Mergers, Acquisitions and Corporate Restructuring
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Lecture - 13
Valuation in M and A: Cash Flow Based Approach -3 (Cost of Capital)

Hello friends, welcome to one more session on mergers, acquisition and corporate restructuring. In the previous session we discussed about the valuation in merger, acquisition and we talked about different aspects different methods of valuation then we started with valuation using cash flow based approach and for the cash flow based approach we need a discounting factor.

And the discounting factor is known as the cost of capital is also known as the expected rate of return of the investors. So, one must be able to find out the cost of capital or expected rate of return of a particular company and then which can be used for discounting the future cash flow. So, we are continuing with that we talked about cost of debt, cost of preference share capital we talked about cost of equity.

In the cost of equity, we talked about different approaches we talked about dividend discount model we also talked about capital asset pricing model. And when it comes to capital asset pricing model, we need the beta as the factor to find out the cost of equity. And we may have a problem for certain stocks where beta is not available with the stock is not listed. So, in that case we have to find out how to, suppose the organization will like to use CAPM capital asset pricing model for finding the cost of equity for an unlisted company also.

In that case, what could be the proxy beta that can be taken. So, for that, we have an approach, approximate approach, which will help us find a proxy beta for a unlisted stock. So, we can use CAPM also for unlisted stock or unlisted company.

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So, the currency that we are going to we are talking about mainly on the cost of equity using capital asset pricing model where we will be talking about the beta on levered and unlevered beta which is used the concept is used to find out the beta of an unlisted stock or a closely held stock for that matter. Even in the market there may be sales traded but very infrequently so, if you get a beta calculated by using the appropriate formula.

That may not be the right figure for that military because this data are not available. So, in that case also we may ignore the beta calculated by using the SML, but security market line which is used for finding the beta instead of that we may go for the proxy beta by going for only about levered beta approaches. So, we will discuss about that in this class. Then, we also talk about weighted average cost of capital.

And we will also have some exercises on cost of capital as well as weighted average cost of capital will have full face exercise.

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So, these keyword that we have the cost of equity, capital asset pricing model, levered and unlevered beta and WACC that is work that is called weighted average cost of capital.

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So, to recapitulate what you discussed in the previous session this is our cost of equity formula where you have cost of equity which is nothing but the risk-free rate of return plus beta into market rate minus R f and this is nothing but this is called risk premium. So, as we know the rate of return is a function of risk involved and beta represents the risk systematic risk of a stock. So, higher the beta higher will be the risk premium for a particular stock.

So, that way we got the and risk return could be government treasury long term bond yield or treasury rate also. And market rate is nothing but the overall market how much return is there, so we can look at long term market growth in index like maybe SNP 500 or **(()) (04:28)**

Indian context Sensex or Nifty and then beta of the stock we have to get it. So, this is the general formula and then when you look at this beta assets beta by default is also levered beta.

That means; with a given level of leverage financial leverage of the company this is the beta there. So, then for an unlisted company we can also find out the proxy beta by using only one lever formula.

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So, the formula that we use for converting the levered and unlevered beta and levered beta or unlevered beta is like this. So, what we need we need beta of levered beta let us you have one company one stock, then we need the debt equity ratio of that particular company we also need the corporate tax rate applicable for that particular company. So, with the help of this we can get the unlevered beta.

And this unlevered beta is supposed to be is assumed to be same for all these companies irrespective of size etcetera. And then we can take this unlevered beta for another company for which we need levered beta. So, then we need to have the database of that operate company for which you need the beta and also tax rate applicable for that. So, with the help of that you can find the beta levered and once you have the beta then CAPM can be applied.

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So, we can take an simple exercise with the help of excel and so for example we have a company which is listed which has been levered beta 0.9 and beta which is by default levered and the company has 0.60 as debt equal ratio and company's tax rate is 30 percent. So,

assuming that there is another company which is exactly comparable in terms of business risk other things operation size sector involved it is a comparable company.

But non-listed and we like to get the beta of the proxy beta for unlimited company B. So, we need to have the debt equity ratio we need to have corporate test. So, the unlisted companies data goodness is 0.40 and tax rate is 25 percent. So, first what you do you have to find out the unlevered beta of A and that will be taken as the unlevered beta for B also. So, what you will need? We have already given the formula here also how to convert levered to unlevered you have given.

So, we will say equal to the levered beta which is given here 0.9 divided by within bracket we have 1 plus then D by E that is your D by is 0.6 into bracket starts 1 - tax rates 1 - the tax rate 30%. So, we will do that and close the bracket and so that is we get. So, 0.6338 is the unlevered beta for company A which can be taken also as the unlevered beta for company B. So, using this unlevered beta we can now find the levered beta of company B.

So, what we require we have unlevered beta given will be using this formula and will multiply 1 plus debt equity ratio of the target company unlisted company again, into 1 minus the tax rate applicable for that unlisted company the tax rate applicable for different companies can be different. So, that is we have taken for about 25% here in assumption. So, the then we got 0.82394 that is, so we have the levered beta of this company is 0.823 or 824.

So, now this 0.824 can be used to find out the cost of equity of company B by using capital asset pricing model. Then, what happens? Although the one company of card **(()) (08:44)** here also by another, the best approach will be that to get the unlevered beta of different companies in the same sector similar type of companies. Then, find take the average and use that average for finding the beta for the only state come that is best.

So, we have another example here and so we have a company A B C D E F G 5 6 7, 7 companies are there. The seven companies have got their respective beta the stock beta from taken from the market then they have their respective debt equation let us assume that all the companies are subject to 25 percent tax rate. So, in that case what you will do will find out the unlevered beta of all the stocks A to G then take the average.

Then, we will use that leverage for find the levered bit about 2 companies X and Y we have to find their debt equity tax rates are given. So, what is the limit beta for these 2 companies based on this data that we have? So, let us first find out the unlevered beta for each of the stock, so again this formula is given how to convert levered to unlevered, this formula the which is blue.

So, first we have levered beta divided by 1 + debt equity ratio into 1 - tax rate of that particular company closing the bracket. So, only what beta for this talk is a stock A is 0.62, now we can drag it and find out that yes these are the unlevered beta of different companies at A to G is given here. Now what we will do here we will take the average and we can use simple average but if you have sufficient data in case of financial ratios and finance figures median is the best representative average.

So, we will take the median unlevered beta is nothing but you can use the formula in excel. And take this one so the median unlevered beta is 0.61, approximately 0.61. Now, this can be used as our reference for finding of the levered beta these two stocks that is X and Y. So, how to get that? so, you have on unlevered beta into 1 plus the debt equity ratio of this particular company X into 1 minus tax rate here it is 30 percent given.

So, that gives us 0.80 for this unlisted company X and if you drag this formula to here in that case, we have to first freeze this one. And if you drag this one so we get 0.84 as the levered beta for the company Y. So, now if you want to want us to find out the cost of equity for a X and Y using capital asset pricing model then we can always use this 0.80, 0.84 respective and find out the cost of equity for the particular stock.

So, this is the way we can now example you took, so first example was to one comparable company was there which we got a levered beta of that company. Or the stock and converted that unlevered beta then, using unlevered beta we got the levered beta of the our unlisted company. Here, instead of depending on one particular company we are taking seven companies comparable companies.

And then from there you are getting the internal data given we get unlimited beta then take the median of those only about seven unlevered beta. Then using that unlevered beta 0.61 that we calculated we got the levered beta of company X and company Y.

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Exercises – Levered and Unlevered Beta - 1

	Company A (listed)	Company B (unlisted)
Levered beta	0.9	??
Debt-Equity ratio	0.60	0.40
Tax rate	30%	25%

So, this is a formula.

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Exercises – Levered and Unlevered Beta - 2

Beta of the stocks of few comparable companies and other information are given below:

Listed Company	Levered Beta	Debt-Equity Ratio	Tax rate
A	0.85	0.50	25%
B	1.23	0.80	25%
C	0.68	0.75	25%
D	0.78	1.10	25%
E	1.10	0.60	25%
F	0.93	0.70	25%
G	0.82	1.30	25%

Required: to calculate the beta of the stock of the unlisted companies:

Unlisted Company	Debt-Equity Ratio	Tax rate
X	0.45	30%
Y	0.53	30%

So, this example you have already exercised this also we have done just now in the excel so this data given in the PPT same thing we already did in the excel itself. So, then once you have got the cost of capital for different components cost of equity, cost of date, cost of preference share capital then, we can find out the weighted average cost of capital one by taking the preference share cost of capital and multiplying respective weight and we can find out the cost of overall cost of capital work.

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Particulars	Number	Face value	Market Price	Book value	Book value
Equity share capital					
Paid up capital	40,000	₹ 10	₹ 35	₹ 4,00,000	
Reserves and surplus	N.A.	N.A.	N.A.	₹ 6,00,000	₹ 10,00,000
Preference share capital*	3,000	₹ 100	₹ 95		₹ 3,00,000
Debentures*	800	₹ 1,000	₹ 980		₹ 8,00,000
Total					₹ 21,00,000

*More details	Debentures	Preference Share Capital
Interest/ Dividend rate	12%	10%
Number of years to maturity (redemption)	5	8
Redemption value	₹ 1,050	₹ 100

Other relevant information:
Risk free rate of return: 7.00%; Market rate of return:15.00%;
Beta of equity: 0.80; Tax rate: 25.00%

CAPM ke

So, we also have another exercise here for a full phase exercise for calculating weighted average cost of capital category hypothetical company. This company has 3 different types of capital that is equity share capital it has got preference share capital it also debentures. And equity share capital comprises of paid up capital and reserves surplus. And departure preference is given and we have certain relevant information how many numbers of shares or debentures are there.

Then, you have the face value of given 10 rupees for equity preference at 100 rupees debentures a 1000 rupees face value. And in market it is traded today at this point let us say when you are doing the calculation like equity service issued at 35 rupees price, price at 35 preference share capital service are priced at 95 and debentures are priced at 980 in the market.

And the book value, the book value means actually it is nothing but the and as per the books of accounts. So, book value of equities the one is paid up capital plus this surplus the total comes to 10 lakh. Similarly, for debenture a preference share capital we have 3000 in to100 face value. So, that gives you 3 lakh rupees and similarly for debentures the face value into number that is the book value 8 lakh.

So, total capital of this company is 21 lakh and some more information is given to find out the cost of preference cost of debenture cost of equity so something like the debentures carries 12 percent interest. And preference share capital carries 10 percent dividend dividends

shares are going to redeem after 5 years preference share capital are going to denote 8 years. And at the time redemption the company will be paying 1050 to this the debenture holders.

And preference shareholders will be getting 100 rupees per share at the time redemption. And some other information is given which is are useful for our cost of equity as well as cost of debt there is because we will be assuming here unless another is given. So, we will be applying capital asset pricing model for finding out the cost of equity. So, for that you need the risk rate of return we need market rate of return we also need the beta of this stock.

And similarly for cost of debt we have to find out the post tax cost of debt in that case we need the tax rate for the company. So, these are the information given for finding out the cost of capital so let us do in the spreadsheet.

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So, this is the same data which are given here like whatever you saw in the power point we got the same value here. Now, your book value is given all this is given and we have to find out the WACC the weighted average cost of capital for which we need the weight of the equity in cost of equity, we need weight of the debt and cost of debt we also need weight of preference share capital and cost of preference share capital.

So, we need 3 of them, 3 cost of capital and 3 respective weights. Then, for the cost of date will be using the YTM approximation formula that is these are the information given and the F and P stands for f is redemption value and P is the today's price and n is number of years to maturity and this will be using. So, then similarly for the cost of preference capital will be using this particular formula and for cost of equity will be using the capital asset pricing model.

And for that we need the risk free rate of return, so capital asset pricing model if we use in cost of equity. So, let us do one by one, so cost of equity is nothing but risk free of return plus beta that is here in this is C15 into risk premium which is nothing but the difference between market rates between 15 percent minus the risk free rate of return that is 7 percent. So, that gives us 13.40 percent the cost of equity, just to as in a caveat I let me say mention here.

In some cases, in some exercises and examples we may be given the risk premium directly. So, for example in this case the risk premium nothing but market return minus risk free rate

that is called is premium. So, possible in certain cases risk premium is directly given instead of giving market rate of return and then finding this premium from there. And in that case directly you can take this premium in the formula itself when you install R m – R f we can directly multiple this premium itself.

So, we got the cost of equity for this particular stock is 13.40 and then we go to the cost of debt calculation using this formula the YTM formula approximate YTM formula. So, we need coupon C stands for coupon that is how much interest they get every year assuming there is annual coupon. So, we get 12 percent coupon on the phase value, so phase value is given in here that is in D 7.

So, that is the coupon that means we are going to get 12 percent of 1000 that is 120 rupees every year then plus the formula says we should get the F and P, F is nothing but redemption value redemption value is given here that is this one 1040 and better to keep in. So, redemption value let us have the bracket in the beginning, so redemption value minus the market price that is market price is given 980 here and divided by the number of years to maturity for this bond debenture is 5 years.

So, that is in your overall numerator and the denominator we have to have the average with respective weight that is divided by 0.6 into the P that is today's price market price plus 0.4 into the today's price into the redemption value. So, that gives us 13.29 percent in the cost of debt before tax. And once you have the cost of debt before tax you can also find out the post-tax cost updates nothing but pre-tax cost update into 1 - tax rate.

So, that tax rate is given here 1 - t that is 25 percent, so that gives us cost of debt as 9.97 percent post tax. Then, cost of preference share capital using this formula again similar like YTM will use this formula so we need the dividend in the numerator that is dividend is 10% of so it is better to start the bracket, so 10 percent of the face value face value is given here in D6 then plus the F - P that is F is redemption value minus today's price P that is 95.

So, that gives us divided by again you have number of years to redemption that is our maturity that is 8 here then we end the bracket and divided by the denominator we have 0.6 multiplied with redemption the today's price 95 plus 0.4 into the redemption value. So, that

gives us the cost of preference share capital is 10.95% we are not going to do any adjustment for cost of preference share capital because there is no tax for tax.

So, we now got three different cost of capital cost of equity cost of debt and cost of preference share capital. Now, what we will do? We will take these figures here, so cost of capital for respective cost of equity will keep it here that is cost of equity is 13.4 then cost of preference share capital is how it will preference here 10.95 percent then, cost of debenture is we have calculated already that is pre post tax 9.97 percent.

So, we got now the individual cost of capital for different instruments. So, now we have to find out the weighted average cost of capital and as you discussed in the previous session, we can use book value as well as market value weight. And the market value weights are given we will go for that but, for this explanation in this exercise we are going to use both book value and market value and we will obviously end up getting two different costs of capital.

But for a learning I am going to explain both book value weight basis as well as market value weight basis. So, first of all you should know what is the book value weight so total book value is 21. So, how much is the weight of equity in total, so it is nothing but 10 lakhs by 21 lakh is the weight of equity. So, what you do here so 10 lakh divided by the total of the capital and in excel, if because this is going to be divided is going to use for rest of the cost weights also.

So, equal to 10 lakh divided by 21 lakh, so that gives us the 47 say 0.62 percent is the weight of equity and we drag it we got, so one can observe here we have frozen this G8, G8 nothing but your total because total is going to be in denominator for all these three values so you dragged it and that was by default taken. So, if you sum it up for a cross check, we can also do the cross check sometimes it should be equal to 100 percent.

So, 100% you can see that, now once you have the weight then very simple, we have to multiply the respective cost of capital into the weight like we have given in this particular formula weight of the equity in the cost of equity and we got this 0.638. So, then we drag this so we got this one and when you sum it up so the cost of capital as per using book value of weight comes to 12 percent, approximately 12 percent is nothing but 11.74 percent.

So, similarly using this one we got that and let me highlight this once we got it. So, when you are going to if you are using the book value weight and find the **(()) (25:23)** asses so how what is going to use utility of this, we are going to use this for discounting the future cash flow for the firm. That is what the purpose the discounting factor. That is the overall rate of return expected by the investors together.

So, now based on market value so we have to first find the market value of this individual capital. So, we already got the market price of different instruments, so for example equity is 35 rupees into the market price. So, into number of shares 35 rupees into market price 35 rupees market price in number of shares. So, then so you can keep it here also then for the bond or preference share the market price is 95 multiplied number of preferences share 3000.

So, that gives us 2,85,000. Similarly, for bonds market price 980 multiplied with 800 number of bonds are the debentures are their bonds and debentures are used something synonym. So, interchangeably, so now total of this particular capital is as per market value is nothing but so this plus this plus this so, that comes to 24.69 lakh or 24,69,000 whereas book value was 24,69,000.

So, similarly now what you do? You find out the market value weight based on this much you know very simple to do it just take the individual value divided by the total value and be careful to freeze it. So, that the denominator can be used also for other things, so if you drag it so we got this, this is not applicable for us and so we got weights are like this much. So, we can now also find out the summation of the total weight to check whether it is 100 percent or not.

So, summation of these that gives us let us see for cross checking yes 100 percent weight so that means our weights are calculated correctly. And then what you do we multiply, now the cost of capital with respective weight. So, the cost of equity is 0.56703 into cost of weight, market value weight is 0.56703 into cost of equity that is 13.40 percent. Then, for this one we multiply this one, the weight of debt, the weight of preference share capital into the cost of preference share capital.

And you can drag this also for cost of debt and when you sum it up now the cost of capital as per market value of weight is 12.03 percent. So, as per book value 11.74 percent as per
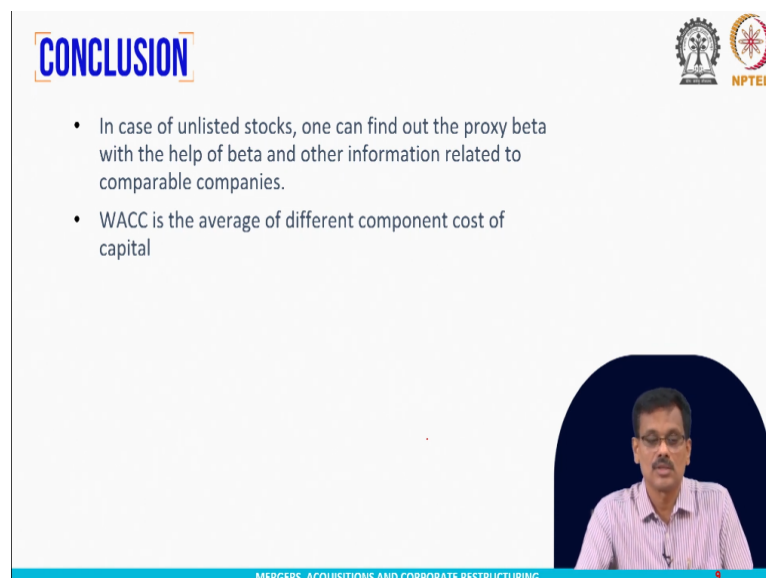
market value 12.03 percent, so as we discussed and always and the authors such a different books are mentioned that if market value figures are available in that case market value weights would be applied for finding out the cost of capital or expected rate of return.

If not available then we can go by the book value weights and find out the equity of cost capital based on book value of book value weights for that. So, in this exercise we discussed we found out the individual cost of capital, equity, preference share capital and debenture, we found out the different debts, weights of different capital based on book value as well as on based on the market value.

And then we found out the weighted average cost of capital using book value as well as market value and we have got 11.74 percent 12.03 percent respectively for cost weighted average cost of capital using 2 different approaches. So, we did this exercise and so in a summary.

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So, we in case of unlisted stocks one can find out the proxy beta with the help of beta and other relevant information related to comparable companies or stocks and work is nothing but the average of different components of cost of capital. In the subsequent session, we will be discussing small exercises on cash flow based approach we also subsequently also take up full-fledged exercise using cash flow based approach where we will use the spreadsheet for finding the value of a company as well as value of equity share.

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So, thank you and happy learning.