Lecture 27 : Cost of Capital - I

Welcome once again to this lecture on a very important topic that we call cost of capital and this is first part of the cost of capital. In this we will be discussing about the cost of capital definition the concept from the investors point of view and from the companies point of view. take a special case for this lecture is the cost of debt, cost of debt, cost of debentures or other capital and debt capital rather and we will give some problems and solutions to give examples. So, how to calculate the cost of capital and what is its implications on the financing. The cost of capital can be defined as the return expected by those who provide funds to the business, this is from the investors point of view.

CONCEPTS COVERED

Cost of Capital
Cost of Debt
Problems and Solutions

including the shareholders, lenders, debt holders. This is a general definition. This is the return expected by those who provide funds to the business. That means, how much the company will pay addition to whatever they have paid for the for the equity or for the

debentures. When the company raises funds from these sources, it must pay an extra amount, this is from the company's point of view, in addition to repaying the principal, whenever is required.

Cost of Capital

- Definition: Cost of capital refers to the return expected by those who provide funds to a business, including shareholders, lenders, and debt-holders.
- When a company raises funds from these sources, it must pay an extra amount in addition to repaying the principal.
- The extra money paid is essentially the cost of using the capital, commonly known as the cost of capital.
- The cost of capital is used to discount or compound cash flows in financial calculations.

Cost of capital is also known as:
- 'Cut-off' rate
- 'Hurdle rate'
- 'Minimum rate of return'

It is used as a benchmark for:
- Framing debt policy of a firm.
- Taking capital budgeting decisions.

In case of ordinary shares, this is not required, but what will be the total amount of dividend that it must pay, including the concept of , the time value of money. So, this will be the cost to the company, this is something like the general concept or well known concept of cost to the company or CTC as we say something like that, actually how much it is costing to a company. The extra money paid is essentially the cost of using the capital. The cost of using the capital that can be abbreviated as cost of capital which is known as well known as this cost of capital.

The cost of capital is used to discount or compound cash flows in financial calculations. These are also known as the cutoff rate, hurdle rate, or minimum rate of return. It can be used for the purpose of framing the debt policy of a firm or taking capital budgeting decisions. What is the significance of the cost of capital? This plays a crucial role in determining the right financial decision for both management and investors.

Significance of cost of capital

- The cost of capital plays a crucial role in determining the right financial decisions for both management and investors.
- Financing decision:
  - When choosing between two sources of finance, a finance manager can compare their costs and opt for the one with a lower cost.
  - Apart from cost, factors like financial risk and control are also considered in the decision-making process.
- Designing an optimal Credit Policy:
  - While setting a credit period for customers, the cost of extending credit is weighed against the potential profit earned from offering credit.

When choosing between two sources of finance, the finance manager will compare the cost of capital for these two sources and choose the lower cost. The instrument or the source which will have a lower cost to the company, then the finance manager will choose that. Apart from cost, factors like financial risk, control, and other considerations are also evaluated. When making a decision, it is not only about the pure figure of cost of capital but also whether you choose equity shares or debt, as they have their own risks.
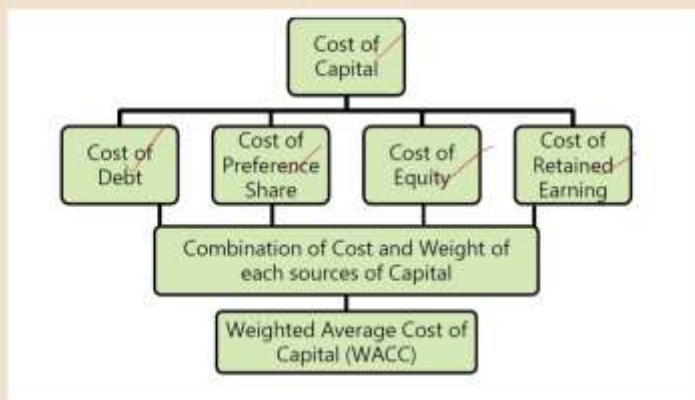
So, together you have to make a decision, but the cost of capital is a prime factor. For designing the optimal credit policy, when extending the credit period, the cost of capital will increase. So, how much benefit are you gaining? If you extend the credit period, how much profit are you gaining, and how much is it adding to the company's cost? This can be compared. So, you can determine the optimal period for extending the credit period.

Long-term debt

- External borrowings and debt instruments do not grant ownership rights to those providing the funds.
- Lenders and debt fund providers have no involvement in the company's decision-making or operations.
- However, they have a claim on the company's profits before taxes, ensuring their returns are prioritized.
- Debt financing includes instruments like debentures and bonds
- Long-term debt includes:
    - Long-term loans from financial institutions
    - Capital from issuing debentures or bonds

So now, we can say that the cost of capital can be summarized as the cost of debt, cost of preference shares, cost of equity, and cost of retained earnings. This we have discussed; these topics we have discussed. Now, we can divide the cost of capital into all these subdivisions. And the combination of this cost and weight of each source will give the weighted average cost of capital, which is called the WACC or work. This will be taught in the last lectures of this week.

So, these are the topics for our discussion, and we will take them up one by one to understand the implications of the cost of different financial instruments. Again, try to recapitulate what long-term debt is. The external borrowings and debt instruments do not grant ownership rights; when somebody purchases debentures, they are not gaining ownership. So, the fund providers have no involvement in the company's decision-making or operations of the company. They have a claim on the company's profit before

taxes, meaning it is first ensured that they will definitely get the interest because, during tax calculation, this part—interest on debentures—will be first deducted.

Features of debentures or bonds:

- **Face Value:**
  - Debentures or bonds are denominated with some value, called the **face value** of the debenture.
  - Interest is calculated on the face value of the debenture.
  - Example: If a company issues 8% non-convertible debentures of ₹100 each, the face value is ₹100, and the interest at 8% will be calculated on this amount.

- **Interest (Coupon) Rate:**
  - Each debenture bears a fixed interest (coupon) rate, except Zero Coupon Bonds and Deep Discount Bonds.
  - The interest (coupon) rate is applied to the face value to calculate interest.
  - This interest is payable to debenture holders periodically (annually, semi-annually, etc.).

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So, we are assuring that they will get the preference part, and then the profit after tax will be calculated. Now, debt financing also includes instruments like—not only debentures, as I have repeatedly mentioned—but also bonds, which are long-term debt instruments. The long-term loans from different financial institutions and capital from issuing debentures or bonds. So, these two things are the main types of long-term debt. Features: what are the different features?

The face value is the   debenture of bonds are denominated with some value in the beginning. For example, 100 rupees, 200 rupees this thing. So, these are called the face value. So, the interest will be calculated on the face value. For example, if I am issuing 8 percent non-combatable debentures of the 100 rupees face value, then this face value will be used

for the ah for the calculation of the interest like with the face value is rupees 100, then we we calculate ah with the 8 percent in the 8 percent will be given ah ah as interest every year for example. So, the face value is ah is face value is used for the calculation of the interest And at the same time just other way round, what is this interest rate? This interest

- **Maturity Period:**
  - Debentures or bonds have a fixed maturity period for redemption.
  - However, in the case of irredeemable debentures, the maturity period is not defined and is taken as infinite.
- **Benefit of Tax Shield:**
  - The payment of interest to debenture holders is allowed as expenses for the purpose of corporate tax determination.
  - Interest paid to debenture holders reduces the tax liability of the company.
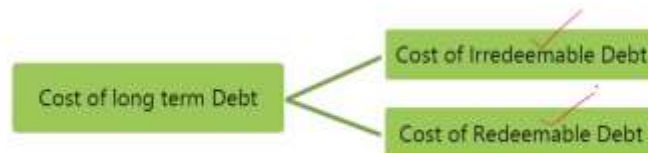 - Saving in tax liability is also known as a tax shield.

rate are fixed interest or we also call it the coupon rate in this case, except the 0 coupon bonds and certain other special types, we have this   fixed interest called coupon rate. So,

Cost of long-term debt (k$_a$)

Based on redemption (repayment of principal) on maturity, debt can be divided in 2 categories:

Cost of long term Debt → Cost of Irredeemable Debt / Cost of Redeemable Debt

this is applied to the face value as we have shown before.

The interest is payable to debenture holders periodically like say annually or semi-annually. So, this is the relationship between the face value and the interest rate. What is the maturity period of these debentures? They have a fixed maturity period for redemption, but in case of a debentures, the maturity is not defined that is open ended.

So, you cannot call it infinite; it will continue forever and is taken as infinite. So, since the payment of interest, as I have said to debenture holders, is allowed as expenses for the purpose of corporate tax determination. So, this reduces the tax liability of the company because the interest is deducted from the income. So, if it is saving the tax liability of the company, we use this as a tax shield. That means the benefit of issuing debentures is that we get a tax shield by paying interest for the debentures we have issued to the public. Now, the cost of long-term debt, or say, for example, we can say K based on the redemption or repayment of the principal on maturity, we can divide this into two categories.

Cost of redeemable debt where the money, the face value, is not given back. There is another part, which is the cost of irredeemable debt, where we have both things: interest and the repayment of principal. So, these are two broad divisions of the cost of long-term debt. Now we will give some examples, but the formula first: the debentures when they are not redeemed, we call them irredeemable debentures. Then the cost of debentures not redeemable during the lifetime of the company is calculated by the simple formula:

$$\bullet \quad K_d = \frac{I \times (1-t)}{NP}$$

where Np is the net proceeds of the debentures. or current market price.

Cost of Irredeemable Debentures

- The debentures which **are not redeemed** by the issuer of the debentures are known as **irredeemable debentures**. The **cost of debentures** not redeemable during the **lifetime of the company** is calculated as follows:

$$K_d = \frac{I \times (1-t)}{NP}$$

Where:

- K_d = Cost of debt after tax
- I = Annual interest payment
- NP = Net proceeds of debentures or Current market price
- t = Tax rate

- Net proceeds **mean** issue price **minus** issue expenses or **floatation cost.**
- If **issue price is not given**, assume it to be **equal to the current market price.**
- If **issue expenses are not given**, assume them to be **zero.**

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Now we are calculating the Kd, that means the cost of debt after tax; I is the annual interest payment, t is the tax rate. Now the net proceeds mean the issue price minus the issue expenses during the flotation. Some additional expenses are incurred. So, the issue price minus the flotation cost will be given. So, if the issue price is not given, assume it to be equal to the current market price, and if issue expenses are not given, assume them to be 0.

Now we will have some explanation about the flotation cost; we use this word. So, the underwriting or the brokerage fees through which it is being issued, legal and administrative charges that we spend for issuing the debentures, registration fees, printing expenses—all these things are taken as flotation cost. The sum of all this is flotation cost. Now, the expenditure incurred to make this security available to the investors is known as the flotation cost.

- **Floatation Cost:** The new issue of a security (debt or equity) involves expenditures such as:
  - Underwriting or brokerage fees
  - Legal and administrative charges
  - Registration fees
  - Printing expenses
- The sum of all these costs is called floatation cost.
- This expenditure is incurred to make the securities available to investors. Floatation cost is adjusted to arrive at net proceeds for the calculation of the cost of capital.

And this is adjusted to arrive at a net proceed for the calculation of the cost of capital. That means, the face value is not the correct term or amount for the calculation of the cost of capital; there is a little adjustment due to the flotation cost. A company will have some examples—very simple examples—on the debenture face value, interest, and the flotation cost. Like, say, a company issues 1,000 debentures of 1,000 rupees each—one debenture is 1,000 rupees, and the number is also 1,000.

At a 12 percent interest rate, that means the company agrees to pay 12 percent interest annually—say, for example, for a debenture. The debentures are issued at a discount of 50 rupees per debenture; when it is issued, the investors are allowed to enjoy a 50-rupee discount per debenture. Now, the underwriting and other costs were, for example, assumed to be 50,000 rupees total for the entire issue. Now, 1,000 debentures are issued at 1,000 rupees each with a discount of 50 rupees per debenture, a 12 percent agreed interest rate, and the total underwriting and flotation cost was 50,000 rupees. Let us calculate the net proceed.

Example 1:

A company issues 1,000 debentures of ₹1,000 each at a 12% interest rate.
The debentures are issued at a discount of ₹50 per debenture.
Underwriting and other costs = ₹50,000 for the total issue.

Step 1: Compute Net Proceeds

Net Proceeds = 10,00,000 − (Discount + Underwriting Expenses)

Net Proceeds = 10,00,000 − (50,000 + 50,000) = ₹9,00,000

Step 2: Compute Cost of Debt Before Tax

Annual Interest Payment = 12 % × 10,00,000 = ₹1,20,000

Before-tax Cost of Debt = 1,20,000/9,00,000 = 13.34 %

Step 3: Compute After-Tax Cost of Debt

Assume **Income Tax Rate = 35%**

Tax Savings = 1,20,000 × 35% = ₹42,000

After-Tax Cost of Debt = 78,000/9,00,000 = 8.67%

Thus, the **final after-tax cost of debt is 8.67%**.

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The net profit is this 1000, the total value, minus the discount plus underwriting expenses. Deduct these values, say 50,000 rupees per debenture, then 50,000 has to be deducted here, and again 50,000 rupees that you have spent for underwriting, then this will also go as another expense. So, this 1000 into 1000 is the actual price because the price of the debentures. So, 1000 into 1000 is the value minus discount. Minus the underwriting expenses, that is actually the net proceeds because we have spent this money also from here, from our company side. Now, the cost of debt before tax, so now we have to pay interest, twelve percent of this amount, the total debenture amount, total cost of debenture here, so that is coming to one lakh twenty thousand rupees before tax.

The cost of debt will be 1,20,000 divided by the net proceeds. So, this is 13.34 percent. Then, what is it coming to when you are getting a tax benefit? So, the income tax rate, if it is 35 percent applied to the companies, then the tax saving will be 1,20,000, which we have paid as interest. So, we will get a benefit of 35 percent of that interest as tax benefit, 42,000 rupees. So, the after-tax cost of debt will be 1,20,000 minus the tax savings of 42,000.

So, effectively it is 78,000. After-tax cost of debt then becomes that 78,000 divided by 9 lakhs, which comes to around 8.67 percent. So, the final after-tax cost of debt is calculated as 8.67 percent. Now, we talk about the redeemable debentures, the cost of redeemable debentures using the approximation method.

Here, what are we taking? We are taking the value of n as a realistic period for which the debenture will exist, and it has to be redeemed after the period is over.

$$K_d = \frac{I \times (1-t) + \frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}}$$

Where:

- I = Interest payment

- NP = Net proceeds or Current market price

- RV = Redemption value of debentures

- t = Tax rate applicable to the company

- n = Remaining life of debentures

So, the above formula is used when only the interest on debt is tax-deductible.

Sometimes, debts are issued at a discount or redeemed at a premium. So, that way, the net profit will be adjusted. If it is irredeemable, then n becomes infinity, and this part becomes 0. So, it becomes a simplified formula, as we have seen in the previous slides. Now, if the discount on issue or premium on redemption is tax-deductible—meaning not only the discount but also the redemption are tax-deductible—then an alternative formula is used to calculate the cost of debt, where we include both:

$$K_d = \frac{I + \frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}} \times (1-t)$$

- If discount on issue and/or premium on redemption are tax deductible, an alternative formula is used to calculate the cost of debt:

$$K_d = \frac{I + \frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}} \times (1-t)$$

- The higher the difference between RV and NP, the lower the accuracy of the result.
- One should not use these formulas if the difference between RV and NP is very high.
- These formulas are not suitable for gradual redemption of bonds.

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The higher the difference between RV and NP, the redemption value and the net profit, the lower the accuracy of the result. This is basically an approximation of the formula for calculating the cost of debenture. So, one should not use this formula if the difference between RV and NP is too high. This is a caution, and this formula is also not suitable for gradual redemption of bonds. So, let's take one more example: say the company issued

10,000 15 percent debentures, meaning the debentures are issued for an interest rate of 15 percent, the number is 10,000, and each has a value of 1,000 rupees.

Now, this is the face value, but at a premium of 14 percent. On April 2008, and to be matured on 1st April 2025, where the period is 7 years. Now, the debentures will be redeemed on maturity. 14, 2025 after this. Compute the cost of debentures assuming a 35 percent tax rate.

Example 2:

A company issued 10000, 15% debentures of ₹1000 each at a premium of 14% on 1.4.2018 to be matured on 1.4.2025. The debentures will be redeemed on maturity. Compute the cost of debentures assuming a 35% tax rate.

Solution:

The cost of debenture (K_d) will be calculated as:

$$K_d = \frac{I \times (1-t) + \frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}}$$

I = Interest on debenture = 15% of ₹1000 = ₹150, NP = Net Proceeds = 114% of ₹1000 = ₹1140
RV = Redemption Value = ₹1000, n = Period of debenture = 7 years, t = Tax rate = 35% (0.35)

$$K_d = \frac{150 \times (1-0.35) + \frac{(1000-1140)}{7}}{\frac{(1000+1140)}{2}}$$

$$K_d = \frac{97.5 - 20}{1070}$$

$$K_d = 0.0724 \text{ or } 7.24\%$$

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The cost of debenture will be calculated using this formula that we have shown earlier:

$$\bullet \quad K_d = \frac{I \times (1-t) + \frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}}$$

So, here you see the I is the interest on the debenture, which is 15 percent of 1000, that means rupees 150 is the interest, 15 percent of 1000. Np is the net proceeds, which is equal to 114 percent of 1000, that is 1140. 1140 is the net proceeds. Because we are giving a 14 percent premium on that. And Rv is the redemption value, which is 1000 rupees, that was the face value in the beginning.

So, the redemption value is also 1000 rupees per N is the period of debenture, which is 7 years, t is the tax rate, which is 35 percent or 0.35. If we put these values, we will find that the cost of debenture under all these conditions comes to 7.24 percent. This is how you can calculate the cost of debentures. With different variations like redeemable or

irredeemable debentures, you can approximately find out that these are the costs to the company or the cost of debt capital.

Now, the cost of convertible debentures. This is a type of long-term debt that has the option to either get the debentures redeemed—that means you can return the debentures to the company and get cash—or convert them into a specified number of company shares instead of cash. Both options are available. That means, in convertible debentures, you can either redeem the debentures and get cash. What you do is convert these debentures into a specified number of company shares instead of cash. Both options are available. So, these are usually unsecured—that means no underlying collateral.

Cost of convertible debenture

- A convertible debenture is a type of long term debt that has the option to either get the debentures redeemed into the cash or get specified numbers of company's shares instead of cash.

- These are usually unsecured (no underlying collateral)

- While determining the redemption value of the debentures, it is assumed that all the debenture holders will choose the option which has the higher value.

- The formula for calculating cost of convertible debenture is same as that of redeemable debentures

$$K_d = \frac{I \times (1-t) + \frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}}$$

When determining the redemption value of the debentures, it is assumed that all debenture holders will choose the option with the higher value. That means, whether to continue with the debentures or to switch over to company shares—convert the debentures into company shares. So, whichever has the higher value. Now, the formula for calculating the cost of convertible debentures is the same as that of redeemable debentures, as we have seen for a period of n years. Now, let us calculate this.

A company issues 10 percent convertible debentures of ₹1000 each—this is the face value—with a maturity period of 4 years. 4 years. At maturity, the debenture holders will have an option. What option? To convert the debenture into equity shares of the company in the ratio of 1:12.

That means, if you have 1 debenture, you can get 12 shares per debenture. The current market price of the equity share is 140 rupees each at the moment, and historically, the growth rate is assumed to be around 4 percent. Per annum. Now, compute the cost of debentures assuming a 35 percent tax rate. See here, this case is not simple.

Previously, it was debentures—either irredeemable or redeemable. But here, we are having convertible debentures, where the debentures can be converted into shares. Now, first, we have to assume that they will compare between continuing with the debenture and redeeming it at the end of the maturity period or converting. They will first compare this and then make the decision. The cash value of the debenture is 1000, where if you send it back, the company has to pay 1000 rupees for each debenture. The value of the equity share is 12 shares because for every debenture, they are getting 12 shares multiplied by the current market value of 140, and then it is growing at the rate of 4 percent every year for 4 years.

$$K_d = \frac{I \times (1-t) + \frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}}$$

We know, $I = 10\%$ of $1000 = 100$, $t = 35\%$ or 0.35

$RV = 1965.36$, $NP = 1000$, $n = 4$

$$K_d = \frac{100 \times (1-0.35) + \frac{(1965.36-1000)}{4}}{\frac{(1965.36 + 1000)}{2}}$$

$$K_d = \frac{65 + 241.34}{1482.68}$$

$$K_d = 0.2066 \text{ or } 20.66\%$$

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So, the total value is coming to, say, 1965 rupees approximately. So, this will be taken as the redemption value, as it is higher than the cash option. The cash option gives them 1000 rupees, but if they convert to shares, then the cost will be 1965 in 4 years. If I assume that everybody will convert into shares because the difference is almost - And, we know the interest rate is 10 percent, and the corporate tax rate is 35 percent.

The redemption value is, the new redemption value is 1965 while we are converting into shares. The net proceeds without any other things, as it is not mentioned, we will take it as 1000, and n is the period of maturity, which is 4 years. If you put all these values, you can easily calculate the cost, which is high at 20.66 percent because the debentures are converted to equities, and the equity is, since we are calculating. So, in the next 4 years, you are assuming a growth in the share values, and then by calculating, you are seeing that when the value of redemption is only 1000, if you are converting them into shares, and with a 4 percent growth rate over 4 years, it is coming to 1965. That means the cost of the capital or debt capital. Convertible debentures are getting, or becoming, much more than what we expect from simple debentures.

REFERENCES

1. Financial Management by P C Chandra. McGraw Hill Publishers. Chennai. India.

2. www.icai.org

We will continue this discussion in the next lecture on the cost of equities. Today, we have discussed the cost of debt debentures. In the next lecture, we will be talking about the cost of equities. We again advise you to go through the financial management book

by P.C. Chandra, McGraw Hill Publishers, and also must see www.ici.org, a fantastic website providing you valuable materials, professional quality materials for the purpose of learning the subject. Thank you very much.