

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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The slide is titled "Dividend Discount Models" and contains the following text:

- The value of a share of common stock is the present value of all future dividends

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

P_0 = Current price
 D_t = The expected dividend at time t .
 R = The investor's required rate of return on a security

Handwritten notes in red ink on the right side of the slide:

- Dividend
- Free cash flow to equity
- Operating cash flow to equity
- Cash flow to equity
- Free cash flow to firm
- Discount rate
- Time

A video inset in the bottom right corner shows a man with a beard and glasses, wearing a light blue shirt, speaking.

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 D_t upon $1 + R$ to the power t and your R is nothing, but the discount rate which is in this case the cost of equity and you can expand it D_1 divided by $1 + R$ to the power 1 plus D_2 divided by $1 + R$ to the power 2 and so on. How to if you have the n number of cash flows and the period is n then it is D_n divided by $1 + R$ 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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Gordon Growth Model

1. Dividends grow at a constant rate
2. The constant growth rate will continue for an infinite period
3. The required rate of return (R) is greater than the infinite growth rate (g)

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

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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 a 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 is equal to D 1 divided by R minus g. Then what this D 1 is equal to this is nothing, but the D 0 into 1 plus g divided by the R minus 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 a indefinite period of time. So, let us see how this particular thing can be derived.

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Gordon Growth Model (Derivation)

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

If the growth rate 'g' is constant, then

$$P_0 = \frac{D_0(1+g)}{(1+R)} + \frac{D_0(1+g)^2}{(1+R)^2} + \dots + \frac{D_0(1+g)^n}{(1+R)^n}$$

Taking the common term D_0 , we can rewrite it as

$$P_0 = D_0 \left[\frac{(1+g)}{(1+R)} + \frac{(1+g)^2}{(1+R)^2} + \dots + \frac{(1+g)^n}{(1+R)^n} \right] \quad (2)$$

Multiply both sides in the above equation by $\frac{1+R}{1+g}$, we can have

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

Subtract the equation (2) from equation (3)

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

Assume that $R > g$; when $n \rightarrow \infty$ then $\frac{(1+g)^n}{(1+R)^n}$ will be closely equal to zero and the right hand side of equation (4) will be left with D_0 . Hence, simplifying this equation

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

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

growth rate is constant for indefinite period

$P_0 = \frac{D_0}{R-g}$

If you see we can start with the initial equation P_0 is equal to your t is equal to 1 of 2 n summation t is equal to 1 of 2 n D_t by $1 + R$ to the power t which is nothing, but D_1 by $1 + R$ to the power 1 plus D_2 divided by $1 + R$ to the power 2 and so on up to D_n ; D_n divide by $1 + R$ to the power n . 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 D_0 into $1 + g$ to the power 1 divided by $1 + R$ to the power 1 and D_0 into $1 + g$ to the power 2 divided by $1 + R$ to the power 2 and so on. And finally, you are getting D_0 into $1 + g$ to the power n divided by $1 + R$ to the power 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 what you can find D_0 ? If you take the common from all the terms then we are finding D_0 , then you can take the bracket then you can find out $1 + D$ to the power n divide by $1 + R$ to the power n and so on. And finally, you are getting $1 + D$ to the power n divided by $1 + R$ to the power n .

Then what you can do? Let you multiply both sides by $1 + R$ divided by $1 + g$. So, then P_0 into $1 + R$ by $1 + g$ is equal to D_0 into this $1 + g$ to the power by $1 + R$ plus $1 + 1 + g$ to the power 2 divide by $1 + R$ to the power 2 and so on multiplied by $1 + R$ divided by $1 + g$. Then $1 + g$ $1 + g$ will be cancelled in one place then finally, you are finding $1 + R$ by $1 + R$ then you are getting 1. Then other term will remain $1 + g$ by $1 + R$ plus $1 + g$ to the power 2 divided by $1 + R$ to the power 2 and so on. And finally, you are getting $1 + g$ to the power n divided by $1 + R$ 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 into $1 + R$ divided by $1 + g$ minus 1 you can take the one this side, then you will be getting D_0 into 1 minus this $1 + g$ to the power n divided by $1 + R$ to the power n .

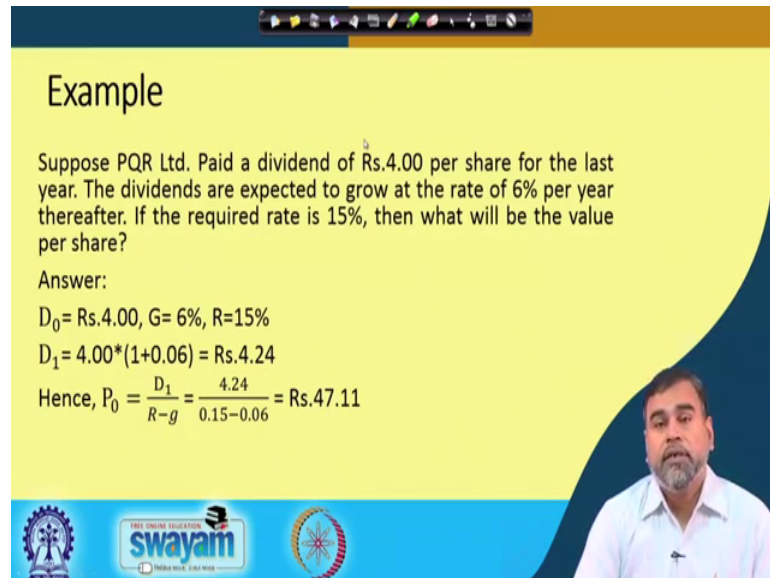
Then as you know that R is greater than g then automatically if n tends to infinity, then this term will be very negligible. It will be very much close to 0. So, then $1 + g$ to the power n divide by $1 + R$ to the power n will be closely equal to 0, then you can cancel that particular term. Then finally, what you can find out that if you simplify that equation then finally, you will find out P_0 into R minus g is equal to D_0 into $1 + g$ then; obviously, then P_0 is equal to D_0 into $1 + g$ divided by R minus g and D_0 into $1 + g$ is nothing, but the D_1 .

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 D_1 upon R minus 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 are 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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Example

Suppose PQR Ltd. Paid a dividend of Rs.4.00 per share for the last year. The dividends are expected to grow at the rate of 6% per year thereafter. If the required rate is 15%, then what will be the value per share?

Answer:

$D_0 = \text{Rs.}4.00$, $G = 6\%$, $R = 15\%$

$D_1 = 4.00 * (1 + 0.06) = \text{Rs.}4.24$

Hence, $P_0 = \frac{D_1}{R - g} = \frac{4.24}{0.15 - 0.06} = \text{Rs.}47.11$

So, here the assumption basically here what basically 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 is equal to 4, 4 into 1 plus 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 divided by 0.15 minus 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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Two Stage Growth Model

- It assumes two different growth rates in two different periods i.e. the supernormal growth rate of dividend in the beginning and a stable rate after that for indefinite period.
- Value of the stock: Present value of the stock during extra ordinary growth phase + present value of terminal price

$$P_0 = \sum_{t=1}^n \frac{DPS_t}{(1+r_e)^t} + \frac{P_n}{(1+r_e)^n} \text{ where } P_n = \frac{DPS_{n+1}}{(r_e - g_n)}$$

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

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 is 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 what 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're getting after the super normal growth rate over.

The super normal growth rate over let's say 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 h g represents the high growth period and s t represents the stable growth period and P_n is equal to your terminal price of the terminal value at the end of year n g 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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Two Stage Growth Model Cont...

- If the growth rate and dividend pay out ratio do not change in the first n years then the formula can be written as:

$$P_0 = \frac{DPS_0 \cdot (1+g) \cdot \left[1 - \frac{(1+g)^n}{(1+r_{e,hg})^n} \right]}{r_{e,hg} - g} + \frac{DPS_{n+1}}{(r_{e,st} - g_n)(1+r_{e,hg})^n}$$

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 $1 + g$ into $1 - 1 + g$ to the power n divided by $1 + r$ 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.

Then your $r - g$ minus $r - g$ 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 $1 + r - g$ to the power n and finally, you are using the constant growth model and you are that is why you are getting it. That means, DPS and plus 1 divided by $1 + r - g$ to the power n. Then whatever price we are getting that again your 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 $1 + r - g$ 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 more clear for you.

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Example: Valuation using two stage dividend discount model

High-Growth Stage	Stable Stage
Earnings per share (EPS)= Rs. 4.00	Retention ratio (g/ROE)= 44.44%
Dividend per share (DPS)= Rs.1.5	Dividend payout ratio = 55.55%
Dividend payout ratio = 37.5%	Return on equity (ROE)= 18%
Return on equity (ROE)= 30%	Cost of equity= 12%
Cost of equity= 10%	Growth rate= 8%
Growth rate = 15%	
Growth period (n) = 5 years	

Handwritten notes on the slide include: $RR = 55.55\%$, $1 - 55.55\%$, 8% , and 18% .

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 . This is your basically your r_e 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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Example:

The present value of dividends can be computed as:

$$PV \text{ of Dividends} = \frac{Rs. 1.5 (1.15) \left[1 - \frac{(1.15)^5}{(1.1)^5} \right]}{(0.10 - 0.15)} = Rs. 8.58$$

Expected earning per share = $Rs. 4.00 \cdot (1.15)^5 \cdot 1.08 = Rs. 8.68$

Expected dividend per share (EPS * Stable period payout ratio) = $Rs. 8.68 \cdot 0.5555 = Rs. 4.82$

Terminal price = $Expected \text{ DPS} / (r_e - g_n) = Rs. 4.82 / (0.12 - 0.08) = Rs. 120.66$

The present value of the terminal price = $(Rs. 120.66 / 1.1^5) = Rs. 68.47$

Total price = $Rs. 8.58 + Rs. 68.47 = Rs. 77.05$

Then 1.5 which is the initial dividend for share into 1.15 5 is the growth rate of 15 percent with the growth rate then 1 plus g , then 1.15 into 1 minus 1 plus g to the power 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 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 n th 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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Operating Cash Flow

Where:
 V_j = value of firm j
 n = number of periods assumed to be infinite
 OCF_t = the firm's operating free cash flow in period t
 $WACC$ = firm j 's weighted average cost of capital

Where:
 OCF_1 = operating free cash flow in period 1
 g_{OCF} = long-term constant growth of operating free cash flow

Weighted average of cost of capital = WACC

WACC = $\frac{D}{D+E} R_D + \frac{E}{D+E} R_E$

So, then already I told you there are two another kite 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; weighted average of the 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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The slide displays the following content:

Free Cash Flow to Equity

$$P_0 = \sum_{t=1}^n \frac{FCF_t}{(1+R)^t}$$

Where:
 V_j = Value of the stock of firm j
 n = number of periods assumed to be infinite
 FCF_t = the firm's free cash flow in period t
 R = the cost of equity

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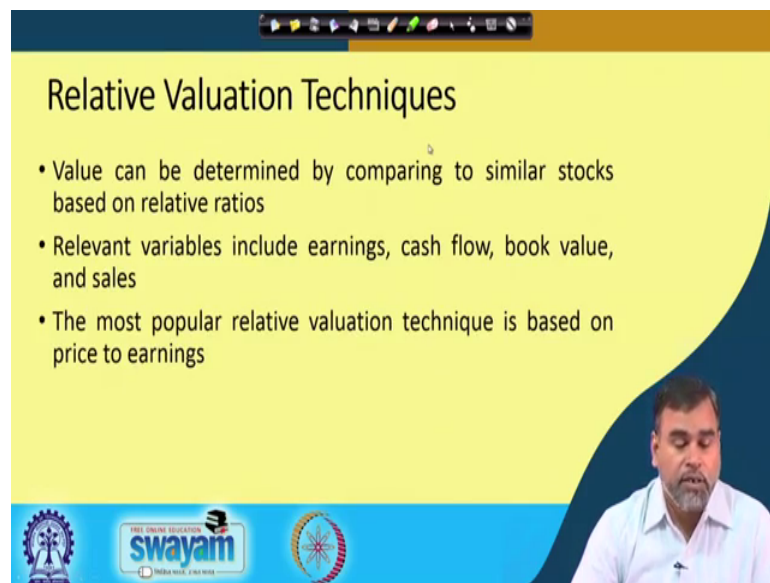
$R_e = R_f + \beta(R_m - R_f)$
 R_f → Risk-free Rate
 R_m → Market Rate
 β → Beta
 $R_m - R_f$ → Market Risk Premium
 R_m → BSE SENSEX
 R_m → NSE NIFTY

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 which 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 plus beta into R m minus 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_a 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 these are basically these are the formulas which are used to calculate the intrinsic value of the stock.

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Relative Valuation Techniques

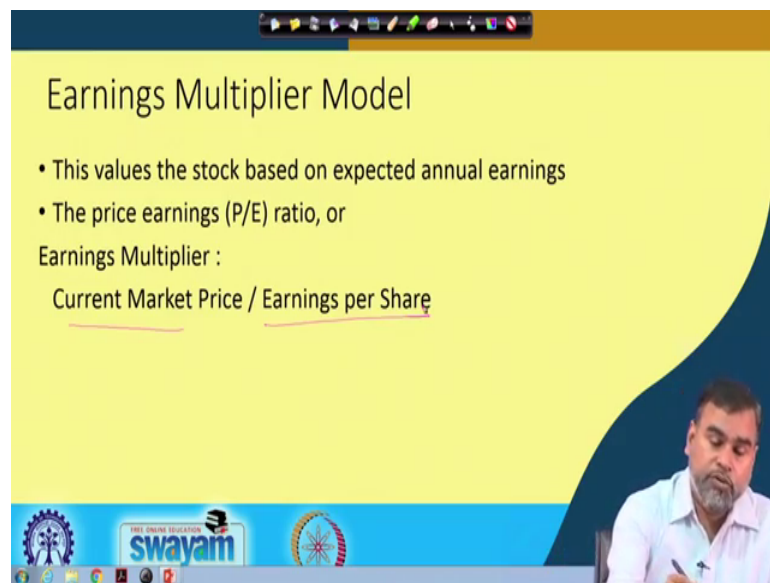
- Value can be determined by comparing to similar stocks based on relative ratios
- Relevant variables include earnings, cash flow, book value, and sales
- The most popular relative valuation technique is based on price to earnings

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 the 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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The slide is titled "Earnings Multiplier Model" and features a yellow background with a dark blue curved shape on the right side. It contains two bullet points and a formula. At the bottom, there is a video inset of a man speaking and a logo for "swayam" with the text "FREE ONLINE EDUCATION".

- This values the stock based on expected annual earnings
- The price earnings (P/E) ratio, or

Earnings Multiplier :

$$\frac{\text{Current Market Price}}{\text{Earnings per Share}}$$

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 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 the or 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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Dividend Discount Model and PE Ratio

$$P_i = \frac{D_1}{k - g}$$

Dividing both sides by expected earnings (E_1)

$$\frac{P_i}{E_1} = \frac{D_1 / E_1}{k - g}$$

Thus, the P/E ratio is determined by

1. Expected dividend payout ratio
2. Required rate of return on the stock (k)
3. Expected growth rate of dividends (g)

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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 to 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 sides 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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Example:

Dividend payout = 50%
Required return = 15%
Expected growth = 10%
 $D/E = 0.50$; $k = 0.15$; $g = 0.10$
 $P/E = 0.50 / 0.15 - 0.10 = 10$

A small change in either or both k or g will have a large impact on the multiplier

$D/E = 0.50$; $k = 0.16$; $g = 0.10$, $P/E = 8.33$
 $D/E = 0.50$; $k = 0.15$; $g = 0.11$, $P/E = 12.5$
 $D/E = 0.50$; $k = 0.14$; $g = 0.11$, $P/E = 16.66$

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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 are affect the PE ratio.

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Price to Cash Flow Ratio

- Companies can manipulate earnings, and cash-flow is less prone to manipulation
- Cash-flow is important for fundamental valuation and in credit analysis

$$P / CF_i = \frac{P_t}{CF_{t+1}}$$

Where:

- P/CF_j = the price/cash flow ratio for firm j
- P_t = the price of the stock in period t
- CF_{t+1} = expected cash low per share for firm j

The slide features a yellow background with a blue wave on the right side. At the bottom, there are logos for 'swayam' and 'INDIA WISE, LEAD WISE' along with a small portrait of a man in a white shirt.

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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The Price-Book Value Ratio

- Shows the growth opportunity of the company
- Study shows an inverse relationship between P/B and stock return

$$P / BV_j = \frac{P_t}{BV_{t+1}}$$

Where:

- P/BV_j = the price/book value for firm j
- P_t = the end of year stock price for firm j
- BV_{t+1} = the estimated end of year book value per share for firm j

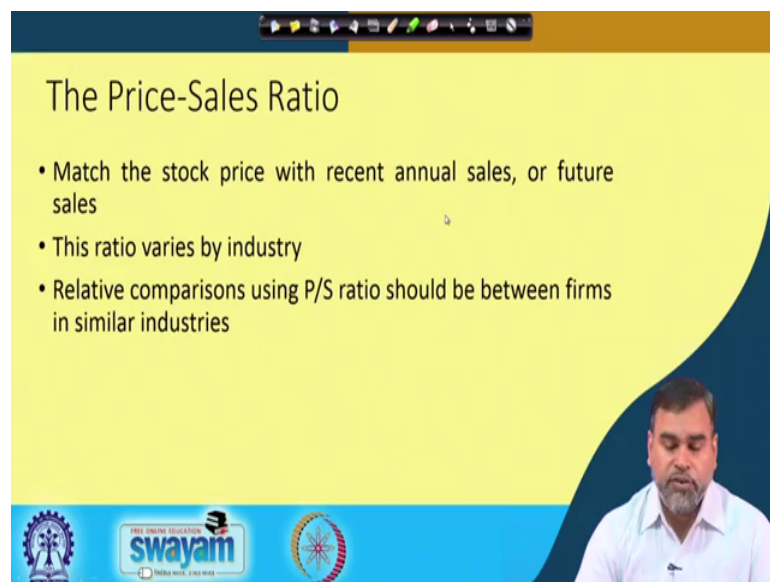
The slide features a yellow background with a blue wave on the right side. At the bottom, there are logos for 'swayam' and 'INDIA WISE, LEAD WISE' along with a small portrait of a man in a white shirt.

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 overvalued.

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 the market has already overvalued that, but the price to book ratio is very high is very low then what we can say that book value is relatively high, but earnings market price is relatively low. That means, the 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 better 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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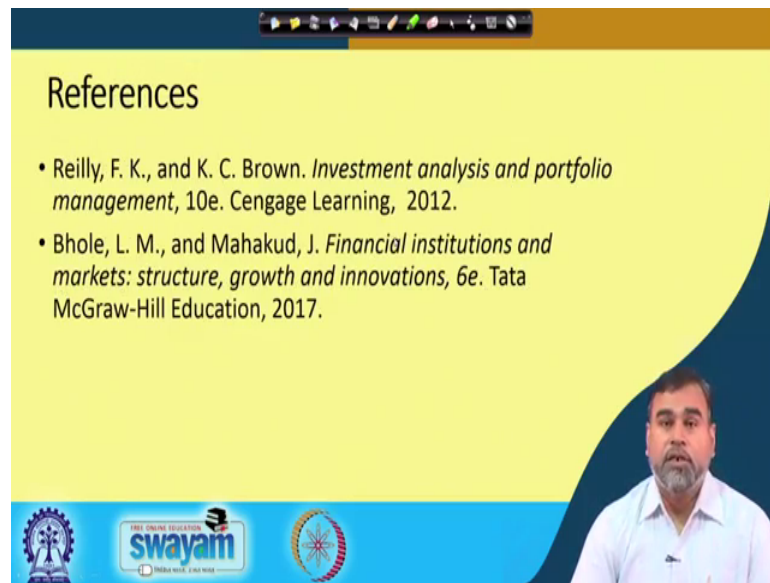
The slide is titled "The Price-Sales Ratio" and features a yellow background with a dark blue curved shape on the right side. At the top, there is a navigation bar with various icons. The main content consists of three bullet points:

- Match the stock price with recent annual sales, or future sales
- This ratio varies by industry
- Relative comparisons using P/S ratio should be between firms in similar industries

In the bottom right corner, there is a video inset showing a man with a beard and glasses, wearing a light blue shirt, speaking. At the bottom of the slide, there are logos for "swayam" (Free Online Education) and "MOOCs" (Massive Open Online Courses).

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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References

- Reilly, F. K., and K. C. Brown. *Investment analysis and portfolio management*, 10e. Cengage Learning, 2012.
- Bhole, L. M., and Mahakud, J. *Financial institutions and markets: structure, growth and innovations*, 6e. Tata McGraw-Hill Education, 2017.

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

Thank you.