

# Cost of Capital

## SEM VI( Teacher:- S. Bhattacharyya)

### A. Cost of Debentures:

The capital structure of a firm normally includes the debt capital. Debt may be in the form of debentures bonds, term loans from financial institutions and banks etc. The amount of interest payable for issuing debenture is considered to be the cost of debenture or debt capital ( $K_d$ ). Cost of debt capital is much cheaper than the cost of capital raised from other sources, because interest paid on debt capital is tax deductible.

### The cost of Irredeemable debenture:

Irredeemable debt is that debt which is not required to be repaid during the lifetime of the company. Such debt carries a coupon rate of interest. This coupon rate of interest represents the before tax cost of debt. After tax cost of perpetual debt can be calculated by adjusting the corporate tax with the before tax cost of capital. The debt may be issued at par, at discount or at premium. The cost of debt is the yield on debt adjusted by tax rate.

$$\text{Cost of irredeemable debt } (K_d) = I/NP (1 - t)$$

Where,  $I$  = Annual interest payment

$NP$  = Net proceeds from issue of debenture or bond

$t$  = Tax rate

### Example:

A company issued 12% debentures at par for Rs 2, 00,000. Compute the after-tax cost of debentures assuming the tax rate at 30%.

$$\text{where, } I = \text{Interest} = 2,00,000 \times \frac{12}{100} = \text{Rs } 24,000$$

$$NP = \text{Net proceeds} = \text{Rs } 2,00,000$$

$$t = \text{Tax rate} = 30\% \text{ i.e. } 0.3$$

$$\therefore K_d = \frac{24,000}{2,00,000} (1 - 0.3) = 0.84 \text{ or } 8.4\%$$

### Example:

(a) A company issues Rs. 1,00,000, 15% Debentures of Rs. 100 each. The company is in 40% tax bracket. You are required to compute the cost of debt after tax, if debentures are issued at (i) Par, (ii) 10% discount, and (iii) 10% premium.

(b) If brokerage is paid at 5%, what will be the cost of debentures if issue is at par?

Ans:

(a) We know, Cost of Debenture  $K_d = \frac{I}{NP}(1 - t)$

(i) Issued at par :  $K_d = \frac{\text{Rs. } 15,000}{\text{Rs. } 1,00,000}(1 - 0.4) = 0.09 \text{ or } 9\%$

(ii) Issued at discount of 10%

$$K_d = \frac{\text{Rs. } 15,000}{\text{Rs. } 90,000}(1 - 0.4) = 0.10 \text{ or } 10\%$$

(iii) Issued at 10% premium

$$K_d = \frac{\text{Rs. } 15,000}{\text{Rs. } 1,10,000}(1 - 0.4) = 0.0818 \text{ or } 8.18\%$$

(b) If brokerage is paid @ 5% and debentures are issued at par

$$K_d = \frac{\text{Rs. } 15,000}{\text{Rs. } 95,000 \text{ (i.e., Rs. } 1,00,000 - \text{Rs. } 5,000)}(1 - 0.4) = 0.0947 \text{ or } 9.47\%$$

### Calculation of Net Issue Price:

$NP = \text{Cost of the Debenture} - [(\text{Discount on Issue, If Any}) \text{ or } (+ \text{ Premium of Issue})] - (\text{Flotation Cost})$

### The cost of Redeemable debenture:

Redeemable debt is that debt which Required to be repaid during the lifetime of the company. Such debt carries a coupon rate of interest. This coupon rate of interest represents the before tax cost of debt. After tax cost of perpetual debt can be calculated by adjusting the corporate tax with the before tax cost of capital. The debt may be issued at par, at discount or at premium. The debt may Also be Redeemed at par, at discount or at premium. The cost of debt is the yield on debt adjusted by tax rate.

### Example:

ZED Ltd. has issued 12% Debentures of face value of Rs. 100 for Rs. 60 lakh. The floating charge of the issue is 5% on face value. The interest is payable annually and the debentures are redeemable at a premium of 10% after 10 years.

What will be the cost of debentures if the tax is 50%?

$K_d$  = Cost of Debenture (After tax)

I = Interest pn Debenture

R = Redemable Price

P = Net Issue Price

N = Number of Years

Ans:.

$$\text{We know, Cost of Debenture } K_d = \frac{I(1-t) + \frac{1}{n}(R-P)}{\frac{1}{2}(R+P)}$$

Here, I = Rs. 12, t = 50% or 0.50, P = Rs. 100 - 5 = Rs. 95, n = 10 years.

R = Rs. 100 + 10% of Rs. 100 = Rs. 110.

$$K_d = \frac{12(1-0.5) + \frac{1}{10}(110-95)}{\frac{1}{2}(110+95)} = \frac{6+1.5}{102.5} = 0.073 = 7.3\%.$$

## **B. Cost of Preference Share Capital:**

For preference shares, the dividend rate can be considered as its cost, since it is this amount which the company wants to pay against the preference shares. Like debentures, the issue expenses or the discount/premium on issue/redemption are also to be taken into account.

### **Cost of Irredeemable preference shares ( $K_P$ ) = $D_P / NP$**

Where,  $D_P$  = Preference dividend per share

$NP$  = Net proceeds from the issue of preference shares.

### **Example:**

A company issues 10% Preference shares of the face value of Rs. 100 each. Floatation costs are estimated at 5% of the expected sale price.

What will be the cost of preference share capital ( $K_P$ ), if preference shares are issued (i) at par, (ii) at 10% premium and (iii) at 5% discount? Ignore dividend tax.

Ans:

(i) When preference shares are issued at par i.e., at Rs. 100 per share,  $K_P = \frac{\text{Rs. } 10}{\text{Rs. } 95} = 0.1052$  or 10.52%, where,  $D_P = 10\%$  of Rs. 100 = Rs. 10, P = Rs. 100 - 5% of Rs. 100 = Rs. 95.

(ii) When preference shares are issued at 10% premium (i.e., at Rs. 110 per share)

$$K_P = \frac{\text{Rs. } 10}{\text{Rs. } 104.50} = 0.0956 \text{ or } 9.56\%,$$

where  $D_P = 10\%$  of Rs. 100 = Rs. 10, P = Rs. 110 - 5% of Rs. 110 = Rs. 104.50.

(iii) When preference shares are issued at 5% discount (i.e., at Rs. 95 per share)

$$K_P = \frac{\text{Rs. } 10}{\text{Rs. } 90.25} = 0.1108 \text{ or } 11.08\%.$$

where  $D_P = 10\%$  of Rs. 100 = Rs. 10, P = Rs. 95 - 5% of Rs. 95 = Rs. 90.25.

### Cost of Redeemable preference shares ( $K_P$ )

$$\text{cost of preference share } (K_P) = \frac{D_P + \frac{1}{n}(R - P)}{\frac{1}{2} \times (R + P)}$$

#### Example:

A company issues 12% redeemable preference shares of Rs. 100 each at 5% premium redeemable after 15 years at 10% premium. If the floatation cost of each share is Rs. 2, what is the value of  $K_P$  (Cost of preference share) to the company?

Ans:

$$\text{We know, cost of preference share } (K_P) = \frac{D_P + \frac{1}{n}(R - P)}{\frac{1}{2} \times (R + P)}$$

Here,  $D_P = 12\%$  of Rs. 100 = Rs. 12,  $R = \text{Rs. 110}$  (at 10% premium)

$P = \text{Rs. 100}$  (at par),  $n = 10$  years.

$$K_P = \frac{\text{Rs. 12} + \frac{1}{10}(\text{Rs. 110} - \text{Rs. 100})}{\frac{1}{2} \times \text{Rs. (110 + 100)}} = \frac{\text{Rs. 12} + \text{Rs. 1}}{\text{Rs. 105}} = \frac{\text{Rs. 13}}{\text{Rs. 105}} = 0.1238 = 12.38\%$$

### C. Cost of Equity Share Capital:

The funds required for a project may be raised by the issue of equity shares which are of permanent nature. These funds need not be repayable during the lifetime of the organisation. Calculation of the cost of equity shares is complicated because, unlike debt and preference shares, there is no fixed rate of interest or dividend payment.

Cost of equity share is calculated by considering the earnings of the company, market value of the shares, dividend per share and the growth rate of dividend or earnings.

#### (i) Dividend/Price Ratio Method:

$$\text{cost of Equity Capital } (K_e) = \frac{D}{P} + g$$

Where,

$D$  = Dividend per share

$P$  = Current market price per share.

$g$  = Expected Constant Growth rate

### Example:

XY Company's share is currently quoted in market at Rs. 60. It pays a dividend of Rs. 3 per share and investors expect a growth rate of 10% per year.

Calculate:

- (i) The company's cost of equity capital.
- (ii) The indicated market price per share, if anticipated growth rate is 12%.
- (iii) The market price, if the company's cost of equity capital is 12%, anticipated growth rate is 10% p.a., and dividend of Rs. 3 per share is to be maintained.

Ans:

**Solution :**

We know, cost of Equity Capital ( $K_e$ ) =  $\frac{D}{P} + g$ .

$$(i) K_e = \frac{\text{Rs. } 3}{\text{Rs. } 60} + 0.10 = 0.05 + 0.10 = 0.15 \text{ or } 15\%$$

$$(ii) \text{ Market Price (P)} = \frac{\text{Dividend (D)}}{\text{Cost of equity capital (K}_e\text{)} - \text{Growth rate (g)}}$$
$$= \frac{\text{Rs. } 3}{15\% - 12\%} = \frac{\text{Rs. } 3}{3\%} = \text{Rs. } 100.$$

$$(iii) \text{ Market Price (P)} = \frac{\text{Rs. } 3}{12\% - 10\%} = \frac{\text{Rs. } 3}{2\%} = \text{Rs. } 150.$$

### Example:

A company's share is currently quoted in the market at Rs. 20. The company pays a dividend of Rs. 2 per share and the investors expect a growth rate of 5% per year.

Calculate

- (a) Cost of equity capital of the company,
- (b) The market price per share, if the anticipated growth rate of dividend is 7%.

Ans:

$$(a) \text{ Cost of equity share capital (K}_e\text{)} = D/P + g$$
$$= \text{Rs. } 2/\text{Rs. } 20 + 5\%$$
$$= 15\%$$

$$(b) \text{ Cost of equity share capital (K}_e\text{)} = D/P + g$$
$$0.15 = \text{Rs. } 2 / P + 0.07$$
$$P = 2/0.08$$
$$P = \text{Rs. } 25.$$

## (ii) Earnings/Price Ratio Method:

$$\text{Cost of Equity Capital} = \frac{E}{P}$$

### Example:

The share capital of a company is represented by 10,000 Equity Shares of Rs. 10 each, fully paid. The current market price of the share is Rs. 40. Earnings available to the equity shareholders amount to Rs. 60,000 at the end of a period.

Ans:

$$\text{We know, Cost of Equity Capital} = \frac{E}{P}$$

$$E = \text{Earnings per share} = \frac{\text{Rs. } 60,000}{10,000} = \text{Rs. } 6.$$

$$P = \text{Current market price} = \text{Rs. } 40.$$

$$\text{Cost of Equity Capital } (K_e) = \frac{\text{Rs. } 6}{\text{Rs. } 40} = 0.15\% \text{ or } 15\%.$$

### Example:

A company Issued 10,000 Equity Shares of Rs. 10 each.

The cost of floatation is expected to be 5%. Its current market price per share is Rs. 40.

If the earnings per share is Rs. 7.25.

Ans:

$$K_e = \frac{E}{P(1-f)}$$

Where  $f$  = Flotation cost

$$K_e = \frac{E}{P(1-f)}$$

$$= \frac{7.25}{40(1-0.05)}$$

$$= \frac{7.25}{38} = 0.1907 \text{ or } 19.07\%$$

$$\text{where } E = \text{Rs. } 7.25$$

$$P = \text{Rs. } 40$$

$$f = 5\% = .05.$$

## Capital Asset Pricing Model (CAPM):

$$K_e = R_f + \beta \times (R_m - R_f)$$

Where:

$R_f$  = Risk-free Rate of Return

$\beta$  = equity beta (levered)

$R_m$  = Market Return

## D. Cost of Retained Earnings:

The profits retained by a company for using in the expansion of the business also entail cost. When Earnings Are Retained In The Business, Shareholders are forced to forego dividends. The dividends forgone by the equity shareholders are, in fact, an opportunity cost. Thus retained earnings involve opportunity cost.

Retained earnings are one of the important internal sources of finance. Profit available to equity can be distributed as dividend. But a proportion of that is distributed and Remaining is kept for Reinvestment. Therefore Retained earnings is the dividend foregone by the equity shareholders. Since equity shareholders are the actual claimants of the retained earnings, the cost of retained earnings, is equivalent to cost of equity.

Cost of retained earnings ( $K_r$ ) will be calculated  $K_r = K_e$

## E. Overall or Weighted Average Cost of Capital:

A firm may procure long-term funds from various sources like equity share capital, preference share capital, debentures, term loans, retained earnings etc. at different costs depending on the risk perceived by the investors.

When all these costs of different forms of long-term funds are weighted by their relative proportions to get overall cost of capital it is termed as weighted average cost of capital. It is also known as composite cost of capital. While taking financial decisions, the weighted or composite cost of capital is considered.

## Calculation of Weighted Average Cost of Capital:

- The specific cost of each source of funds (i.e., cost of equity, preference shares, debts, retained earnings etc.) is to be calculated.
- Weights (i.e., proportion of each, source of fund in the capital structure) are to be computed and assigned to each type of funds. This implies multiplication of each source of capital by appropriate weights.
- (iii) Add all the weighted component costs to obtain the firm's weighted average cost of capital.

## The weights are assigned:

- Book values of various sources of funds
- Market values of various sources of capital
- Marginal book values of various sources of capital.

$$\text{Weighted average cost of capital (K}_0\text{)} = K_1W_1 + K_2W_2 + \dots + K_nW_n$$

Where  $K_1, K_2$  = Component costs

$W_1, W_2$  = Weights.

## Example:

A Ltd has the following capital structure and, after tax costs of Capital for the different sources of fund.

Equity Shares (1,00,000 shares)	50,00,000
1.5% Debentures	50,00,000
Total	<u>1,00,00,000</u>

The company is expected to declare a dividend of Rs. 5 per share. The market price per share is Rs. 50. The dividend is expected to grow at 10%.

Compute weighted average cost of capital of RIL Ltd. assuming 50% tax rate.

Ans:

Computation of specific cost of each source :

(i) Cost of Debenture ( $K_d$ ) =  $r(1 - t) = 15\% (1 - 0.5) = 7.5\%$

(ii) Cost of Equity share ( $K_e$ ) =  $\frac{D}{P} + g = \frac{\text{Rs. } 5}{\text{Rs. } 50} + 10\% = 20\%$

Statement Showing Weighted Average Cost of Capital

Source (1)	Amount (Rs.) (2)	Proportion (3)	After-tax Cost (4)	Weighted Cost (5) = (3) × (4)
Equity share capital	50,00,000	0.50	0.20	0.1000
Debentures	50,00,000	0.50	0.075	0.0375
	10,00,000	1.00		0.1375

∴ Weighted Average Cost of Capital ( $K_o$ ) =  $0.1375 \times 100 = 13.75\%$

Example:

Debt as percentage of total capital employed	Cost of debt %	Cost of equity %
0	5.0	12.00
10	5.0	12.00
20	5.0	12.50
30	5.50	13.0
40	6.0	14.0
50	6.50	16.0
60	7.0	20.0

The optimum debt-equity mix for the company by calculating composite cost of capital.

Ans:

**Solution :**

**Computation of Composite Cost of Capital**

Proportion of Debt	Cost of Debt	Weighted Cost of Debt	Proportion of Equity	Cost of Equity	Weighted Cost of Equity	Composite Cost of Capital (%)
(1)	(2)	(3) = (1) × (2)	(4) = 1 - (1)	(5)	(6) = (4) × (5)	(7) = (3) + (6)
0.0	5	0	1	12.0	12.0	12.0
0.1	5	0.5	0.9	12.0	10.8	11.3
0.2	5	1.0	0.8	12.50	10.0	11.0
0.3	5.5	1.65	0.7	13.0	9.1	10.75
0.4	6.0	2.4	0.6	14.0	8.4	10.80
0.5	6.5	3.25	0.5	16.0	8.0	11.25
0.6	7.0	4.20	0.4	20.0	8.0	12.20

- Optimal debt-equity mix for the company is at the point where the composite cost of capital is Minimum.
- Therefore, The composite cost of capital is minimum (10.75%) at the debt-equity mix of 3: 7 (i.e., 30% debt and 70% equity). Therefore, 30% of debt and 70% equity mix would be an optimal debt-equity mix for the company.