

FINANCIAL MANAGEMENT

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COST OF CAPITAL

4RTH SEMESTER

COST OF RETAINED EARNINGS

H.4. Formula for determining the Cost of Retained Earnings

If K_r be the cost of retained earnings, then —

$$K_r = E (1 - t) (1 - B)$$

where —

E = Shareholders' expected rate of dividend or Dividend yield ratio

$$\therefore E = \frac{\text{Dividend per share}}{\text{Market Price of Each share}}$$

t = Shareholders' personal rate of income tax

B = Brokerage cost to shareholders

Note : We know that the expected rate of return to the shareholders is equivalent to the cost of equity share capital. So, the above formula can also be written as —

$$K_r = K_e (1 - t) (1 - B)$$

$$\text{or, } K_r = \left(\frac{D}{P} + g \right) (1 - t) (1 - B) \quad \left[\because K_e = \frac{D}{P} + g \right]$$

□ **Example 1 :** (a) A Ltd. has declared a dividend of ₹ 30 per share on its Equity Shares. The market price of the share is ₹ 240 while the face value is ₹ 100. If the shareholders' personal tax rate is 30%, determine the cost of retained earnings.

Solution ⇒

(a) Let E be the Dividend yield ratio.

$$\therefore E = \frac{\text{Dividend per share}}{\text{Market price of each share}} = \frac{\text{Rs. 30}}{\text{Rs. 240}} = \frac{1}{8}$$

Now, if ' K_r ' be the cost of retained earnings, then—

$$K_r = E (1 - t) (1 - B)$$

where, t = Shareholders' personal tax rate,

B = Brokerage cost.

$$\therefore t = 30\% \text{ or, } 0.30 \text{ and } B = 0.$$

$$\text{Thus, } K_r = \frac{1}{8} (1 - 0.30) (1 - 0)$$

$$\text{or, } K_r = \frac{1}{8} \times 0.70 = 0.0875 \text{ or, } 8.75\%.$$

Hence, required cost of retained earnings is 8.75%.

Let ' t ' be the shareholders' personal

- Q. Calculate the cost of retained earnings from the following data :
- Current market price of each share is ₹ 50.
 - Brokerage cost per share is 2% on market price.
 - Rate of growth in expected Dividends is 6%.
 - Expected Dividend per share on new shares is ₹ 12.50.
 - Shareholders' marginal tax rate is 30%.

752

(d) We know that, if ' K_r ' be the cost of retained earning, then—

$$K_r = \left(\frac{D}{P} + g \right) (1 - t) (1 - B)$$

where—

D = Dividend per share = ₹ 12.50,

P = Market price of each share = ₹ 50,

t = Shareholders' marginal tax rate = 30% or, 0.30.

B = Brokerage cost per share = 2% or, 0.02

and g = growth rate of dividend = 6% or, 0.06.

Thus—

$$K_r = \left(\frac{12.50}{50} + 0.06 \right) (1 - 0.30) (1 - 0.02)$$

$$\text{or, } K_r = (0.25 + 0.06) \times 0.70 \times 0.98$$

$$\text{or, } K_r = 0.31 \times 0.70 \times 0.98$$

$$\text{or, } K_r = 0.21266 \text{ or, } 21.27\% \text{ (Approx.)}$$

Hence, required cost of retained earning is 21.27%.

I Weighted Average Cost of Capital

The weighted average cost of all the components of the capital structure is called **Overall Cost of Capital**. Here weight refers to the proportion in which the components of the capital structure has been taken. Suppose, a company has Equity shares of ₹ 50,000, Preference shares of ₹ 30,000 and Debentures of ₹ 20,000 in its capital structure of ₹ 1,00,000. So, the proportion of equity shares = $\frac{50,000}{1,00,000} = 0.50$, Preference shares = $\frac{30,000}{1,00,000} = 0.30$ and Debentures = $\frac{20,000}{1,00,000} = 0.20$. Here 0.50, 0.30 and 0.20 are the weights of the equity shares, preference shares and debentures respectively. The weighted average cost of capital can be determined by dividing the sumtotal of the products, which are obtained by multiplying the cost of each component of the capital structure with their respective weights, with the total of the weights of all the components.

It can be noted in this context that the sumtotal of the weights is always one. So, there is no justification to divide the total products by the sumtotal of the weights. Thus, it can be said that the **weighted average cost of capital can be determined by adding the products which are obtained by multiplying the individual weight of a particular component of the capital structure with its cost**. As for instance, if K_e , K_p , K_r and K_d are the costs of equity share capital, preference share capital, retained earnings and debentures, and W_e , W_p , W_r and W_d are their respective weights, then the weighted average cost of capital or overall cost of capital will be $= K_0 = (K_e \times W_e) + (K_p \times W_p) + (K_r \times W_r) + (K_d \times W_d)$.

Generally, two types of weights are used for determining the weighted average cost of capital, such as — (1) Historical Weight, and (2) Marginal Weight. These are discussed below:

1.1. Historical Weight

Historical weights refer to the weights of the existing components of the capital structure. Every existing component has two values — one is book value and the other is market value. On the basis of such two values, the historical cost of capital can be determined in two ways, such as

(a) Book value weight method and (b) Market value weight method. These methods are discussed below one by one —

A. Book Value Weight Method : Under this method, the proportion of the recorded value of each component of the capital structure is used as weight. So, it can be said that the method in which the recorded value of each component of the capital structure, which is available from the books of accounts or balance sheet, is used as weight in order to determine the weighted average cost of capital, is called **Book Value Weight Method**. When book value is used as weight to determine the overall cost of capital, the following advantages are available —

Firstly, the book value of each component of the capital structure can easily be obtained from the books of accounts or published financial reports.

Secondly, if book value is used as weight for determining the overall cost of capital, then the cost so determined is free from speculative effect.

Thirdly, if the overall cost of capital is determined by using the book value as weight, then the cost so obtained is consistent with the capital structure, because the capital structure is set on the basis of the book value.

Fourthly, if there is depression in the market, then the cost of capital should be determined by using the book value as weight. Because, under this situation, the book value of components of the capital structure is more than its market value. So, if the overall cost of capital is determined on the basis of the book value, then the fear of future losses is reduced.

The book value weight method of determining the overall cost of capital has some limitations also. These are —

Firstly, the book value of a component of the capital structure is the historical value. So, if the overall cost of capital is determined by using the book values of the components of the capital structure, then that cost is not consistent with the present situation.

Secondly, the book value is a historical value. The meaning of determining the cost of capital on the basis of the book value is to give importance to the past activities and ignore future. It is not correct, because the cost of capital is determined for ascertaining the costs which will be borne by the firm in order to fulfil the future expectations of the investors.

Thirdly, when there is boom in the market, the book value is lower than the market value. Under this situation, if cost of capital is determined on the basis of the book value, then the cost so determined is lower than the expected rate of return to the investors.

□ **Example 1 :** Kalimata Ltd. has the following capital structure :

	₹
Equity Share Capital (Expected Dividends 15%)	8,00,000
12% Preference Share Capital	5,00,000
10% Debentures	4,00,000
8% Long-term Loan	3,00,000

You are required to calculate the weighted average cost of capital, assuming 40% as the rate of income tax, before and after tax.

• Solution ⇒

*Statement showing for Computation of before Tax
Weighted Average Cost of Capital*

Items	Book value (₹)	Weight (W)	Before Tax Cost % (K)	Total Cost % (W × K)
Equity Share Capital	8,00,000	0.40	15	6
Preference Share Capital	5,00,000	0.25	12	3
Debentures	4,00,000	0.20	10	2
Long term Loan	3,00,000	0.15	8	1.2
Before Tax Weighted Average Cost of Capital				12.2

*Statement showing for Computation of after Tax
Weighted Average Cost of Capital*

Items	Book value (₹)	Weight (W)	After Tax Cost % (K)	Total Cost % (W × K)
Equity Share Capital	8,00,000	0.40	15	6.00
Preference Share Capital	5,00,000	0.25	12	3.00
Debentures	4,00,000	0.20	6	1.20
Long term Loan	3,00,000	0.15	4.8	0.72
After Tax Weighted Average Cost of Capital				10.92

Workings & Tutorial Notes

Income tax does not affect the cost of Equity Capital as well as the Preference Capital. So, the after tax and before tax cost of these two items will remain unchanged.

$$\begin{aligned}\text{After Tax Cost of Debenture} &= \text{before tax cost } (1 - t) \\ &= 10\% (1 - 0.40) \\ &= 10\% \times 0.60 = 6\%\end{aligned}$$

$$\begin{aligned}\text{Similarly, after tax cost of long term loan} &= 8\% (1 - 0.4) \\ &= 8\% \times 0.6 = 4.8\%\end{aligned}$$

- B. Market Value Method :** In this method, the weighted average cost of capital is determined in the same way as book value weight method. But, in this case, the market values of components of the capital structure are taken as weights instead of their book values. So, in this case, the weighted average cost of capital is determined by using the market value of each component as its weight. If the market value is used as weight in the case of determining the weighted average cost of capital, then some advantages are available. These are —

Firstly, if the market value is used as weight, then it is possible to determine the cost of capital with respect to the present situation. As a result of it, the cost so determined is realistic.

Secondly, if there is boom in the market, the prices of shares and debentures increase. As a result, the market value is increased. Under this situation, if overall cost of capital is determined on the basis of the market value, then the cost so determined is high. As a result of it, the fear of future losses reduces because the firm has to earn equivalent profits of the cost of capital as a return of capital employed.

There are some disadvantages of using market value in the case of determining the overall cost of capital. These are—

Firstly, the market value is not stable, it is fluctuated frequently. So, if the overall cost of capital is determined by using the market value as weight, then the cost so determined is not acceptable for a long period.

Secondly, the market value of shares or debentures may not be available unless those are listed in a stock exchange.

Thirdly, the market value may be distorted when security prices are influenced by speculative trading.

Fourthly, if the overall cost of capital is determined by using the market value as weight under depression, then the cost so obtained is lower than the expected rate of return of the investors.

□ **Example 1 :** The capital structure of Tunga Ltd. for the year-ended 31st December, 2005, is given below :

	₹
Equity Share Capital (₹ 10 each)	3,00,000
Reserve & Surplus	1,50,000
Preference Share Capital (₹ 100 each)	2,40,000
Debentures (₹ 100 each)	1,00,000

All these securities are traded in the capital markets. Recent prices are debentures @ ₹ 100, Preference Shares @ ₹ 125 and Equity Shares @ ₹ 20 each.

You are required to calculate the overall cost of capital using market value as weight after taking into consideration the following further information :

- ₹ 100 per debenture redeemable at par : 10-years maturity, 12% coupon rate, 5% flotation costs, sale price ₹ 100.
- ₹ 100 Preference Share redeemable at par : 8-years maturity, 10% Dividend rate, 4% flotation costs, sale price ₹ 100.
- Applicable tax rate : 50%.
- The company's EBIT for the year-ended 31st December, 2005 are ₹ 2,40,000.
- Growth rate in earnings : 5% p.a.

Solution ⇒ Statement showing for Computation of overall Cost of Capital

Items	Market value (₹)	Weight (W)	After Tax Cost (%) (K)	Total Cost (%) (W × K)
Equity Share Capital	4,00,000	0.40	20.00	8.00
Reserve & Surplus	2,00,000	0.20	20.00	4.00
Preference Share Capital	3,00,000	0.30	10.71	3.21
Debentures	1,00,000	0.10	6.41	0.64
Overall cost of Capital				15.85

Working Notes

1. Computation of cost of Equity :

EBIT	=	₹ 2,40,000
Less : Interest on Debentures (Rs. 1,00,000 × 12/100)	=	12,000
EBT	=	2,28,000
Less : Tax @ 50%	=	1,14,000
EAT	=	1,14,000
Less : Preference Dividend (Rs. 2,40,000 × 10/100)	=	24,000
Earnings to Equity Shareholders	=	90,000
∴ Earnings per Share (E)	=	$\frac{90,000}{30,000} = ₹ 3$

Now, Cost of Equity = $\frac{E}{P} + g$

where,—

E = Earnings per Share,

P = Market price or, selling price of each Equity Share and

g = growth rate of earnings.

∴ P = ₹ 20, E = ₹ 3 and

g = 5% or, 0.05.

Hence, Cost of Equity = $\frac{3}{20} + 0.05$
= (0.15 + 0.05) = 0.20 or, 20%.

2. Computation of cost of Preference Share Capital :

Let K_p be the cost of Preference Share Capital.

$$K_p = \frac{D + \frac{(R - P)}{n}}{\frac{(R + P)}{2}}$$

where,—

D = Dividend per share,

R = Redeemable price,

P = Net selling price,

and n = Redeemable period in terms of years

$$\therefore D = ₹ 100 \times \frac{10}{100} = ₹ 10,$$

$$R = ₹ 100,$$

$$P = ₹ \left\{ 100 - \left(100 \times \frac{5}{100} \right) \right\} = ₹ 95$$

and n = 8 years.

$$\therefore K_p = \frac{10 + \frac{(100 - 95)}{8}}{\frac{(100 + 95)}{2}}$$

$$= \frac{10 + 0.625}{97.5} = 0.1071$$

or, 10.71%.

3. Computation of Cost of Debentures :

Let K_d be the cost of Debentures.

$$\therefore K_d = \left[\frac{I + \frac{(R - P)}{n}}{\frac{(R + P)}{2}} \right] (1 - t)$$

where,—

I = Interest on Debenture,

R = Redeemable price,

P = Net selling price,

n = Redeemable period in terms of years,

and t = tax rate.

$$\therefore I = ₹ 100 \times \frac{12}{100} = ₹ 12,$$

$$R = ₹ 100$$

$$P = ₹ \left\{ 100 - \left(100 \times \frac{5}{100} \right) \right\} = ₹ 95$$

$n = 10$ years and $t = 50\%$ or, 0.50

$$\text{Thus, } K_d = \left[\frac{12 + \frac{(100 - 95)}{10}}{\frac{(100 + 95)}{2}} \right] (1 - 0.50)$$

$$= \left[\frac{12 + 0.50}{97.50} \right] \times 0.50$$

$$= \frac{12.50}{97.50} \times 0.50 = 6.41\%$$

4. Computation of market value of Equity Share Capital and Reserve & Surplus.

Total market value of

Equity = ₹ 20 × 30,000 shares = ₹ 6,00,000.

Ratio of Equity Share Capital and Reserve & Surplus

= 3,00,000 : 1,50,000 = 2 : 1.

∴ Market value of Equity Share

Capital = ₹ 6,00,000 × $\frac{2}{3}$
= ₹ 4,00,000.

Market value of Reserve &

Surplus = ₹ 6,00,000 × $\frac{1}{3}$
= ₹ 2,00,000.

5. Market value of Preference Share Capital :

= ₹ 125 × 2,400 shares

= ₹ 3,00,000.

6. Market value of Debenture :

= ₹ 100 × 1,000 Debentures

= ₹ 1,00,000.

1.2. Marginal Weight

In this case, the weights are assigned to each source of funds in proportions of financing inputs the firm intends to employ. The sources from which capitals are procured in order to undertake a capital budgeting project, the proportion of the procured components from those sources are used as weight. When overall cost of capital is determined by using these weights, the cost is called marginal cost of capital. Thus, it can be said that *when the overall cost of additional capital is determined by using the proportion of different components of the capital procured from different sources as weight for the purpose of making investment in a new project, the cost is called Marginal Cost of Capital.* For example, total amount of capital of ₹ a has been procured for making investment in a new project, out of which 'W_e' fraction is equity share capital, 'W_p' fraction is preference Share Capital and 'W_d' fraction is debt-capital. Now, if costs of equity share capital, preference share capital and debt-capital are K_e, K_p and K_d respectively then the Marginal Cost of Capital will be (W_e × K_e) + (W_p × K_p) + (W_d × K_d).

□ **Example 1 :** Nabarun Ltd. proposes to undertake an investment project at a cost of ₹ 4,00,000. The various sources from which the same can be financed and their relative specific costs are given below :

Proposed sources	Amount ₹	Cost of Capital (%)
Equity Share capital	1,60,000	15
Retained earnings	1,00,000	?
Preference Share Capital	80,000	12
Debentures	60,000	See Note (a)
	<u>4,00,000</u>	

Note : (a) 10% Debentures of ₹ 100 each to be issued at a premium of 10% redeemable after 5 years.

Assuming a Corporate Tax rate of 40%, recommend the minimum acceptable rate of return for the proposed project.

Solution ⇒ Statement showing Weighted Average Cost of Capital

Items	Amount (₹)	Weight (W)	Specific Cost (%) (K)	Total Cost (%) (W × K)
Equity Share Capital	1,60,000	0.40	15	6.00
Retained earnings	1,00,000	0.25	15	3.75
Preference Share Capital	80,000	0.20	12	2.40
Debentures	60,000	0.15	4.57	0.69
Weighted average cost				12.84

Hence, the minimum acceptable rate of return for the proposed project is 12.84%.

Working Notes

1. Computation of cost of Debenture :

Let K_d be the cost of Debentures.

$$K_d = \left[\frac{1 + \frac{(R - P)}{n}}{\frac{(R + P)}{2}} \right] (1 - t)$$

where—

I = Annual interest,

R = Redeemable Price,

P = Net selling price,

n = Redeemable period in terms of years,

and

t = tax rate.

$$\therefore I = ₹ (100 \times 10/100) = ₹ 10$$

$$R = ₹ 100,$$

$$P = ₹ \left\{ 100 + \left(100 \times \frac{10}{100} \right) \right\} = ₹ 110,$$

$$n = 5 \text{ years and } t = 40\% \text{ or, } 0.40.$$

$$\begin{aligned} \therefore K_d &= \left[\frac{10 + \frac{(100 - 110)}{5}}{\frac{(100 + 110)}{2}} \right] (1 - 0.40) \\ &= \frac{(10 - 2)}{105} \times 0.60 = \frac{8}{105} \times 0.60 \\ &= 0.0457 \text{ or, } 4.57\%. \end{aligned}$$

2. Computation of Cost of retained earnings :

Let ' K_e ' be the cost of retained earnings.

$$\therefore K_e = K_c(1 - t) (1 - B)$$

where,—

K_c = Cost of Equity Capital = 15%,

t = Shareholders' personal tax rate = Nil, and

B = Brokerage cost to shareholders = Nil.

$$\therefore K_e = K_c(1 - Nil) (1 - Nil)$$

$$\therefore K_e = K_c$$

$$\therefore K_e = 15\% \text{ or, } 0.15.$$

Statement of Eshani Ltd. as on 31st December,