Financial Institutions and Markets
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Lecture - 47
Stock Market – II

So, in the previous class we started the discussion on the Stock Market. There we have discussed about the importance of stock market and as well as the different instruments which are available in the stock market and what are those basic differences between them. And the next discussion about this thing is basically that how the pricing of that particular instruments are done and what are those different methods for valuation of the equity or the stock which are traded in the stock market.

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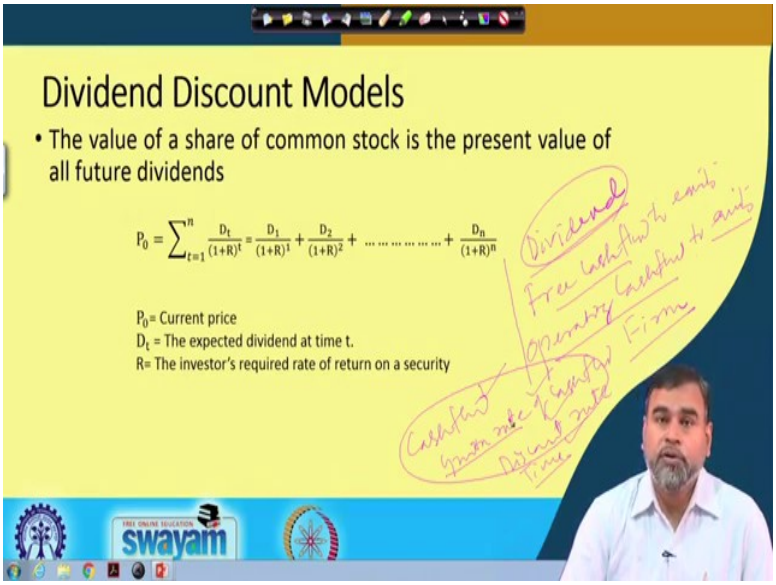

So, if you remember in the beginning we discussed about certain conceptual issues related to valuation. So, price of any kind of asset is nothing, but the present value of the future cash flows. So, whenever we talk about the future cash flows and if you think about the stocks, what are those possible future cash flows which are related to the equity or the stock if you see, these are basically one thing is your dividend. Second thing is your free cash flow to equity, then we have the operating cash flow to the equity.

So, these are three different cash flows which are basically available; the operating cash flow to the equity or operating cash flow to the firm. So, generally the operating cash flow is

always calculated with respect to the company or the firm it is not with respect to only equity. So, there we have three types of cash flows. We have dividend we have free cash flow and we have operating cash flow. And already if you remember we also discussed about there is that three inputs which are required for the valuation of any kind of asset. One is your cash flow, second one is the growth of the cash flow or the growth rate of the cash flow and third thing we want the discount rate. And obviously, time is another factor or the time period is another factor.

So, we have the four inputs are mostly the major inputs are these three which are quite important for the valuation of any type of asset. So, with reference to that if you think about the equity or the stock, we also need this four inputs we need cash flow. We need growth rate of the cash flow, we need discount rate; we need the time. So, here already we discuss that dividend is the first cash flow which is related to equity or the stock and we have the growth rate of the cash flow means growth rate of the dividend. Then finally, the discount rate which is nothing, but the cost of equity in the context of the equity because that is the expected return what we can get it from that particular investment, then we have the time period.

So, these are the four inputs always we need whenever we go for the valuation of the equity using the dividend as the cash flow. So, we go back the formula is basically nothing, but it is

$$\frac{D_t}{(1+R)^t}$$

Your R is nothing, but the discount rate which is in this case the cost of equity and you can expand it

$$\frac{D_1}{(1+R)^1}+\frac{D_2}{(1+R)^2}+\ldots$$

If you have the n number of cash flows and the period is n then it is D n divided by 1 plus R to the power n. And finally, we can find out the P_0; the P_0 is nothing, but the intrinsic value of that particular equity.

So, this is what basically the values and principles where the valuation formula which is used for valuation of the equity using dividend as the cash flow. Then if you see there are certain things related to this.

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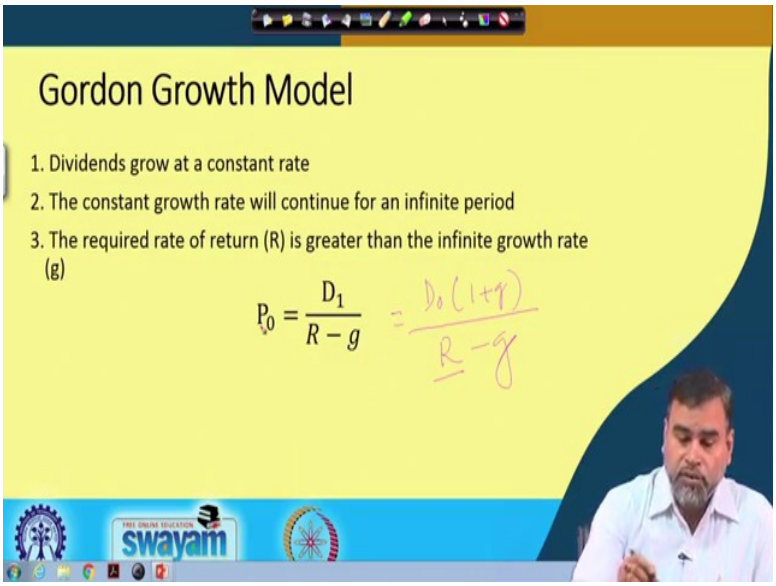

One is that a different ways the valuation is done. Then one particular thing if you take certain assumption that let the dividend is growing at a constant rate. The growth of the dividend is not changing this is number 1 and this particular growth we will continue for an indefinite period of time. There is no specific period is mentioned that up to what period this growth rate will be this much. Let that is basically continue for indefinite period of time and another assumption we are taking that dividend what growth rate we have that is less than the cost of equity.

That means the required rate of return will be greater than the indefinite growth of the particular cash flow or the growth rate of the particular cash flow. So, then if you see that if you expand that particular formula if you simplify that formula finally, we are getting

$$P_0 = \frac{D_1}{R-g}$$

Then what this D_1 is equal to this is nothing, but the $D_0(1 + g) / R - g$. So, D_0 is the initial dividend what the company is paying and g is equal to the growth rate of the dividend, R is equal to the discount rate or the cost of equity and this is the way in the P_0 is equal to the intrinsic value of that particular equity what basically we are calculating using dividend as the cash flow.

So, this is the way basically this is one particular model which basically talks about the valuation of equity which popularly known as the Gordon's Growth Model. Gordon has

given this particular concept assuming that the growth rate of the dividend remains constant for an indefinite period of time. So, let us see how this particular thing can be derived.

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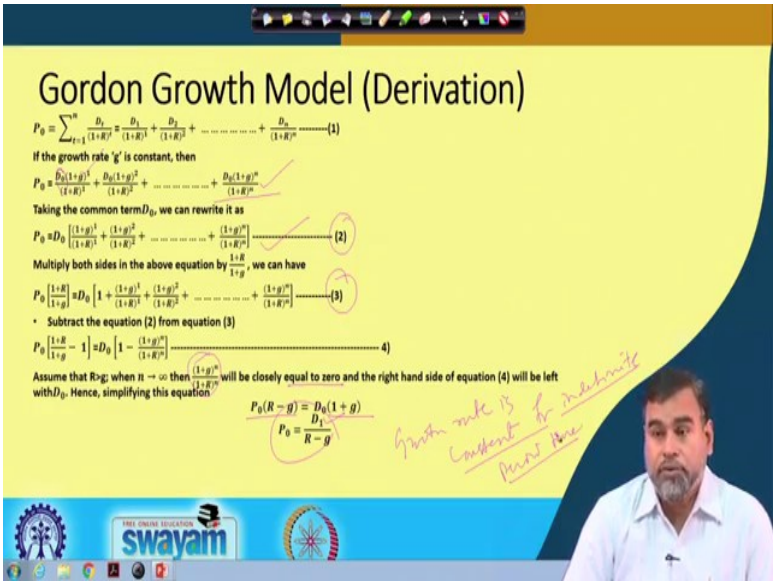

If you see we can start with the initial equation

$$P_0 = \sum_{t=1}^{n} \frac{D_t}{(1+R)^t} = \frac{D_1}{(1+R)^1} + \frac{D_2}{(1+R)^2} + \ldots\ldots\ldots\ldots\ldots + \frac{D_n}{(1+R)^n} \text{ ---------(1)}$$

Then if you assume that the growth rate of g is constant and D 0 is equal to the initial dividend. So, here if you see this D 0 which is the initial dividend g is equal to the constant growth rate, then you can expand it and this way D 1 is nothing but

$$\frac{D_0(1+g)^1}{(1+R)^1} + \frac{D_0(1+g)^2}{(1+R)^2} + \ldots\ldots\ldots\ldots\ldots + \frac{D_0(1+g)^n}{(1+R)^n}$$

Then if you take common D 0, you can take common because D 0 is involved in all the terms in that particular equation. Then you can take the bracket then you can find

$$D_0\left[\frac{(1+g)^1}{(1+R)^1} + \frac{(1+g)^2}{(1+R)^2} + \ldots\ldots\ldots\ldots\ldots + \frac{(1+g)^n}{(1+R)^n}\right] \text{ ---------- (2)}$$

Then what you can do? Let you multiply both sides by (1 + R) / (1 + g).

$$P_0\left[\frac{1+R}{1+g}\right] = D_0\left[1 + \frac{(1+g)^1}{(1+R)^1} + \frac{(1+g)^2}{(1+R)^2} + \ldots\ldots\ldots\ldots\ldots + \frac{(1+g)^n}{(1+R)^n}\right] \text{----------(3)}$$

Then 1 plus g 1 plus g will be cancelled in one place then finally, you are finding 1 plus R by 1 plus R then you are getting 1. Then other term will remain 1 plus g by 1 plus R plus 1 plus g to the power 2 divided by 1 plus R to the power 2 and so on. And finally, you are getting 1 plus g to the power n divided by 1 plus R to the power n.

Then you what you can do? You subtract this equation from this equation, then what you will find that all the terms will be cancelled and finally, what you get you are only finding that

$$P_0\left[\frac{1+R}{1+g}-1\right]=D_0\left[1-\frac{(1+g)^n}{(1+R)^n}\right] \text{ ---------- 4)}$$

Then as you know that R is greater than g then automatically if n tends to infinity, then this term will be very negligible. It will be very much close to0. So, then 1 plus g to the power n divide by 1 plus R to the power n will be closely equal to 0, then you can cancel that particular term. Then finally, what you can find out that if you simplify that equation then finally, you will find out $P_0(R-g)=D_0(1+g)$ then; obviously, then

$$P_0=D_0\frac{(1+g)}{(R-g)}=\frac{D_1}{(R-g)}$$

So, this is the way this particular formula can be derived and this formula basically talks about where the growth rate is constant; growth rate is constant for a indefinite period of time remember for indefinite period of time. So, this is basically very important in this context that whenever the growth rate remains constant for indefinite period of time, then the value of equity is nothing, but the $\frac{D_1}{(R-g)}$ then R is equal to the cost of equity and g is equal to the growth rate of the dividends.

So, this is the way the Gordon Growth Model can be derived and the constant growth model can be derived. So, then you can move that not necessary that always from the beginning whatever growth rate the company always gets, the same growth rate will continue for indefinite period of time that may not be true. Let you can relax that assumption that let in the beginning the growth rate is relatively higher and over the period the growth rate again come down to a steady growth rate.

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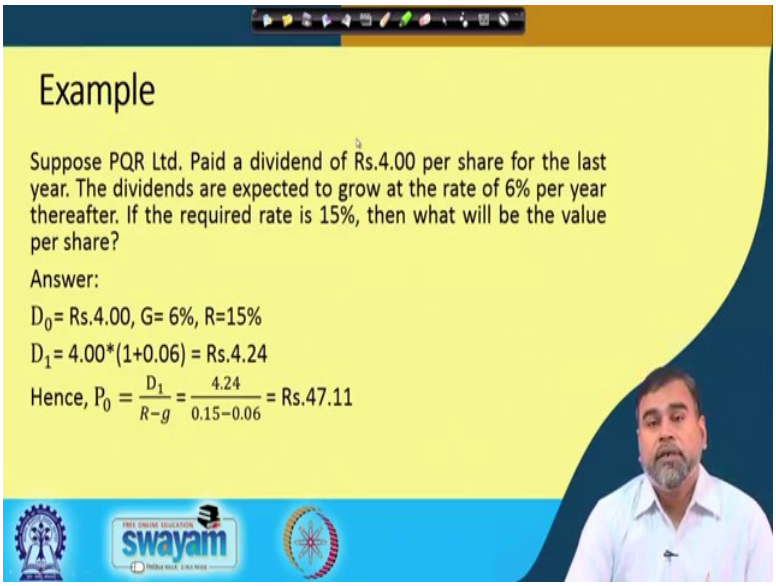

So, the assumption basically here what, we can take the growth rate is constant for a particular period of time maybe supernormal growth rate in the beginning, then it can come down. We will see that thing further, then how the formula get change, but if you use that equation and find out a value of that particular equity then let the dividend is 4 rupees and the dividend are expected to grow at a rate of 6 percent; that means, g is equal to 6 percent.

Then required rate of return is 15 percent means your R is equal to fifteen percent then what will the value then you can use directly that formula your D_0 = 4, 4 × (1 + 0.06) which is the growth rate. But you will be getting 4.24, then you can discount that 4.24 with respect to that discount rate which is 15 percent in this case. Then 4.24 / 0.15 -0.16 that will give you 47.11 rupees.

So, this is the way basically the valuation of equity is done if the growth rate remains constant for indefinite period of time. That is very easy to calculate because that is the way basically we can all directly we can improve of the D_0 value, then you can use that formula and get it this thing.

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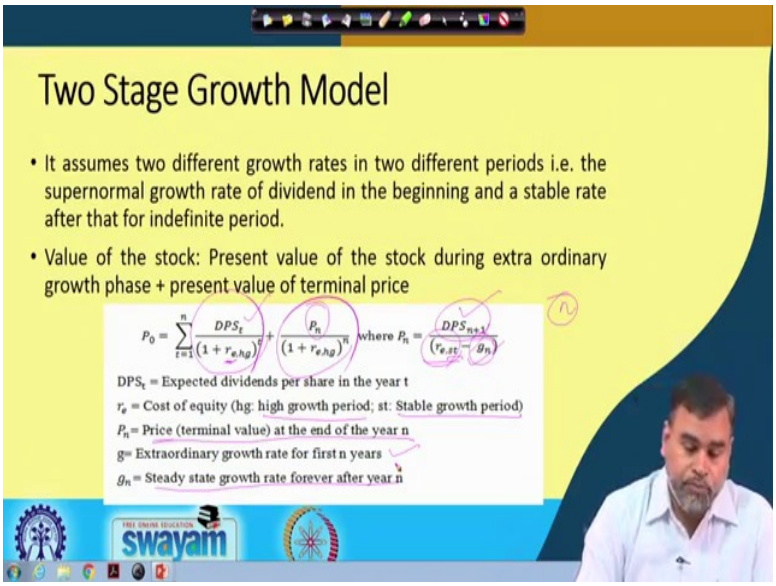

And I already told you that is another model called the two stage growth model. There we are assuming there are two different growth rates into different periods and there is a high growth rate in the beginning and after a certain period of time the growth rate basically you will reduce and it remains stable for indefinite period of time. If there are two different growth rates which are available in one period that is a supernormal growth rate, in another period that is a stable growth rate which is relatively lower.

So, in that context, then how we can calculate the value of the stock? The value of the stock can be calculated you can calculate the present value of the cash flow in the extraordinary growth phase or the supernormal growth phase, then you can find out the present value of the terminal price. Then what is the terminal price? The terminal price is basically whatever expected cash flow will be getting after the supernormal growth rate period will be over. Then if you discount that particular price with respect to that proper discount rate whatever we have in that particular period of time, then the terminal price of that particular stock can be calculated.

So, now if you observe because we have the two different growth stages, we have two different terms what we can use it for the valuation of that equity. One is the high growth rate term and another one is the constant growth rate term or the stable growth rate term. So, if you see this one this term talks about the high growth rate term and this term talks about the constant growth rate term. And here the P_n with what we have taken. The P_n is basically

nothing, but whatever expected dividend per share you are getting after the super normal growth rate over.

The super normal growth rate over let are the period of n, then what is the expected dividend you are getting and the period n + 1 then that n + 1. And we are assuming that that particular dividend growth rate will remain constant over a period of time, then we can find out what is the stable cost of equity or the required rate of return and what is the stable growth rate.

So, if you can do that then your P_n can be calculated. So, that is the way basically the terminal price can be calculated and the terminal price can be discounted and to find out the present value. Then that present value and this present value if you add up, then you can find out the value of the stock in that particular context. So, already I explain that thing here your r_e is equal to the cost of equity where hg represents the high growth period and st represents the stable growth period and P_n is equal to your terminal price of the terminal value at the end of year ng is equal to the growth extraordinary growth rate for the first n years.

And your g n is equal to the steady growth rate forever after the supernormal growth rate period gets over. So, now you can see that a little bit you can expand this particular equation.

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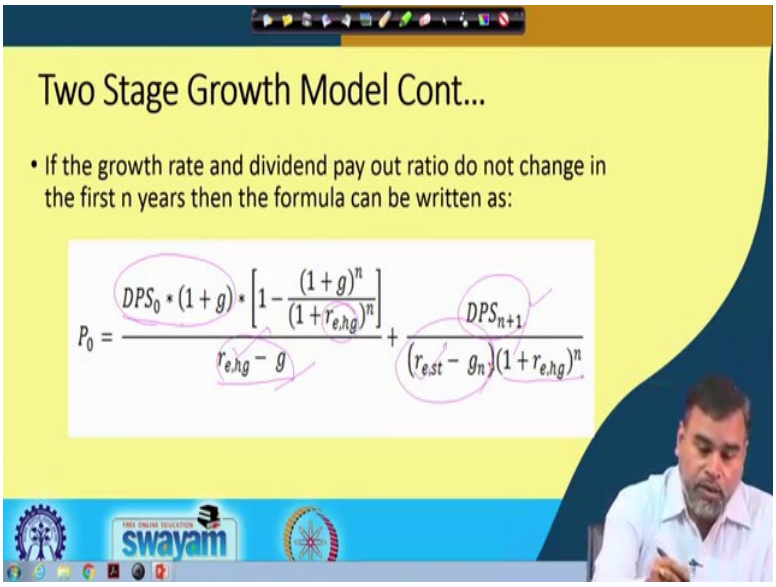

If you assume that the growth rate and the dividend payout ratio do not change in the first n years, then the formula can be written as this way. You can use this same constant growth rate formula the DPS 0 into 1 plus g into 1 minus 1 plus g to the power n divided by 1 plus

your r to the power n and here the r is because if the first period the r is nothing, but the high growth rate period r the cost of equity in the context of high growth period.

$$P_0 = \sum_{t=1}^{n} \frac{DPS_t}{(1 + r_{e,hg})^t} + \frac{P_n}{(1 + r_{e,hg})^n} \text{ where } P_n = \frac{DPS_{n+1}}{(r_{e,st} - g_n)}$$

DPS_t = Expected dividends per share in the year t

r_e = Cost of equity (hg: high growth period; st: Stable growth period)

P_n= Price (terminal value) at the end of the year n

g= Extraordinary growth rate for first n years

g_n= Steady state growth rate forever after year n

Then your r e minus g r minus g which is nothing, but the high growth period cost of equity minus the growth rate of the dividend in that particular period plus your DPS and plus 1 divided by because you are discounting it which respect to this 1 plus r e h g to the power n and finally, you are using the constant growth model and that is why you are getting it. That means, DPS and plus 1 divided by 1 plus r e hg to the power n. Then whatever price we are getting that again you are discounting it with respect to this stable growth cost of equity then finally, the present value of that particular price or terminal price can be calculated.

So, DPS and plus 1 divided by 1 plus r e to the power n which is basically nothing, but the value what we are getting in the end of the super normal period. So, let us see one example then it will be clearer for you.

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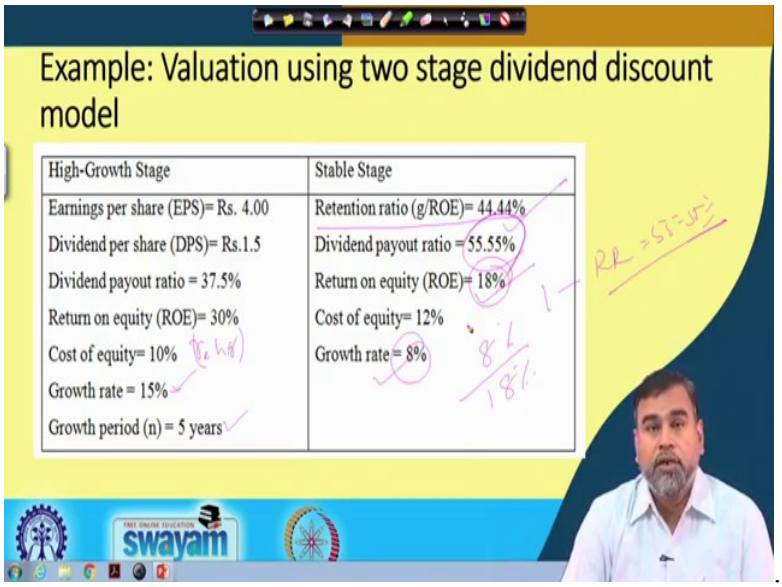

Let there are two stages here we have taken; one is high growth stage, another one is stable stage earnings per share. You assume that let for rupees dividend per share is 1.5 rupees, then dividend payout ratio has become 37.5 percent. The return on equity is 30 percent cost of equity is 10 percent which is your $r_{e,hg}$. This is your basically your r e h g, then we have the growth rate which is the growth rate in the super normal period. In this is your period which is continue the growth rate high in growth rate continuous that is 5 years.

Then after 5 years, your retention ratio let become 44.44 percent that you are getting because after that the growth rate has become 8 percent and your return on equity let for the company is 18 percent that already you know that your growth is nothing, but the retention ratio multiplied by the return on equity. So, if your growth is given and ROE is given the retention ratio can be calculated that is 44.44 in this percent. This is 8 percent divided by the 18 percent that you can get it this one. Then dividend payout ratio is nothing, but 1 minus your retention ratio that is 55.55 percent in this case that you got it.

Then after using this data, you can use it for calculation of your value of the equity. Then how basically you are trying to do this? If you see, then you can put those values in that formula.

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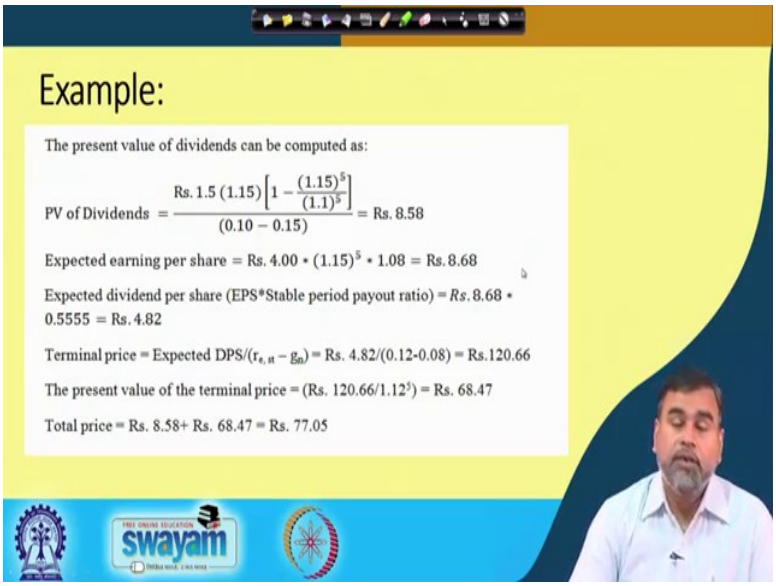

Then 1.5 which is the initial dividend for share into 1.15 15 is the growth rate of 15 percent with the growth rate then 1 + g, then 1.15 into 1 minus 1 + g ^{n}. That means, n is equal to 5 1.15 to the power n divided by 1 plus r to the power n; r in the first period is 10 percent in 1.1 to the power 5.

Then finally, what we are getting that divided by r minus g r in that high growth period is 10 percent in 0.1 minus 0.15, then you are getting 8.58 percent 8.58 rupees. Then expected earnings per share after the nth period is over; that means, the first period was 15 percent growth rate initial earnings was 4 rupees then 4 rupees multiplied by 1.15 to the power 5 multiplied by 1.081 point. Why you are multiplying 1.08 because in the 6th year the growth rate was 8 percent.

Then what you are getting? 8.68, then you know that your dividend is 55.55 percent your dividend payout ratio, then 8.68 into 0.555, you are getting 4.82. Then that 4.82 which is your expected dividend divide by your next year's cost of equity that is 12 percent which is given minus g n which is the stable growth rate. Then 4.82 divided by 0.12 minus 0.08 what you are getting 12.66 rupees.

Then what if you can calculate the present value of this, then you have to discount it with respect to the discount rate that is 12 percent in the stable growth period. Then 120.66 divided by 1.12 to the power 5, then you are getting 68.47 rupees. So, in the first period it was 8.58 rupees, next period is 68.47 rupees and if you add up, then the value of equity will be 77.05

rupees. So, this is the way the two stage growth model works in the market. There are other models also there are three stage model, there are h model and all this things for that you can go for any valuation books which talks about in detail about those. But here I have just introduced that two concepts where the valuation of equity can be carried out.

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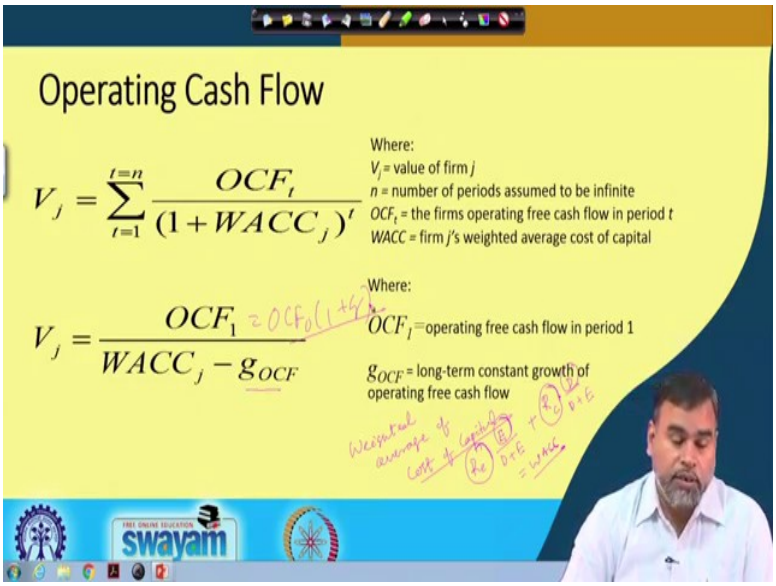

So, then already I told you there are two another kind of cash flow which is related to the company that is your operating cash flow and how the operating cash flow is calculated that we have explained in the previous class. You can use this same formula that you are OCF instead of dividend you can calculate this OCF operating cash flow divided by 1 plus, but here you remember your cost of capital is considered as the discount rate. And here it is not the cost of equity why you are not talking about cost of equity because your cash flow what you are considering that is with respect to the firm not with respect to the equity only.

So, WACC what already you know that what is WACC? WACC basically your Weighted Average of Cost of Capital. So, how to calculate the weighted of cost average of cost of capital? That is your cost of equity multiplied by the percentage of equity; that means, your E upon D plus E D is equal to your debt plus your cost of debt let R c into D upon D plus E.

So, if you know the cost of equity, you know the cost of debt and how much percentage of the equity the company has and how much percentage of debt the company has, then you can find out the WACC. The weighted average of cost of capital can be calculated. These are the weights as a percentage which is related to equity and the debt. Then what you can do? You

can discount with respect to the WACC and the operating cash flow will be discounted and finally, the value of the particular company can be calculated.

So, again same thing if you are assuming that there is a constant growth rate for the OCF, then you can use the same Gordon formula what we have derived that your V is equal to or p is equal to your D 1 divided by R minus g. In this case, your OCF 1 divided by WACC minus g of growth rate of the OCF and your OCF 1 is nothing, but OCF 0 into 1 plus g divided by your WACC minus the growth rate of the OCF then you can calculate the operating cash flow.

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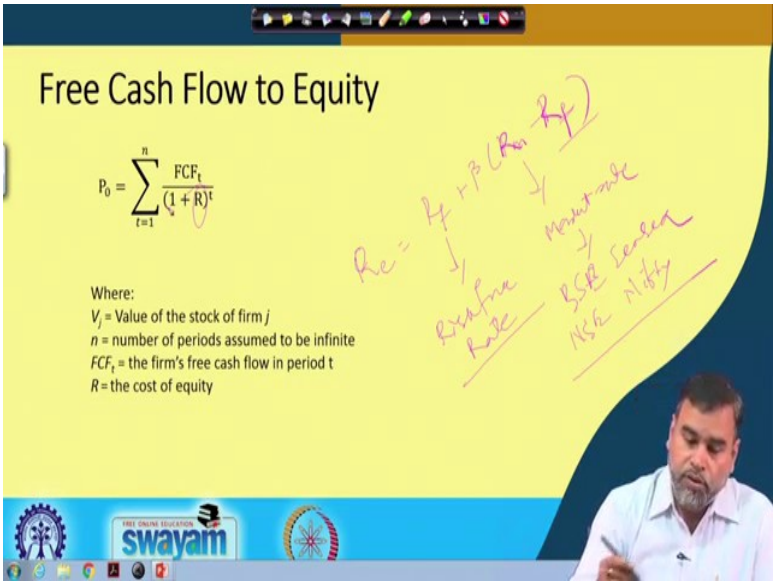

But if you are going for the free cash flow then you can also use the same thing the operating cash flow minus in the capital expenditure plus net debt issue that will give you the free cash flow. Then if you have the free cash flow, the free cash flow is basically with respect to equity. So, here again your R is equal to the cost of equity. Once you calculate the free cash flow, you can already have the cost of equity with you and you know what is cost of equity.

Again I am reminding you the cost of equity basically you can calculated your R_e is equal to you can calculate your $R_f + \beta (R_m - R_f)$ and here your R_f is basically your risk free rate. You can use the treasury bill rate or any other rate as a risk free rate R_m is equal to the market rate. And here your market rate is basically you can return from the sensex your BSE SENSEX, you can take the return from the NSE NIFTY so on.

Any kind of market index return can be calculated as considered as R_f and R_f is equal to the risk free rate and you can find out your R and once the R is calculated, you can calculate the free cash flow. Then you discount with respect to that to find out the value of the particular stock. So, this is another way; another way of calculation of the value of the stock. But basically these are the formulas which are used to calculate the intrinsic value of the stock.

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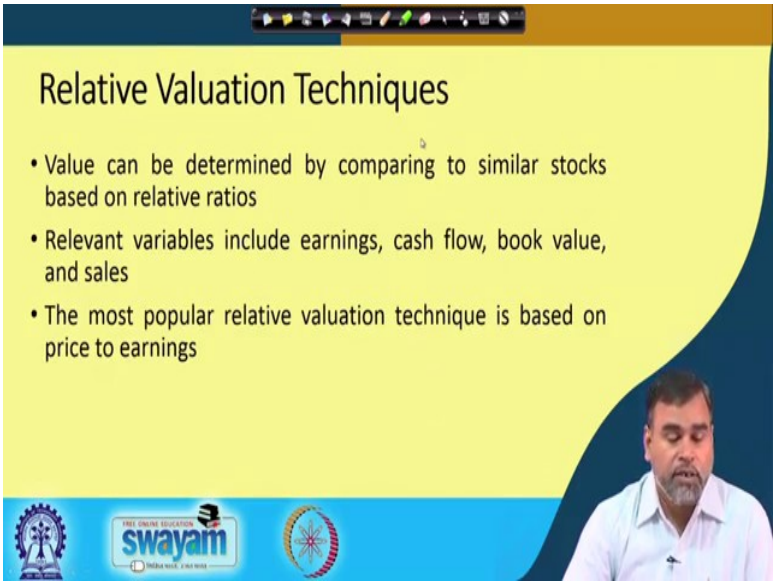

So, another one is basically what your relative valuation techniques and the relative valuation techniques are used for what reason? To decide or to make a comparison between the different stocks which are available in the market. So, whenever anybody wants to invest in the market, then what kind of stock they should choose on the basis of their objective that basically decided by the relative valuation techniques.

So, whenever you go for the relative valuation technique we always compare between the similar stocks using certain ratios. So, using certain relative valuation ratios. What are those relative ratios we use? The relative ratios can be used with respect to earnings with respect to cash flow with respect to book value of the company or book value of the stock or it can be also with respect to sales. Why basically, we go for using those kind of ratio analysis for doing this, because the ratio analysis can normalize the data and that normality can help you to make a comparison in a better way.

So, there are different ratios the most popular ratio is basically based on the price earning ratio. You might have heard about p ratio that P E ratio is the most popular method for the

valuation of the equity that is price earning ratio. So, let us see that how those ratios are basically used for the valuation of that.

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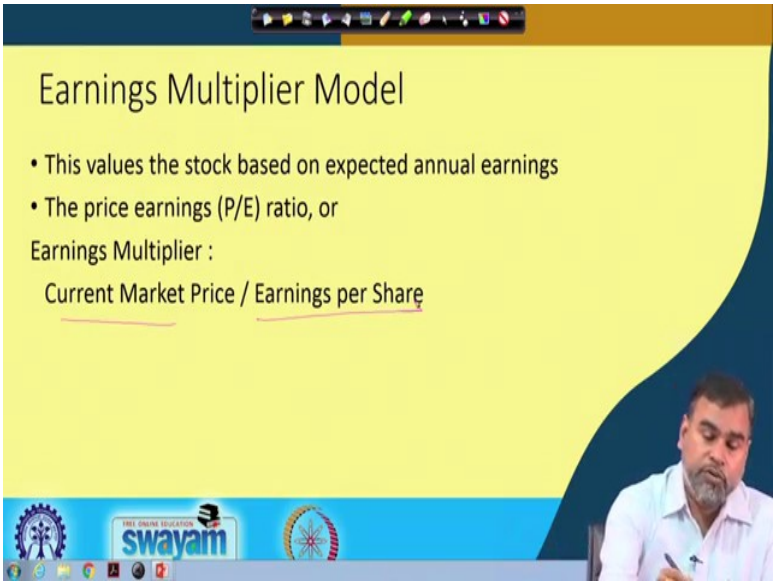

Then PE ratio is nothing, but the current market price the current market price upon the expected earnings for the share. So, if you have the expected earnings per share, then you have the current market price that will give you the PE ratio. And PE ratio means what is the interpretation of the PE ratio. The PE ratio interprets that to get 1 unit of the return from 1 unit or 1 rupee or 1 dollar value of investment for a particular stock you have to spend 5 rupees.

So, if you are spending 5 rupees, you are getting 1 rupees. So, lower the PE, better for the investor. So, lower the PE better for the investor because there is a growth potential of that particular stock. You are investing less and getting more. So, that is the way the PE ratio is interpreted in the market.

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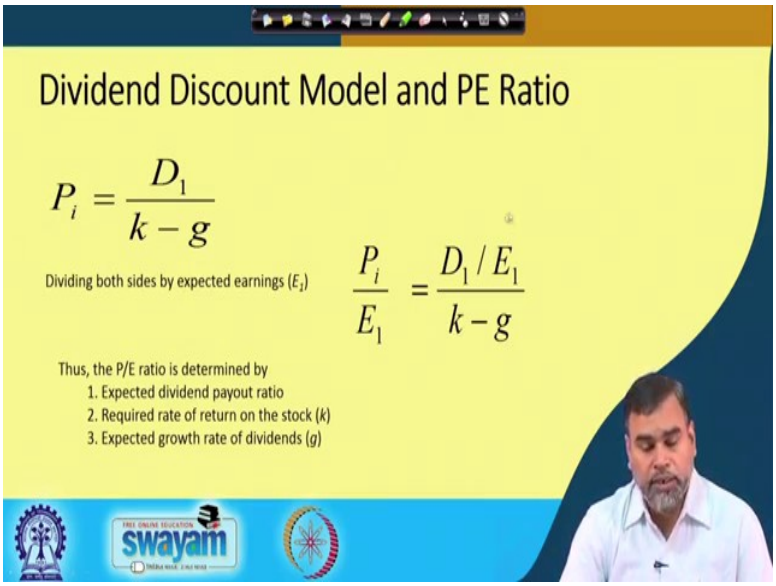

Then we can see that there is a relationship you can establish between the dividend discount model and the PE ratio. If you remember your P is equal nothing, but D 1 by R minus g or the k minus g whatever way you can represent the required rate of return of the stock. Then if you divide E in both side then you are D 1 upon a divide by k minus g or R minus g will give you the value of the PE ratio.

Then what are those factors which can affect the p ratio the p ratio is determined by the expected dividend payout ratio? It is also determined by the required rate of return of the stock; that means, cost of equity then the growth rate of the dividends.

So, those factors also affect the price earning ratio of the company in already I told you that lower the p better for the investor for investment in the market to you choose those stocks which PE ratio is relatively low.

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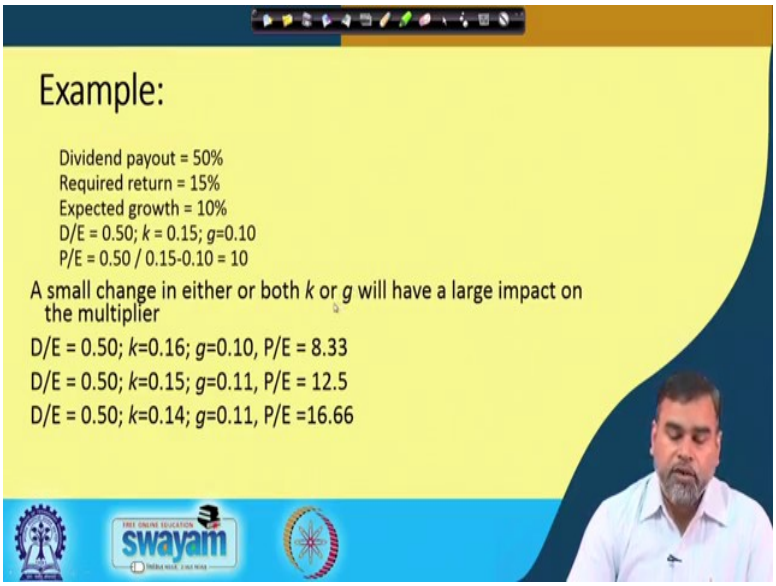

So, any change of the k or g will have a larger impact. If you see the example, dividend is constant required rate of return is 15 percent expected growth rate 10 percent D by E if is 0.5, but k is equal to 0.15 g is equal to 0.1 then P by E has become 10. What let g has change k has change from 15 to 16 percent. P by E become 8.33.

Let k has become 0 point remain 0.15 g has sense to 0.11, then it has become 12.5 that both have changed let from 15 to it has become 14 percent from 10 to it has become 11 percent, then P become 16.66. When a small changes in the k or g or R or g, will change this PE ratio drastically. So, that is why we can say that these are the major factors which affect the PE ratio.

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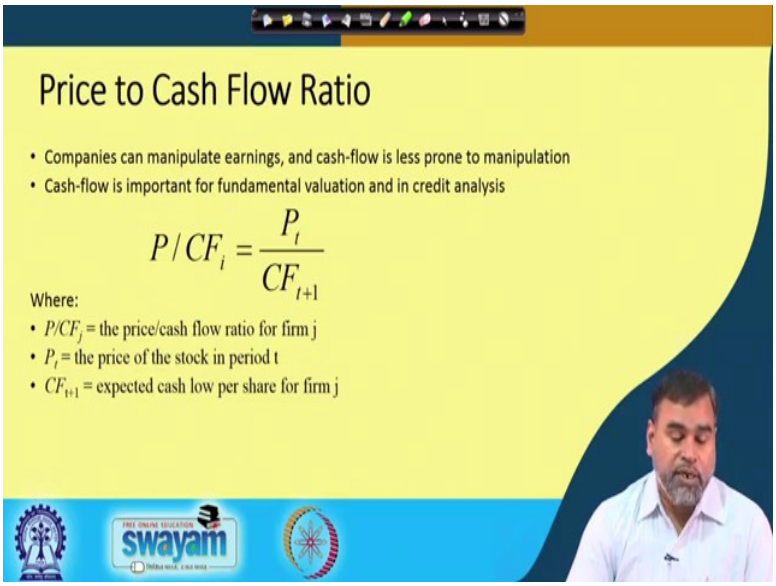

Then we have another ratio called price to cash flow some people argue that the companies can manipulate the earnings, but the cash flow is less prone to the manipulation. So, because of that the cash flow is very important for the valuation and as well as the credit analysis of the company. So, you can also find out the market price upon the cash flow expected cash flow for share of that particular firm and lower the cash flow again those particular stocks are considered the value stocks. So, that is the way basically you can interpret this things in the market.

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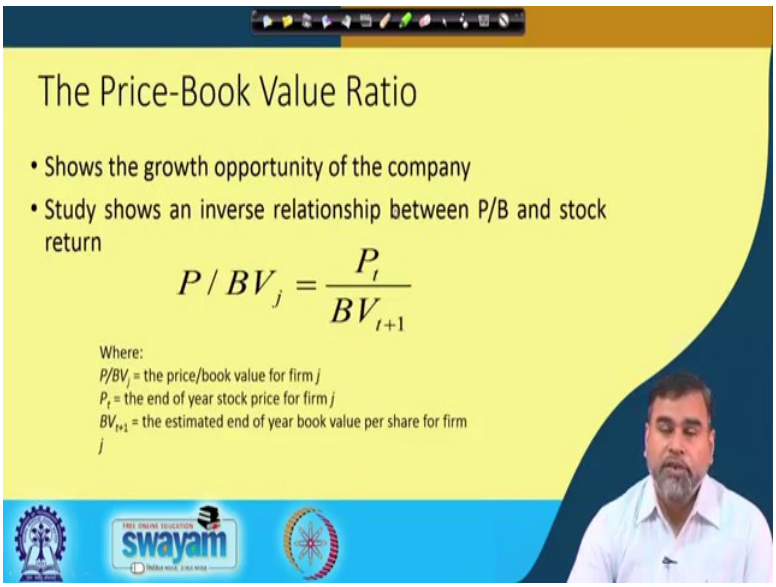

Then we have price to book ratio; the price to book ratio is a proxy for the growth opportunity and the previous studies have shown that the price to book ratio and stock return there is an inverse relationship. That means, if the price to book ratio is very much high; that means, what the market value of that particular company is already high; that means, the company is already over value.

So, in that context the expectation from that particular stock is relatively less or the return expected return from the stock can be less because market has already overvalued that, but the price to book ratio is very low then what we can say that book value is relatively high, but earnings market price is relatively low. That means, market has undervalued the stock and there is a possibility that the price of the stock will further grow up.

So, in that context lower the price to book ratio; that means, the company has more growth opportunity expected growth opportunity is higher than it is a better candidate for the investment in the market. So, this is the way the price to book ratio is used in the market.

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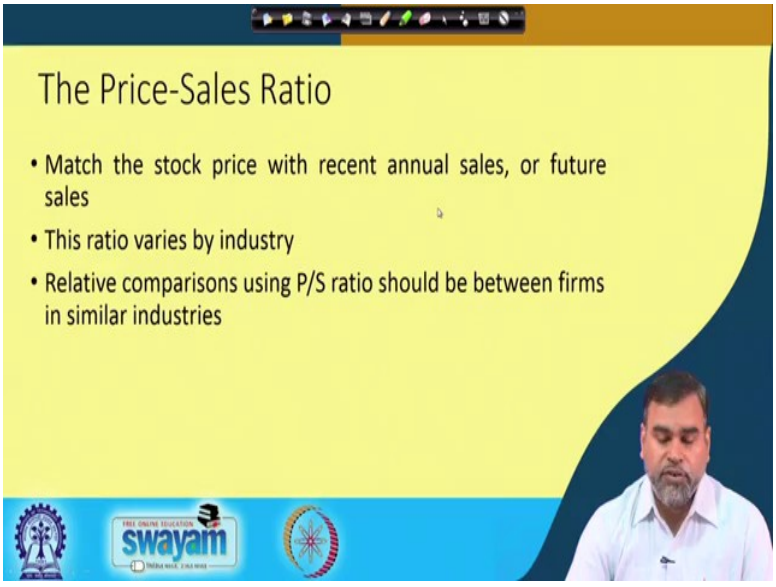

Then we have price to sales ratio and ratio of basically varies with the industry, but relative comparison using price to sales ratio should be between the firms within the similar industries. Because those are affected by some kind of seasonal and cyclical factors in the market.

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So, these are the references what you can go through to know more about this thing and further we will be discussing about the markets and all this things related to the equity of the stock.

Thank you.