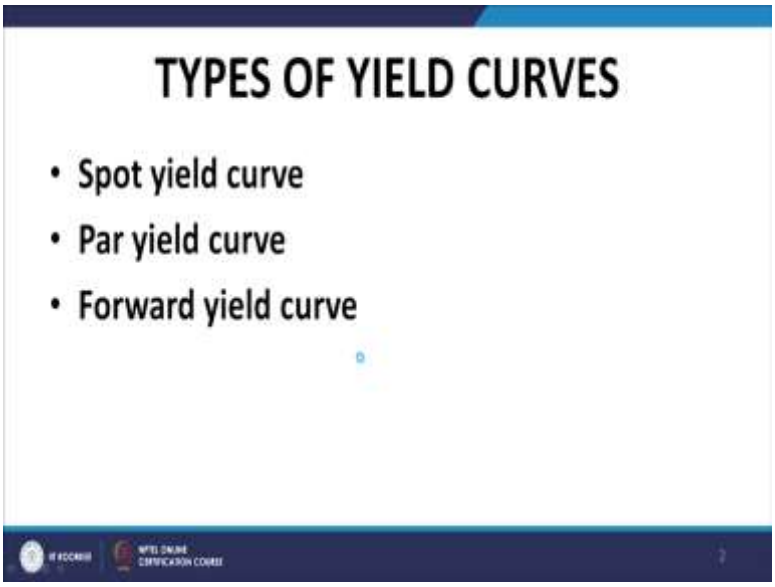

We have three types of yield curves you have the spot yield curve, which plots the spot yields that is the yield on zero coupon bonds against the respective maturities of the bonds, then we also have a yield curve which can be based on coupon bonds where we plot the YTM of the coupon bonds against the maturities of the relevant bonds. We have the par yield curve which is a plot of par yields.

What are par yields? These are yields which are yields on bonds which are coated at par. In other words they are the coupon rate, when the bond is ascribed those coupon rates would yield a par value of the bond, but because in the case of the par value the coupon rates and the YTMs go inside and therefore we can also define the par bonds in terms of YTMs of bonds coated at par. Or we cannot define them in terms of the coupon rates of bonds which are coated at par.

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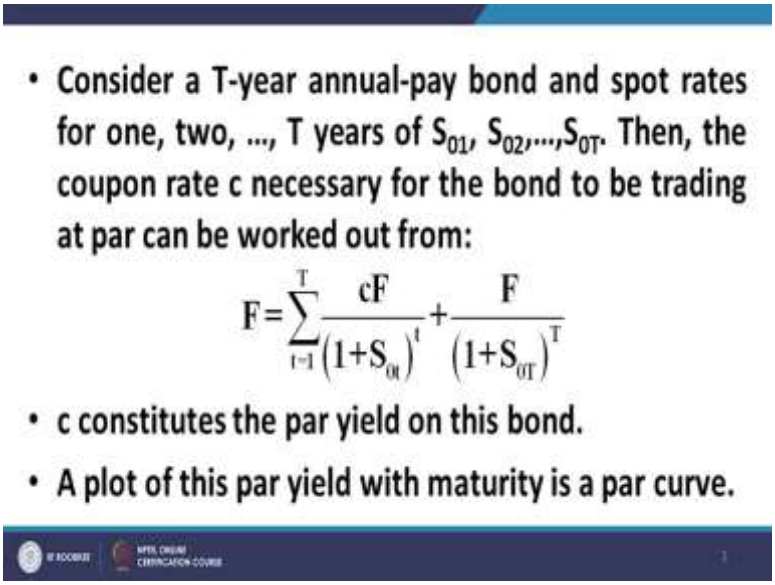

The formula for the par bond yield yields is given on the slide. We have the coupon rates which are the unknown quantities and we use the respective spot rates corresponding to various maturities and we arrive at the coupon rate which corresponds to the bonds quoting at par or the bond price being at par value. Then we also have forward rates and I discussed this in a lot of detail. We arrived at a relationship between the forward rates and the spot rates on no arbitrage considerations which are given in this slide.

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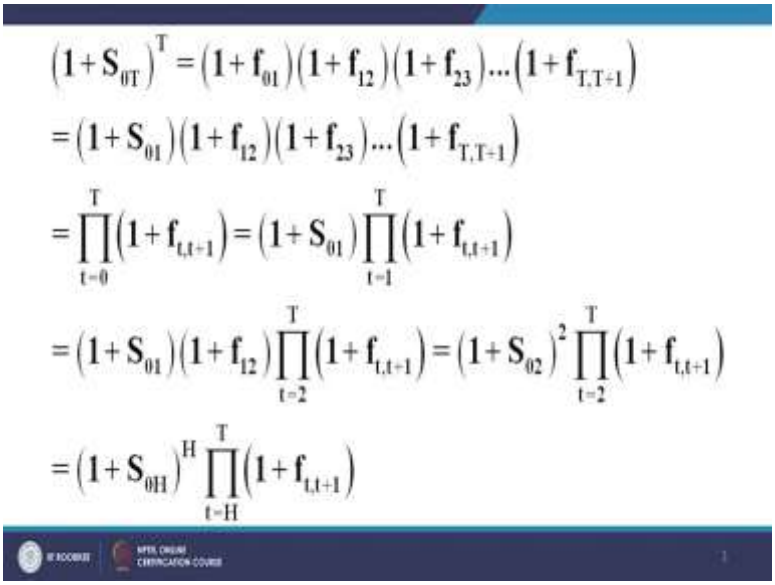

And we can also have a forward rate yield curve, which plots the forward rates for a given maturity, say a one year maturity. For different annual periods in the future like if that one year loan starts at t equal to one year and ends at t equal to two year, what rate you will get?

Then if the loan starts at two t equal to two years ends at t equal to three years what rate would you get? That is plotted as a two dimensional graph and that is the forward rate yield curve. Then we talked about yield spreads. Yield spreads are represented as the difference between the yields of two different bonds.

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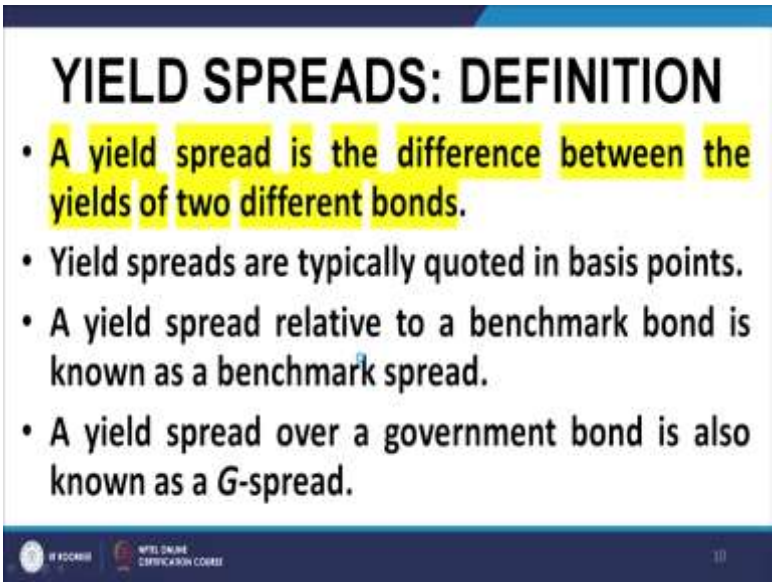

They commonly we have a benchmark yield where one of the bonds the basic bonds constitutes the benchmark. It may be a triple a rated bond or it may be a government bond and we try to value or evaluate the yield spread of our given bond which is of a given sub, credit rating and on that basis we arrive at a differential yield that is ascribed to the riskiness of the bond.

A yield where the benchmark yield is the government is the yield on government bonds is called the G spread. Now the utility of these the yield spread, well we know that the yields of bonds depends on the riskiness of the bond and the change in yield may be ascribed to two factors the macroeconomic factors, macroeconomic changes in changes which cause a change in the yield of our instrument or there may be singular factors which are specific to the to the yield of our given instrument like a change in the credit rating of the instrument.

Now if the yield spread remains the same and there is an increase in the yield on our instrument we need not worry too much because that would be due to the macroeconomic factors the yield spread is constant which shows that across the spectrum of various instruments the yield has increased, whereas if there is an increase in the yield spread and an increase in yield then we need to worry.

Because an increase in yield spread means that the market perception of the risk of that particular instrument has changed and that could be a cause for worry for the investor. Then we have zero volatility spreads, now so far whatever curves that I have been talking about are primarily based on YTMs.

The yield spreads that we have worked out on the basis of certain benchmark yields or government yields are based on the YTMs of the various bonds, YTMs of argument bond versus the YTM of the corresponding government bond or the corresponding benchmark bond. In other words these yield spreads do not take into account the the curvature of the yield curve, of the spot yield curve.

It does not account for the curvature of the spot yield curve, it does not account for the possibility of the differentials in spot rates corresponding to different maturities. So in order to evolve a process whereby this this phenomenon is accommodated in the yield spread, we evolve what is called the Z spread.

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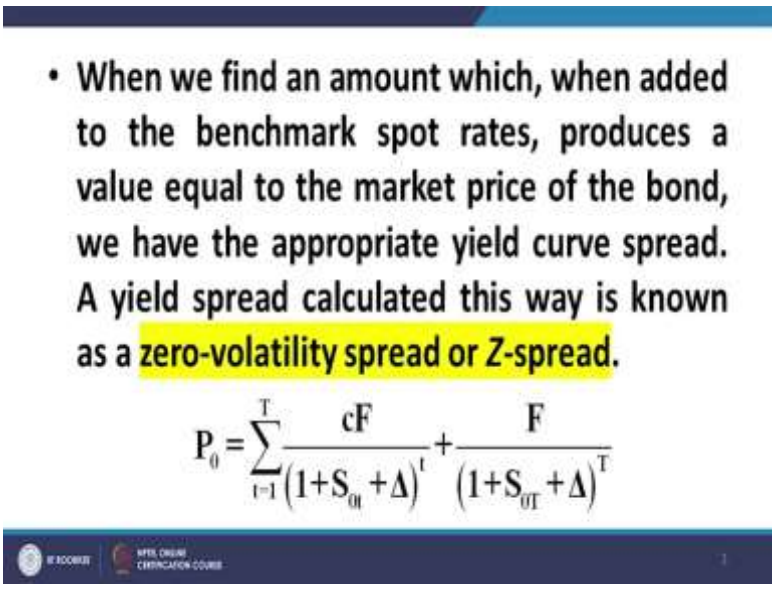

What we do in the Z spread is given in this formula right at the bottom of the slide we add a certain specific, a certain constant to each of the spot rates constituting the spectrum of spot rates which are relevant for evaluating a particular bond. Each of the spot rates are added by a constant. Now please note this spot rates that are considered here are the benchmarks water.

So this for example, this portraits that are related to the evaluation of a government bond or the or our benchmark bound triple a rated bond, whatever the case may be, we add a certain constant to each of these as H0 ts and then we evaluate the price of, evaluate the discount the cash flows on the bond and equate the present value of all the future cash flows to the current market price.

Remember it is the current market price not the par values not the par value and the current market price. So on the right hand side we have the current market price on the left hand on the left hand side we have the current market price I am sorry and on the right hand side we have the present value of all future cash flows discounted at a rate which is the relevant spot rate for the benchmark bond plus a certain constant.

This gives us an expression or an equation in one unknown which is that constant number on solving this equation we can arrive at the value of that constant which is delta in this particular equation and by using this value of delta we get the appropriate spread, which accommodates or which also accounts for the curvature of the yield curve.

Then we talked about option adjusted spreads certain bonds may have embedded option features in them like bonds which are callable at the instance of the issue on terms which are already specified in the issue documents or we also may have portable bonds in which case the the bonds are can be sold back to the company at the instance of the investor on terms which are contained again in the issue document.

So the option adjusts spread based on the bond which does not have that option feature embedded in them in other words what we do is we work out the Z spread on the bond on the option bond which with the option in place or with the option structure in place we work out the Z spread and from this we subtract the value of the bond if the option was not there. This gives us the value of the option.

Let me repeat as this is slightly technical. You see we have three quantities, we have the option or we have the bond with the option which for which let us say we calculate the Z

spread, then we have the bond without the option feature we will have a certain spread for that particular bond and then this is relevant to the bond without the option feature or with excluding the option feature is called the option adjusted spread and then of course we have the yield on the government bond or the benchmark point at the case may be.

So let us take an example to illustrate what I am saying for, just a moment, for a callable bond the yield demanded by the investor would be higher if the option is a part of the bond in other words if the if we evaluate the yield for the bond with the option that is the Z spread the the the yield would be higher this yield required by the bond holders or the investors would be higher because the callability feature operates to the benefit of the issuer of the bond not to the investor of the bond.

The issuer can buy back the bond according to the terms of the issue. So if the so because of this additional feature that operates to the benefit of the issuer the option adjust on the yield on this bond a callable one would be more than the yield on a corresponding bond without the option feature which is called the option adjuster spread.

So Z spread minus the option adjusted spread will give you the value of the option Z spread minus option adjustable spread, option adjusted spread, I repeat is the spread corresponding to the bond with the option feature delinked from the bond and the Z spread is the yield on the bond with the option feature in place. So if you subtract the two you get the value of the option.

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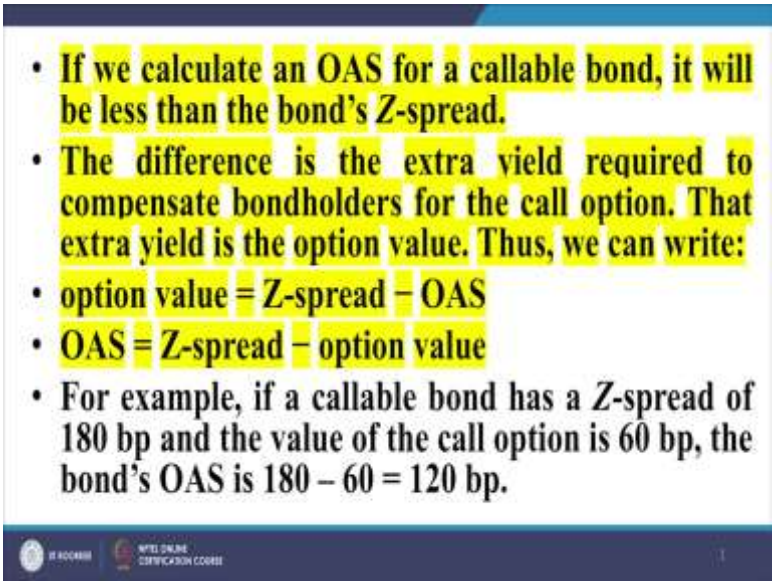

For example if a callable bond has a judge spread of 180 basis points and the value of the call option is 60 basis point then the option adjusted spread is 120 basis point. Then we moved on to equity valuation and we consider the following methods of equity valuation, cash flow based methods, the DCF methods, income based methods, asset based methods using comparables and finally the option based methods.

Our primary focus in this particular course would be on the DCF based methods which are the methods of choice in most cases although the other methods become significant in singular situations, which we shall also discuss. So let us continue with the cash flow based methods but before that I also enumerated the features that set out, set apart the equity valuation, from the bond violation that we have been discussing so far.

Firstly the cash flows on the equity on holdings in equity shares of a company are non discretionary, I am sorry, non-contractual, cash flows on bonds are contractual they are embodied in the bond indenture bond contract the interest rates face values and so on, in the case of equity shares the cash flows are discretionary on the resting, on the company in general meeting which has the discretion to make the, declare the dividends or otherwise retain the profits for future use in the company.

Then equity takes the substantive businesses which is much more difficult to quantify compared to the creditors faced by lenders, for assessing of the credit risk we can always have recourse to credit ratings by reputed agencies which provide us certain guideline, certain guidance about the riskiness of a depth security and accordingly enable us to arrive at some rationality in working out the discount rate for working the intrinsic value of the instrument.

However because the equity shareholders run the business risk of the company they take the substantive business risk which is much more difficult to quantify and which is much more difficult to encode in a single number which will form the premise of discounting the equity cash flows. Growing concern concept I explained in the last lecture.

We need to have this concept in place so that the assets and liabilities of companies across the board may be evaluated on a consistent basis in the absence of this growing concern concept the valuations may differ significantly from company to company of similar assets and which may provide difficulty in forming any kind of comparative opinions and so then there was the issue because of the existence of the growing concern concept.

We have the problem with us of of summing up us infinite series of cash flows or discounting an infinite series of cash flows and that involves that implies that it becomes absolutely necessary unavoidable to impute a certain pattern to this cash flows and to enable some mobility of this cash flows and arrive at a finite figure as the sum of these cash flows.

So that is a practical necessity besides having some theoretical rational basis that we shall discuss soon. Then but the saving grace is that as we move into the future while the estimation becomes distorted, estimation becomes blurred it is also true that the distant cash flows contribute lesser and lesser to the present value of the total cash flows.

Why DCF is the method of choice? Well, there are reasons for this the DCF method is more amenable to time value of money compared to income. The DCF method represents the current purchasing par of the cash flow or of the company rather than a fictional a notional figure which appears purely on the balance sheet.

In actual fact if you look carefully what does profit and loss account or the reserves surplus account represent on a balance sheet? It is simply a notional difference between the physical manifestations of assets and the corresponding set of liabilities and the owner's equity whatever is the difference between the total of these figures manifests itself as the results and surplus of the profit component in the balance sheet.

So what I want to convey by this? The message that I want to convey is that profits are a notional figure the profits do not have any physical existence unlike cash flows cash flows or physical existence cash flows are sums of money that that get transferred from one party to another or sums of money that may be available for transfer available for exchange against goods against services against capital items.

Whatever the case may be but the important thing is the cash flow it is the cash balance that will enable you to to invest to buy something in the mind profits may not be the the you know the physical manifestation which would enable us to make investments and thirdly cash flows being physical items and they do are less susceptible they are less susceptible to accounting policies and ambiguous accounting treatments like the case of depreciation and other several other cases that i alluded to in the last lecture.

Now we talk about the cash flow based methods. We have two fundamental cash flow based methods we have the dividend discount models and we have the free cash flow based models.

The choice of the dividend discount model when can…when should we use the dividend discount model? Well if the company has a consistent history of dividend payments then obviously we can use the dividend discount model.

If it has a consistent history of dividend payments and the dividend policy is clear and related to the earnings of the firm then the perspective, this is an important point the perspective or the party who is doing the valuation, the analyst who is doing the valuation or the investor who is doing the evaluation is a small investor who cannot influence in anything to any significant degree the dividend policy of the company this is important.

The perspective of the party who is doing the valuation if he is using the dividend discount model should be that of a small investor, an investor who has marginal say an extremely marginal say in the affairs of the company particularly in so far as declaration of dividend is concerned. So he will take whatever is given to him that is the important thing he cannot decide on what is to be given to him he will take only whatever is given to him.

So that is the perspective from which the dividend valuation is appropriate and the firm is a major is in…is in the mature state of the industry. So if these features exist then we can use the dividend discount model without much distortion for the valuation of equity. Now the choice of the free cash flow based models, free cash flow based models, well the important thing is here the perspective shifts. Why the perspective shifts?

You will see gradually as we move along this presentation. The important thing is that in the free cash flows represent the surplus that is available for distribution whereas the dividend is the amount that is actually distributed. So that is the fundamental difference between free cash flows and dividend. Dividend is the amount that is actually distributed by the company free cash flow is the amount that is available for distribution.

Now if you are looking at the company as a potential takeover target or evaluating the company from investor who is having a significant control over the company, over the affairs of the company then naturally it is the free cash flow that is the relevant parameter for determining the value of the company because then you are not concerned with the dividend decision.

Once you take over the company or one because you have substantial say in the company you can always impose your decision on the company and so far as the quantity and rate of

dividend is concerned. So your perspective should not depend on that particular decision your perspective should depend on what is available on the basis of which you can take a decision on what is to be distributed or not or if if anything at all is to be distributed.

So that is the difference between free cash flow and that is the reason that when we talk about free cash flow based valuation we are doing the evaluation from the perspective of a person who is who has a controlling interest in the company or is proposing to take up a controlling interest in the company, because he is not influenced by the dividend decision he can he can as and when he has that control.

If he has the control well and good if he does not have the control he has the ability on taking up a controlling stake to influence the decision of dividends or to influence the dividend decision so that dividend decision should not contribute to value in so far as the interest of that controlling shareholder is concerned.

So that is important and of course the others are pretty much obvious that if a firm does not pay dividends then you have to take request to free cash flows if it does not have a consistent dividend payment required then you have to take recourse to the free cash flow based methods and of course if the free cash flow tracks profitability relatively better than dividends do then again you should use the free cash flow based models.

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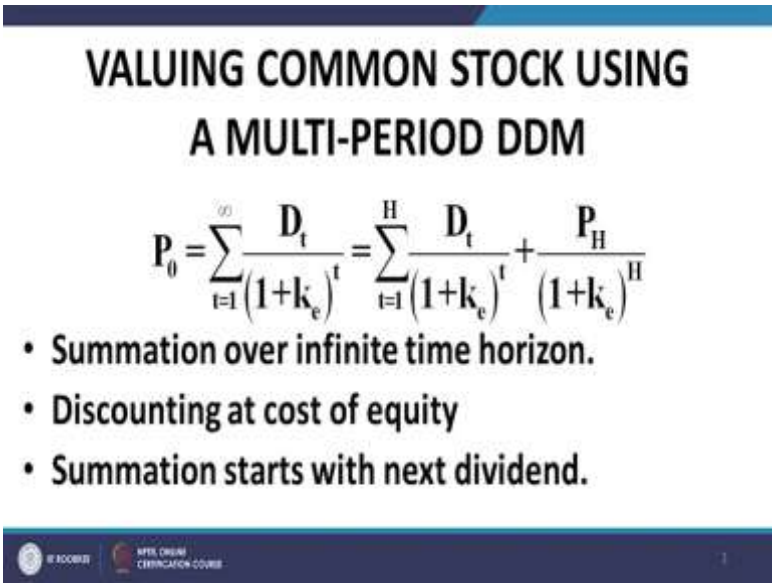

Now this is a basic model this is the formula for the intrinsic value of a stock based on dividend discounting. We discount the infinite stream of dividend obviously because we are

talking about an infinite stream of dividend as usual as i mentioned in the introduction to equity analysis that we are now faced with the problem of having summations over of an infinite set or infinite series.

So and that being the case we very often what we do is we split up the the forecasting of cash flows into two parts, we do an explicit forecasting process for an explicit for forecast period or a forecast period is which is explicitly done in terms of the the rates of dividend or the amounts of dividend and then we need, we work out a terminal value.

Terminal value is based on the either on the best of the hypothetical or anticipated or expected price at the end of the forecast horizon or it may be based on a value that is a having that is worked out on the basis of a constant growth rate indefinitely. So we split a split in other words what we do is we split the infinite stream of cash flows into two parts one explicitly forecasted cash flow stream which is over a forecast horizon.

And then secondly the remaining cash flows are ascribed a certain value either based on a certain estimation of the value itself or based on a certain growth rate and that is assumed to exist indefinitely so as as a growing annuity that is. So that is how we do the evaluation of of the intrinsic value of an equity share we divide it into two parts. Now the explicit forecast period may again be divided into two parts or more than two parts.

So the basic thing is you see you can have any kind of pattern that you feel appropriate to the exercise being done depending on the nature of the evaluation nature of this stock being valued nature of the company the economic condition or the projections for the economy projections for that relevant industry projections for the company and all these things you can ascribe a certain pattern.

May be having a single single stage growth model or you may have a two stage growth model or a three stage growth or an n stage growth whatever the case may be it really depends on the acumen and the understanding of the analyst how he perceives the future cash flows to be. But the important thing is that a certain pattern must be imputed to the cash flow, because you are talking about a summation of an infinite stream, so you you cannot indefinitely go on forecasting that stream it has to end somewhere.

So the point at which it ends as i mentioned you have to take either a terminal value for that cash flow or you have to take a terminal growth rate on the basis of it the terminal value can

be calculated. Some assumption has to be made about the indefinite future behavior of cash flows, but for the finite period you can have explicit forecasting, you can forecast the dividends from year to year basis, you can forecast the dividend with a growth rate for the first n1 years and second growth rate for n2 years, third growth rate for n3 years and so on.

So that freedom is always there to the analyst but the important thing is at the end of the day we are summing up a geometric progression and infinite stream of cash flows. The discount rate here is the is the cost of equity, as you can see here in this formula and the another important thing is that you start with the stream starts with the next cash flow it is not from the current dividend the current dividend is not relevant.

You see when whenever we do a discounting exercise for calculating intrinsic value we are concerned with future cash flows, the discounting of future cash flows, so when we talk about discounting of future cash flows, the first term that is relevant is the next dividend and not the previous dividend, not the current dividend. This is an important point that we need to keep track off.

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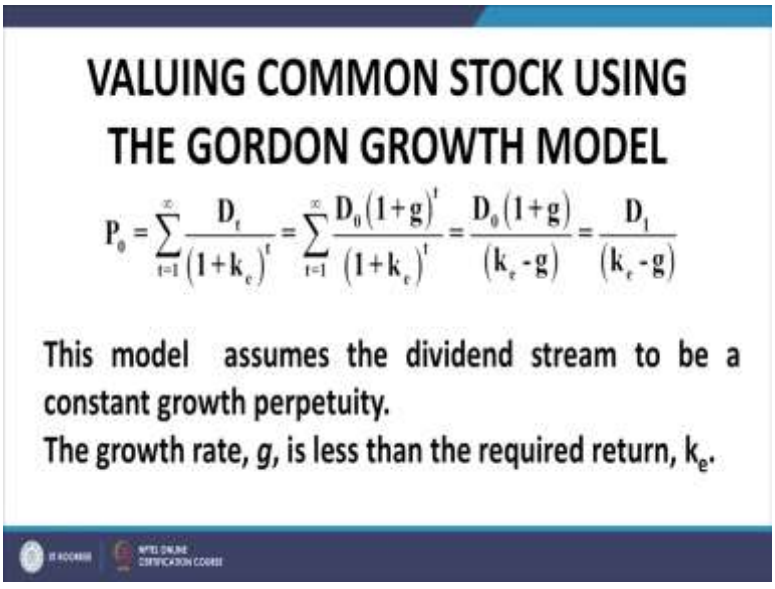

Then the this is the simplest model that we have where we have only one growth rate and that growth rate is assumed to apply indefinitely over the life of the company and this is called the Gordon growth model. And this ends up with a very simple formula which is given in the right hand side of the equation D 1 divided by ke minus g.

Where g is the that constant growth rate, we are evaluating in this case, we are evaluating the dividend as a constant growth perpetuity and at a rate ke and the growth rate embedded in the perpetuity is g and on summing the geometric progression that we get the formula D1 upon ke minus g. So this is the simplest model the Gordon growth model.

The P zero is the current price the intrinsic value, D zero is the dividend that you have just received D1 is the dividend that you are going to receive in the end of period one ke is the required rate of equity and g is the dividend growth rate. Interpretation of ke is the expected return by equity shareholders. Now the important thing that I mentioned want to mention is that at equilibrium the required rate by a particular investor or a required by the market will be equal to the expected rate on that security.

Why is that, because the price will adjust itself accordingly for example if the required rate by investors is higher if the required by the collective wisdom of the market is higher and the expected rate of return is lower at a particular point in time from that particular security then the price will the demand for that security will fall.

And as a result of which if the supply is constant what will happen is because of the fall in demand the price will decrease and as a result of it the expected rate would increase and again at equilibrium the two rates would more or less converge to each other. The required rate of return on a security would equal its if expected rate at equilibrium.

Why the growth rate cannot exceed k e well the mathematical reason is simple if the growth rate exceeds ke then we have a divergent series and the formula that we used for arriving at a at a value at a finite value for the infinite stream of cash flows will not work recall that for an infinite geometric progression the sum of the cash flows in the sum of the infinite stream infinite geometric progression is given it converges or it takes a finite value only if the the common ratio is less than one.

If the common ratio is greater than one the series diverges and you cannot have a finite sum for an infinite stream of cash flows or any other thing if the common ratio is greater than one. So in order that the common ratio is less than one, we must have g must be less than ke. So this is a mathematical reason if g is greater than ke we will not have a convergence series and as a result of which we cannot arrive at a finite sum of that series.

So but as far as the economy is concerned there is also some logic if the growth rate exceeds the cost of capital or the cost of equity then it is it is definitely prudent for the company to keep on reinvesting its resources to earn more and more profits because you are you are the growth of your earnings is more than the the the cost that you are paying for retaining these funds.

And as a result of this indefinite and unprecedented continuous growth what will happen is that the company will will grow so much as to exceed that industry and in fact encompass the entire economy as a whole which is an absurd proposition, so in real life we cannot have a situation where a company grows at a rate faster than the cost of equity of that company indefinitely.

There may be small, please note the important point there may be small periods they may be say 3 years 5 years 10 years for which a company that has a patent or that has some kind of innovative product that it has introduced into the market it may grow at huge rates it can grow at massive rates but at the end of the day that those rates cannot continue indefinitely that is the important bottom line.

The word indefinitely is most important it needs to be emphasized growth rates exceeding for example the normal inflation and the growth of the economic parameters like the GDP and GNP cannot manifest themselves in any company indefinitely. For a finite periods, yes, it can happen but for it to continue up to infinity the company would encompass the entire economy and that is an absurd situation to to imagine.

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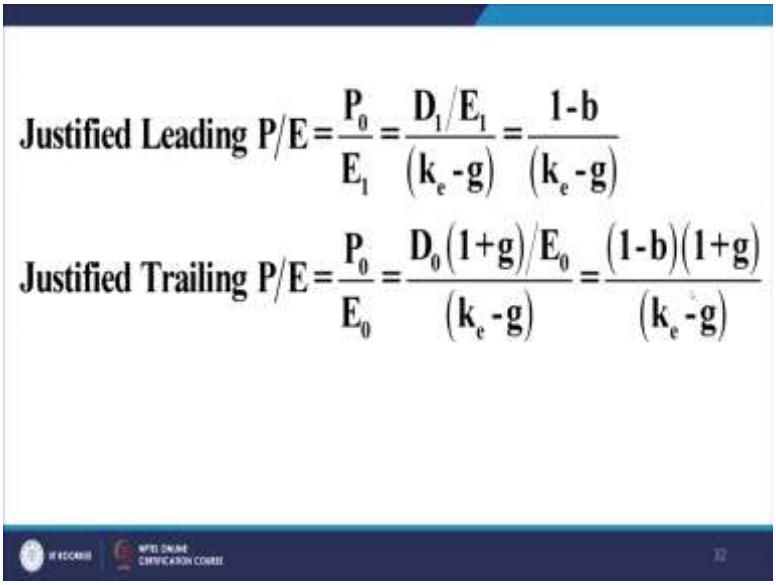

Then on the basis of our price valuation or intrinsic value evaluation we can arrive at justified leading and trailing PE ratios which are also usually calculated by the analysts. The leading price earning ratio is based on the earnings forecast for the next period, and the trailing price earnings ratio is based on the previous or the immediately preceding earnings.

So I repeat the leading PE ratio worked out on the basis of the value calculations by discounting the DCF valuation uses the earnings that are projected for the next period and the trailing PE ratio is the justified PE ratio rather is the PE ratio that is worked out on the basis of the dc evaluation and the immediately preceding earnings.

So the formula for the justified leading PE ratio and the justified trailing PE ratio is given on the slide its quite simple for the leading PE ratio we have P0 upon E1 where E1 is the projected earnings for the immediately following period and that is period 1 and when you simplify it it becomes the payout ratio divided by ke minus g.

And for the trailing PE ratio it becomes the payout b is the retention ratio so 1 minus b is the payout ratio so 1 minus b is the payout ratio into 1 plus g divided by ke minus g. This is the trailing PE ratio based on or justified leading and justified trailing PE ratios which are based on the DCF valuations that we calculated. We will continue after the break. Thank you!