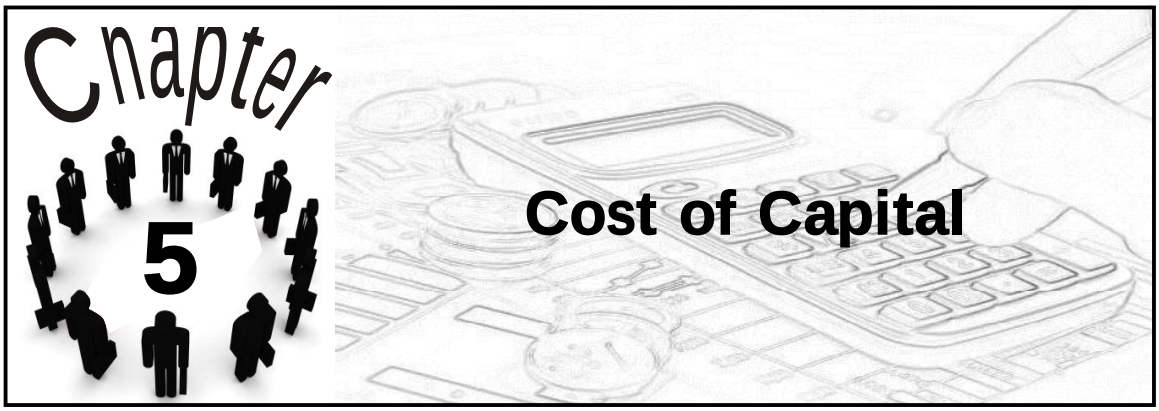


INTRODUCTION

Capital structure is the mix of long-term sources of funds like debentures, loans, preference shares, equity shares and retained earnings in different ratios. It is always advisable for companies to plan their capital structure. Decisions taken by not assessing things in a correct manner may jeopardize the very existence of the company. Firms may prosper in the short-run by not indulging in proper planning but ultimately may face problems in future. With unplanned capital structure, they may also fail to economize the use of their funds and adapt to the changing conditions.

Designing an Ideal Capital Structure

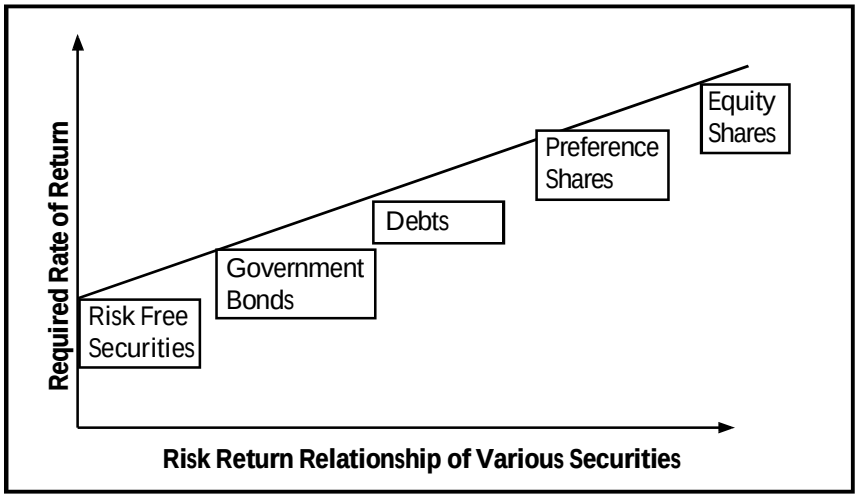
It requires a number of factors to be considered such as:

- **Return:** The capital structure of a company should be most advantageous. It should generate maximum returns to the shareholders for a considerable period of time and such returns should keep increasing.
- **Risk:** As already discussed in the previous chapter on leverage, use of excessive debt funds may threaten the company's survival. Debt does increase equity holders' returns and this can be done till such time that no risk is involved.
- **Flexibility:** The company should be able to adapt itself to situations warranting changed circumstances with minimum cost and delay.
- **Capacity:** The capital structure of the company should be within the debt capacity. Debt capacity depends on the ability for funds to be generated. Revenues earned should be sufficient enough to pay creditors' interests, principal and also to shareholders to some extent.
- **Control:** An ideal capital structure should involve minimum risk of loss of control to the company. Dilution of control by indulging in excessive debt financing is undesirable.

With the above points on ideal capital structure, raising funds at the appropriate time to finance firm's investment activities is an important activity of the Finance Manager. Golden

opportunities may be lost for delaying decisions to this effect. A combination of debt and equity is used to fund the activities. What should be the proportion of debt and equity? This depends on the costs associated with raising various sources of funds. The cost of capital is the minimum rate of return a company must earn to meet the expenses of the various categories of investors who have made investment in the form of loans, debentures, equity and preference shares. A company no being able to meet these demands may face the risk of investors taking back their investments thus leading to bankruptcy. Loans and debentures come with a pre-determined interest rate, preference shares also have a fixed rate of dividend while equity holders expect a minimum return of dividend based on their risk perception and the company's past performance in terms of pay-out of dividends.

The following graph on risk-return relationship of various securities summarizes the above discussion.



Now that we are familiar with the different sources of long-term finance, let us find out what it costs the company to raise these various types of finance. The cost of capital to a company is the minimum rate of return that it must earn on its investments in order to satisfy the various categories of investors who have made investments in the form of shares, debentures or term loans. Unless the company earns this minimum rate, the investors will be tempted to pull out of the company, leave alone participate in any further capital investment in that company. For example, equity investors expect a minimum return as dividend on their perception of the risk undertaken based on the company's past performance, or on the returns they are getting from shares they have of other companies.

The weighted arithmetic average of the cost of different financial resources that a company uses is termed as its cost of capital. Let us look at a simple example. A company has a total capital base of ` 500 lakh in the ratio of 1:1 of debt-equity i.e., divided equally between debt and equity; ` 250 lakh of debt and ` 250 lakh of equity. If the post-tax costs of debt and equity are 7% and 18% respectively, the cost of capital to the company will be equal to the weighted average cost i.e.,

$$\frac{250}{500} \times 7\% + \frac{250}{500} \times 18\% = 12.5\%.$$

Assumptions

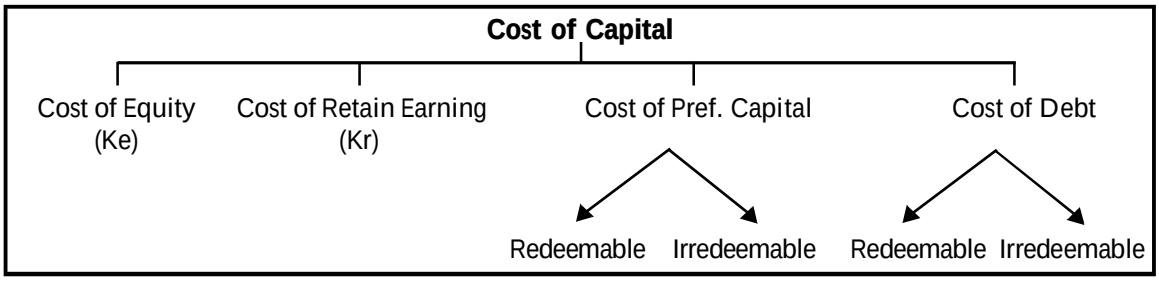
Given this definition of cost of capital, it must be noted that the use of this measure for appraising new investments will depend upon two important assumptions:

(a) the risk characterizing the new project under consideration is not significantly different from the risk characterizing the existing investments of the firm, and

(b) the firm will continue to pursue the same financing policies. Put differently, there will be no deviation from the debt-equity mix presently adopted by the firm.

For calculating the cost of capital of the firm, we have to first define the cost of various sources of finance used by it. The sources of finance that are typically tapped by a firm are: (a) debentures, (b) term loans, (c) preference capital, (d) equity capital, and (e) retained earnings. The mechanics involved in computing the costs of these sources of finance are discussed in the following section.

COSTS OF DIFFERENT SOURCES OF FINANCE



Cost of Debentures: The cost of a debenture is defined as the discount rate which equates the net proceeds from issue of debentures to the expected cash outflows in the form of interest and principal repayments, i.e.,

$$P = \sum_{t=1}^{n} \frac{I(1-t)}{(1+k_d)^t} + \frac{F}{(1+K_d)^n} \qquad \text{.....(1)}$$

where,

k_d = post-tax cost of debenture capital

I = annual interest payment per debenture capital

t = corporate tax rate

F = redemption price per debenture

P = net amount realized per debenture and

n = maturity period.

The interest payment (I) is multiplied by the factor (1 – t) because interest on debt is a tax-deductible expense and only post-tax costs are considered. An approximation formula as given below can also be used.

$$k_d = \frac{I(1-t) + \frac{F-P}{n}}{\frac{F+P}{2}} \qquad \text{.....(2)}$$

Note: When the difference between the redemption price and the net amount realized can be written off evenly over the life of the debentures and the amount so written-off is allowed as a tax-deductible expense, the above two equations can be changed as follows:

Equation (1) becomes

$$P = \sum_{t=1}^{n} \frac{I(1-t) - \frac{(F-P)t}{n}}{(1+k_d)} + \frac{F}{(1+k_d)^n}$$

Equation (2) becomes

$$k_d = \frac{I(1-t) + \frac{F-P}{n}}{\frac{F+P}{2}}$$

The following illustration illustrates the application of this formula.

Illustration 1. Ajax Limited has recently made an issue of non-convertible debentures for ` 400 lakh. The terms of the issue are as follows: each debenture has a face value of ` 100 and carries a rate of interest of 14 per cent. The interest is payable annually and the debenture is redeemable at a premium of 5 per cent after 10 years.

If Ajax Limited realizes ` 97 per debenture and the corporate tax rate is 50 per cent, what is the cost of the debenture to the company?

Solution: Given I = ` 14, t = 0.5, P = ` 97, and n = 10 years, F = ` 105, the cost per debenture (k_d) will be:

$$k_d = \frac{14(1-0.5) + \frac{105-97}{10}}{\frac{105+97}{2}} = 7.7 \text{ per cent}$$

Illustration 2. Lakshmi Enterprise wants to have an issue of non-convertible debentures for ` 10 Cr. Each debenture is of a par value of ` 100 having an interest rate of 15%. Interest is payable annually and they are redeemable after 8 years at a premium of 5%. The company is planning to issue the NCD at a discount of 3% to help in quick subscription. If the corporate tax rate is 50%, what is the cost of debenture to the company?

Solution:

$$k_d = \frac{I(1-T)+\{(F-P)/n\}}{(F+P)/2}$$

$$= \frac{15(1-0.5)+(105-97)/8}{(105+97)/2}$$

$$= \frac{7.5+1}{101}$$

$$= 0.084 \text{ or } 8.4\%$$

Cost of Term Loans: The cost of the term loans will be simply equal to the interest rate multiplied by (1 – tax rate). The interest rate to be used here will be the interest rate applicable to the new term loan. The interest is multiplied by (1 – tax rate) as interest on term loans is also tax deductible.

$$k_t = I\ (1 - t)$$

Where,

I = Interest rate

t = Tax rate.

Illustration 3. Yes Ltd. has taken a loan of ` 50,00,000 from Canara Bank at 9% interest. What is the cost of term loan if the tax rate is 40%?

Solution:

$$K_t = I(1 - T) = 9(1 - 0.4) = 5.4\%$$

Cost of Preference Capital: The cost of a redeemable preference share (k^p) is defined as that discount rate which equates the proceeds from preference capital issue to the payments associated with the same i.e. dividend payment and principal payments, which can be.

$$P = \sum_{t=1}^{n} \frac{D}{(1+k_p)^t} + \frac{F}{(1+k_p)^n} \qquad .....(3)$$

where,

k_p = cost of preference capital

D = preference dividend per share payable annually

F = redemption price

P = net amount realized per share and

n = maturity period

An approximation formula as given below can also be used.

$$k_p = \frac{D + \frac{F - P}{n}}{\frac{F + P}{2}} \qquad \text{.....(4)}$$

Illustration 4. The terms of the preference share issue made by Color-Dye-Chem are as follows: Each preference share has a face value of ` 100 and carries a dividend rate of 14 per cent payable annually. The share is redeemable after 12 years at par. If the net amount realized per share is ` 95, what is the cost of the preference capital?

Solution:

Given that D = 14, F = 100, P = 95 and n = 12

$$k_p = \frac{14 + \frac{100 - 95}{12}}{\frac{100 + 95}{2}} = 0.148 \text{ or } 14.8 \text{ per cent}$$

Illustration 5. C2C Ltd. has recently come out with a preference share issue to the tune of ` 100 lakhs. Each preference share has a face value of 100 and a dividend of 12% payable. The shares are redeemable after 10 years at a premium of ` 4 per share. The company hopes to realize ` 98 per share now. Calculate the cost of preference capital.

Solution:

$$k_p = \frac{D + \{(F - P)/n\}}{(F + P)/2}$$

$$= \frac{12 + (104 - 98)/10}{(104 + 98)/2}$$

$$= \frac{126}{101}$$

$$k_p = 0.1247 \text{ or } 12.47\%$$

Cost of irredeemable preference share capital (k_p) = D/NP × 100

Where, D = Divided

NP = Net Proceed

Is Equity Capital free of Cost?

Some people are of the opinion that equity capital is free of cost for the reason that a company is not legally bound to pay dividends and also the rate of equity dividend is not fixed like preference dividends. This is not a correct view as equity shareholders buy shares with the expectation of dividends and capital appreciation. Dividends enhance the market value of shares and therefore equity capital is not free of cost.

Cost of Equity Capital: Measuring the rate of return required by the equity shareholders is a difficult and complex exercise because the dividend stream receivable by the equity shareholders is not specified by any legal contract (unlike in the case of debenture holders). Several approaches are adopted for estimating this rate of return like the dividend forecast approach, capital asset pricing approach, realized yield approach, earnings-price ratio approach, and the bond yield plus risk premium approach.

According to the dividend forecast approach, the intrinsic value of an equity stock is equal to the sum of the present values of the dividends associated with it, i.e.,

$$P_e = \sum_{t=1}^{n} \frac{D_t}{(1+k_e)^t} \qquad \text{.....(5)}$$

where,

P_e = price per equity share

D_t = expected dividend per share at the end of year one, and

k_e = rate of return required by the equity shareholders.

If we know the current market price (P_e) and can forecast the future stream of dividends, we can determine the rate of return required by the equity shareholders (k_e) from equation (5) which is nothing but the cost of equity capital. In practice, the model suggested by equation (5) cannot be used in its present form because it is not possible to forecast the dividend stream completely and accurately over the life of the company. Therefore the growth in dividends can be categorized as nil or constant growth or super normal growth and the equation (5) can be modified accordingly. How to value a security given the required rate of return and pattern of growth, has already been discussed in the chapter 'Valuation of Securities'. Cost of equity from the company's point of view is nothing but the rate at which the intrinsic value of the market price of the share is equal to the discounted value of the dividends. For instance, assume a constant growth rate (g) in DPS. Assuming a constant growth rate in dividends, the equation (5) can be simplified as follows:

$$P_e = \sum_{t=1}^{n} \frac{D_1}{k_e - g} \qquad \text{.....(6)}$$

If the current market price of the share is given (P_e), and the values of D_1 and g are known, then the equation (6) can be rewritten as $k_e = \frac{D_1}{P_e} + g$

The following illustration illustrates the application of this formula.

Illustration 6. The market price per share of Mobile Glycols Limited is ` 125. The dividend expected per share a year hence is ` 12 and the DPS is expected to grow at a constant rate of 8 per cent per annum. What is the cost of the equity capital to the company?

Solution:

The cost of equity capital (ke) will be:

$$k_e = \frac{D_1}{P_e} + g = \frac{12}{125} + 0.08 = 17.6 \text{ per cent}$$

Illustration 7. Suraj Metals are expected to declare a dividend of ` 5 per share and the growth rate in dividends is expected to grow @ 10% p.a. The price of one share is currently at ` 110 in the market. What is the cost of equity capital to the company?

Solution:

$k_e = (D_1/P_e) + g$

$= (5/110) + 0.10$

$= 0.1454$ or 14.54%

Realized Yield Approach: According to this approach, the past returns on a security are taken as a proxy for the return required in the future by the investors. The assumptions behind this approach are that (a) the actual returns have been in line with the expected returns, and (b) the investors will continue to have the same expectations from the security. As these assumptions generally do not hold good in real life, the results of this approach are normally taken as a starting point for the estimation of the required return.The realized return over a n-year period is calculated as $(W_1 \times W_2 \times .....W_n)^{1}/_{n-1}$

Where W_t, referred to as the wealth ratio, is calculated as $\frac{D_t + P_t}{P_{t-1}}$ and t = 1, 2.... n.

D_t = Dividend per share for year t payable at the end of year

P_t = Price per share at the end of year t.

Illustration 8.

Year	1	2	3
DPS(`)	1.50	2.00	1.50
Price per share at the end of the year	12.00	11.00	12.00

The wealth ratios are:

If the price per share at the beginning of the year 1 is ` 10.

Year	1	2	3
Wealth ratio	1.35	1.08	1.23

Realized yield = (1.35 × 1.08 × 1.23)1/3 – 1

= 0.2149 or 21.5%

Capital Assets Pricing Model Approach: This model establishes a relationship between the required rate of return of a security and its systematic risks expressed as β. According to this approach, the cost of equity is reflected by the following equation:

$$k_i = R_f + \beta_i (R_m - R_f) \quad \text{.....(7)}$$

where,

k_i = rate of return required on security i

R_f = risk-free rate of return

β_i = beta of security i

R_m = rate of return on market portfolio.

The CAPM model is based on some assumptions, some of which are:

- Investors are risk-averse.
- Investors make their investment decisions on a single-period horizon.
- Transaction costs are low and therefore can be ignored. This translates to assets being bought and sold in any quantity desired. The only considerations mattering are the price and amount of money at the investor's disposal.
- All investors agree on the nature of return and risk associated with each investment.

Illustration 9. What is the rate of return for a company if its β is 1.5, risk free rate of return is 8% and the market rate or return is 20%**.**

Solution:

$$k_e = R_f + \beta(R_m - R_f)$$
$$= 0.08 + 1.5(0.2 - 0.08)$$
$$= 0.08 + 0.18$$
$$= 0.26 \text{ or } 26\%$$

Bond Yield Plus Risk Premium Approach: The logic behind this approach is that the return required by the investors is directly based on the risk profile of a company. This risk profile is adequately reflected in the return earned by the bondholders. Yet, since the risk borne by the equity investors is higher than that by the bondholders, the return earned by them should also be higher. Hence this return is calculated as:

Yield on the long-term bonds of the company + Risk premium.

This risk premium is a very subjective figure which is arrived at after considering the various operating and financial risks faced by the firm. Though these risks are already factored in the bond yield, since by nature equity investment is riskier than investments in bonds and is exposed to a higher degree of the firm's risks, they also have an impact on the risk-premium. For example, let us take two companies A and B, A having a net profit margin of 5% and B of 10% with other things being equal. Since company B faces less downside risk compared to company A, it will have to pay less interest to its bondholders. Hence, the risk

of a company is already accounted for in the bondholders' return. Yet, when it comes to estimating the equityholders' risk premium, these risks are considered all over again because the equityholders are going to bear a larger part of these risks. In fact, these risks being taken into account for fixing the bondholders' return will result in a multiple increase in the equityholders' risk. Hence, the equityholders of company A will receive a higher risk premium than those of company B.

Earnings Price Ratio Approach: According to this approach, the cost of equity can be calculated as:

$$k_e = E_1/P$$

where,

E_1 = expected EPS for the next year

P = current market price per share

E1 can be arrived at by multiplying the current EPS by (1 + growth rate).

This ratio assumes that the EPS will remain constant from the next year onwards.

There are two parameters which have to be analyzed to see if this approach will provide an accurate result or not. They are dividend payout ratio and the rate of return the firm is capable of earning on the retained earnings. The results are accurate in the following two scenarios:

- When all the earnings are paid out as dividends. Here the rate of return the firm is capable of earning becomes irrelevant. or,
- The dividend payout ratio is less than 100 per cent and retained earnings are expected to earn a rate of return equal to the cost of equity.

In all other cases there is scope for this approach not giving an accurate estimate. The option (a) is not normally seen in real life situations, while it is difficult to foresee the option (b). This approach should hence be used with caution.

Cost of Retained Earnings: Earnings of a firm can be reinvested or paid as a dividend to the shareholder. If the firm retained part of its earnings for future growth of the firm, the shareholder will demand compensation from the firm for using that money. As a result, the cost of retained earnings simply represents a shareholder's expected return from the firm's common stock. Viewing retained earnings as fully subscribed issued of additional common stock we can set the firm's cost of retained earnings k_r to the cost of equity capital.

i.e., $k_r = k_e$

The cost of retained earnings is always less than the cost of new issue of common stock due to absence of floating costs when projects with retained earnings.

Cost of External Equity: Cost of external equity comes into the picture when there are certain floatation costs involved in the process of raising equity from the market. It is the rate of return that the company must earn on the net funds raised, in order to satisfy the equityholders' demand for return. Under the dividend capitalization model, the following formula can be used for calculating the cost of external equity:

$$K'_e = \frac{D_1}{P_0 (1-f)} + g$$

where,

K'_e = cost of external equity

D_1 = dividend expected at the end of year 1

P_0 = current market price per share

g = constant growth rate applicable to dividends

f = floatation costs as a percentage of the current market price.

For all other approaches, there is no particular method for accounting for the floatation costs. The following formula can be used as an approximation in such cases:

$$K'_e = k_e/(1-f)$$

where,

k_e = rate of return required by the equity investors

K'_e = cost of external equity

f = floatation costs as a percentage of the current market price.

Illustration 10. Asbestos Limited has got ` 100 lakh of retained earnings and ` 100 lakh of external equity through a fresh issue, in its capital structure. The equity investors expect a rate of return of 18%. The cost of issuing external equity is 5%. The cost of retained earnings and the cost of external equity can be determined as follows: Cost of retained earnings:

$k_r = k_e$ i.e., 18%

Cost of external equity raised by the company:

Now $K'_e = \frac{k_e}{1-f} = \frac{0.18}{1-0.05}$ = 18.95%

Illustration 11. Alpha Ltd. requires ` 400 Cr to expand its activities in the southern zone of India. The company's CFO is planning to get ` 250 Cr through a fresh issue of equity shares to the general public and for the balance amount he proposes to use ½ of the reserves which are currently to the tune of ` 300 Cr. The equity investors' expectations of returns are 16%. The cost of procuring external equity is 4%. What is the cost of external equity?

Solution:

We know that $k_e = k_r$, that is k_r is 16%

Cost of external equity is:

$K'_e = k_e/(1-f)$

$= 0.16/(1-0.04) = 0.1667$ or 16.67%

Weighted Average Cost of Capital: In the previous section we have calculated the cost of each component in the overall capital of the company. The term cost of capital refers to the overall composite cost of cap or the weighted average cost of each specific type of fund. The purpose of using weighted average is to consider each component in proportion of their contribution to the total fund available. Use of weighted average is preferable to simple average method for the reason that firms do not procure funds equally from various sources and therefore simple average method is not used. The following steps are involved to calculate the WACC.

Step I: Calculate the cost of each specific source of fund, that of debt, equity, preference capital and term loans.

Step II: Determine the weights associated with each source.

Step III: Multiply the cost of each source by the appropriate weights.

Step IV: WACC = $W_e k_e + W_r k_r + W_p k_p + W_d k_d + W_t k_t$

Assignment of Weights: Weights can be assigned based on any of the below mentioned methods:

1. The book values of the sources of funds in the capital structure,
2. Present market value of the funds in the capital structure and
3. In the proportion of financing planned for the capital budget to be adopted for the next period.

As per the book value approach, weights assigned would be equal to each source's proportion in the overall funds. The book value method is preferable. The market value approach uses the market values of each source and the disadvantage in this method is that these values change very frequently.

Illustration 12. Prakash Packers Ltd. has the following capital structure:

	` in lakhs
Equity Capital (` 10 par value)	200
14% Preference Share Capital ` 100 each	100
Retained Earnings	100
12% Debentures (` 100 each)	300
11% Term loan from ICICI Bank	50
Total	750

The market price per equity share is ` 32. The company is expected to declare a dividend per share of ` 2 per share and there will be a growth of 10% in the dividends for the next 5 years. The preference shares are redeemable at a premium of ` 5 per share after 8 years and are currently traded at ` 84 in the market. Debenture redemption will take place after 7 years at a premium of ` 5 per debenture and their current market price is ` 90 per unit. The corporate tax rate is 40%. Calculate the WACC.

Solution:

Step I: is to determine the cost of each component.

$k_e = (D_1/P_0) + g$

$= (2/32) + 0.1$

$= 0.1625$ or 16.25%

$k_p = [D + \{(F - P)/n\}]/(F + P)/2$

$= [14 + (105 - 84)/8]/(105 + 84)/2$

$= 16.625/94.5$

$= 0.1759$ or 17.59%

$k_r = k_e$ which is 16.25%

$k_d = [I(1 - T) + \{(F - P)/n\}]/\{F + P)/2\}$

$= [12(1 - 0.4) + (105 - 90)/7]/(105 + 90)/2$

$= [7.2 + 2.14]/97.5$

$= 0.096$ or 9.6%

$k_t = I(1 - T)$

$= 0.11(1 - 0.4)$

$= 0.066$ or 6.6%

Step II: is to calculate the weights of each source.

$W_e = 200/750 = 0.267$

$W_p = 100/750 = 0.133$

$W_r = 100/750 = 0.133$

$W_d = 300/750 = 0.4$

$W_t = 50/750 = 0.06$

Step III: Multiply the costs of various sources of finance with corresponding weights and WACC calculated by adding all these components.

$WACC = W_ek_e + W_pk_p + W_rk_r + W_dk_d + W_tk_t$

$= (0.267 \times 0.1625) + (0.133 \times 0.1759) + (0.133 \times 0.1625) + (0.4 \times 0.092) + (0.06 \times 0.066)$

$= 0.043 + 0.023 + 0.022 + 0.0384 + 0.004$

$= 0.1304$ or 13.04%

Illustration 13. Johnson Cool Air Ltd., would like to know the WACC. The following information is made available to you in this regard.

The after tax cost of capital are:

- Cost of debt 9%
- Cost of preference shares 15%
- Cost of equity funds 18%

The capital structure is as follows:

- Debt ` 6,00,000
- Preference capital ` 4,00,000
- Equity capital ` 10,00,000

Solution:

Fund source	Amount	Ratio	Cost	Weighted cost
Debt	` 6,00,000	0.3	0.09	0.027
Preference capital	` 4,00,000	0.2	0.15	0.03
Equity capital	` 10,00,000	0.5	0.18	0.09
Total	**` 20,00,000**	**1.0**		**0.147**

WACC is 14.7%

Illustration 14. Manikyam Plastics Ltd. wants to enter into the arena of plastic moulds next year for which it requires ` 20 Cr. to purchase new equipment. The CFO has made available the following details based on which you are required to compute the weighted marginal cost of capital.

- The amount required will be raised in equal proportions by way of debt and equity (new issue and retained earnings put together account for 50%).
- The company expects to earn ` 4 Cr as profits by the end of year of which it will retain 50% and pay off the rest to the shareholders.
- The debt will be raised equally from two sources – loans from IOB costing 14% and from the IDBI costing 15%.
- The current market price per equity share is ` 24 and dividend pay out one year hence will be ` 2.40.

Solution:

Source of Funds	Weights	After Tax Cost	Weighted Cost
Equity Capital	0.4	0.1	0.04
Retained Earnings	0.1	0.1	0.01
14% loan from IOB	0.25	0.07	0.0175
15% IDBI loan	0.25	0.075	0.01875
Total			**0.0863 or 8.63%**

$k_e = (D_1/P_0) + g$

$= (2.40/24) = 0.1$ or 10%

$k_t = I(1 - T)$

$= 0.14(1 - 0.5) = 0.07$ or 7%

$k_t = I(1 - T)$

$= 0.15(1 - 0.5) = 0.075$ or 7.5%

Illustration 15. Canara Paints has paid a dividend of 40% on its share of ` 10 in the current year. The dividends are growing @ 6% p.a. The cost of equity capital is 16%. The Company's top Finance Managers of various zones recently met to take stock of the competitors' growth and dividend policies and came out with the following suggestions to maximize the wealth of the shareholders. As the CFO of the company you are required to analyze each suggestion and take a suitable course keeping the shareholders' interests in mind.

Alternative 1: Increase the dividend growth rate to 7% and lower k_e to 15%

Alternative 2: Increase the dividend growth rate to 7% and increase k_e to 17%

Alternative 3: Lower the dividend growth rate to 4% and lower k_e to 15%

Alternative 4: Lower the dividend growth rate to 4% and increase k_e to 17%

Alternative 5: increase the dividend growth rate to 7% and lower k_e to 14%

Solution:

We all know that $P_0 = D_1/(k_e - g)$

Present case = 4/(0.16-0.06) = ` 40

Alternative 1 = 4.28/(0.15 – 0.07) = ` 53.5

Alternative 2 = 4.28/(0.17 – 0.07) = ` 42.8

Alternative 3 = 4.16/(0.15 – 0.04) = ` 37.8

Alternative 4 = 4.16/(0.17 – 0.04) = ` 32

Alternative 5 = 4.28/(0.14 – 0.07) = ` 61.14

Recommendation: The last alternative is likely to fetch the maximum price per equity share thereby increasing their wealth.

Illustration 16. Ventura Home Appliances Ltd. has the following capital structure:

	` in lakhs
Equity Capital (10 lakh shares at par value)	100
12 per cent preference capital (10,000 shares at par value)	10
Retained earnings	120
14% Non-convertible Debentures (70,000 debentures at par value)	70
14% term loan from APSFC	100
Total	**400**

The market price per equity share is ` 25. The next expected dividend per share (DPS) is ` 2.00 and the DPS is expected to grow at a constant rate of 8 per cent. The preference shares are redeemable after 7 years at par and are currently quoted at ` 75 per share on the stock exchange. The debentures are redeemable after 6 years at par and their current market quotation is ` 90 per share. The tax rate applicable to the firm is 50 per cent. Calculate the weighted average cost of capital.

Solution: We will adopt a three-step procedure to solve this problem.

Step I: Determine the costs of the various sources of finance. We shall define the symbols ke, kr, kp, kd and ki to denote the costs of equity, retained earnings, preference capital, debentures, and term loans respectively.

Note: Market price can be taken as a close substitute of the net amount realizable per share or debenture.

Step II: Determine the weights associated with the various sources of finance.One issue to be resolved before concluding this section relates to the system of weighting that must be adopted for determining the weighted average cost of capital. The weights can be used on: (i) book values of the sources of finance included in the present capital structure, (ii) present market value weights of the sources of finance included in the capital structure and (iii) proportions of financing planned for the capital budget to be adopted for the forthcoming period. Let us assume the book value approach and the weights of a source of fund, according to book value approach is equal to the book value of that particular source divided by the total of the book values of all sources i.e., weight given to equity would be equal to book value of equity divided by book value of equity, retained earnings, debt, preference shares (if any). Similarly the weights according to the market value approach is equal to the market value of a particular source divided by the market value of all sources. For instance, weight attached to equity is equal to the market value of equity divided by the market value of equity, debt, preference shares, if any.We shall define the symbols W_e, W_r, W_p, W_d and W_i to denote the weights of the various sources of finance.

$$W_e = \frac{100}{400} = 0.25$$

$$W_r = \frac{120}{400} = 0.30$$

$$W_p = \frac{10}{400} = 0.025$$

$$W_d = \frac{70}{400} = 0.175$$

$$W_i = \frac{100}{400} = 0.25$$

Step III: Multiply the costs of the various sources of finance with the corresponding weights and add these weighted costs to determine the weighted average cost of capital (WAC). Therefore,

$$WAC = W_e k_e + W_r k_r + W_p k_p + W_d k_d + W_i k_i$$

$$= (0.25 \times 0.16) + (0.30 \times 0.16) + (0.025 \times 0.1780) + (0.175 \times 0.0912) + (0.25 \times 0.07)$$

$$= 0.1259 \text{ or } 12.59 \text{ per cent.}$$

Illustration 17. Deepak steel has issued non-convertible debentures for ` 5 Cr. Each debenture is of a par value of ` 100 carrying a coupon rate of 14%. Interest is payable annually and they are redeemable after 7 years at a premium of 5%. The company issued the NCD at a discount of 3%. What is the cost of debenture to the company? Tax rate is 40%.

Solution:

$$k_d = \frac{I(1-T) + \{(F-P)/n\}}{(F+P)/2}$$

$$= \frac{14(1-0.04) + (105-97)/7}{(105+97)/2}$$

$$= \frac{8.4 + 1.14}{101}$$

$$= 0.094 \text{ or } 9.4\%$$

Illustration 18. Supersonic industries Ltd. has entered into an agreement with Indian Overseas Bank for a loan of ` 10 Cr with an interest rate of 10%. What is the cost of the loan if the tax rate is 45%?

Solution:

$$k_t = I(1 - T)$$

$$= 10(1 - 0.45)$$

$$= 5.5\%$$

Illustration 19. Prime group issued preference shares with a maturity premium of 10% and a coupon rate of 9%. The shares have a face a value of ` 100. and are redeemable after 8 years. The company is planning to issue these shares at a discount of 3% now. Calculate the cost of preference capital.

Solution:

$$k_p = \frac{D + \{(F - P)/n\}}{(F + P)/2}$$

$$= \frac{-9 + (110 - 97)/8}{(110 + 97)/2}$$

$$= \frac{-9 + 1.625}{103.5} = 10.27\%$$

EXERCISE

Self-assessment Questions 1

1. _____ is the mix of long-term sources of funds like debentures, loans, preference shares, equity shares and retained earnings in different ratios.
2. The capital structure of a company should generate _____ to the shareholders.
3. The capital structure of the company should be within the _____.
4. An ideal capital structure should involve _____ to the company.
5. _____ do not have a fixed rate of return on their investment.
6. According to Dividend Forecast Approach, the intrinsic value of an equity share is the sum of _____ associated with it.

Answers to SAQs

Self-assessment Questions 1

1. Capital structure
2. Maximum returns
3. Debt capacity
4. Minimum risk of loss of control
5. Equity shareholders
6. Present values of dividends

Self-assessment Questions 2

State with reasons whether the following statements are True/False.

(a) Debentures and bonds are debt instruments.

(b) Every investment has some risk.

(c) Credit rating helps the investors to make good choice of investment in equity shares

(d) Yield curve considers only the relationship between the maturity and its yield

(e) Interest rate is determined by the RBI

Answers to SAQs

Self-assessment Questions 2

(a) True, (b) True, (c) False, (d) True, (e) False.

Terminal Questions

1. The following data is available in respect of a company:

   Equity ` 10 lakhs, cost of capital 18%

   Debt ` 5 lakhs, cost of debt 13%

   Calculate the weighted average cost of funds taking market values as weights assuming tax rate is 40%.

2. Bharat Chemicals has the following capital structure:

` 10 face value equity shares	` 4,00,000
Term loan @ 13%	` 1,50,000
9% Preference shares of ` 100, currently traded at ` 95 with 6 years maturity period	` 1,00,000
Total	` 6,50,000

   The company is expected to declare a dividend of ` 5 next year and the growth rate of dividends is expected to be 8%. Equity shares are currently traded at ` 27 in the market. Assume tax rate of 50%. What is WACC?

3. The market value of debt of a firm is ` 30 lakhs, which of equity is ` 60 lakhs. The cost of equity and debt are 15% and 12%. What is the WACC?

4. A company has 3 divisions – X, Y and Z. Each division has a capital structure with debt, preference shares and equity shares in the ratio 3:4:3 respectively. The company is planning to raise debt, preference shares and equity for all the 3 divisions together. Further, it is planning to take a bank loan @ 12% interest. The preference shares have a face value of ` 100, dividend @ 12%, 6 years maturity and currently priced at ` 88. Calculate the cost of preference shares and debt if taxes applicable are 45%

5. Tanishk Industries issues partially convertible debentures of face value of is ` 100 each and realizes ` 96 per share. The debentures are redeemable after 9 years at a premium of 4%, taxes applicable are 40%. What is the cost of debt?

Answers to Terminal Questions

1, 2, 3: $WACC = W_e k_e + W_p k_p + W_r k_r + W_d k_d + W_t k_t$

5. *Hint:* Apply the formula $k_p = \dfrac{D + \{(F - P)/n\}}{(F + P)/2}$

6. *Hint:* Apply the formula $k_d = \dfrac{1(1 - T) + \{(F - P)/n\}}{(F + P)/2}$

6. Bharat Ltd. paid dividend of ` 2.50 p.a. in the last yr. Dividends is expected to grow at 10% p.a. for indefinite future. What would be the value of stock if the required rate of return is 15%? Is it worth investing in the share at current market price of ` 60?
7. BSES paid ` 2.50 as dividend per share on its equity shares for the last year. Dividends are expected to grow at 10 per cent per year for an indefinite future. What is its expected rate of return if its current market price is ` 20? If the required rate of return is 12% , what would be the value of stock? Is it worth investing in the share?
8. RIL paid ` 3 as dividend per share on its equity shares for last yr. It is expected that it will grow at 10% per yr. for indefinite future.
   (a) What is the expected rate of return if current market price is ` 15?
   (b) If the required rate if return is 15%, then what would be the value of stock?
   (c) Is it investing in RIL worth?
9. A debenture of ` 10,000 face value carries an interest rate of 9 per cent is redeemable after 7 years at a premium of 5%. If the required rate of return is 12% what should be the present value?
10. A GOI bond of ` 1,000 has a coupon rate of 8 % per annum and maturity of 10 years. If the current market price is ` 1,015. Find YTM?
11. A Bond of ` 1,000 face value carrying an interest rate of ` 15 per cent is redeemable after 6 years at a premium of 5 % if the required rate of return is 15 % what is the present value of the bond?
12. A bond of ` 1,000 has a coupon rate of 6 per cent per annum and maturity period of 3 years . The bond is currently selling at ` 900. what is the yield to maturity in the investment of this bond?
13. A bond of ` 1,000 has a coupon rate of 8 p.a. & maturity period of 3yrs. The bond is currently selling at ` 910. What is the yield to maturity in the investment of this bond?
14. A bond of ` 1,000 face value carrying an interest rate of ` 14 per cent is redeemable after 6yrs. at a premium of 5% if the required rate of return is 15% what is the present value of bond?
15. A Bond of ` 1,000 has a coupon Rate of 6 p.a. & maturity period of 3 yr. The bond is currently selling at ` 900. What is the yield to maturity in the investment of this bond?
16. Following is the Capital Structure of XCEL Ltd.:

	Amount `	**Proportion %**	**Cost %**
Equity shares	18,00,000	30	12
Retained earnings	15,00,000	25	11
Pref. Shares	12,00,000	20	10
Debt	15,00,000	25	5

Calculate Weighted Avg. Cost of Capital

17. S Ltd. Has the following capital structure:

(`in Lacs)

Equity	2,00,000 Shares	40.00	20/Share
6% Preference	1,00,000 Share	10.00	10
8% Debentures	3,00,000 Shares	30.00	10

It proposes to borrow loan of ` 20.00 lacs with interest at 10% p.a. The dividend on equity will increase from ` 2 to ` 3 per share. You are required to ascertain the change in then W.A.C.C. Consequent to proposed borrowings.

18. A company has on its books the following amounts and specific costs of each type of capital:

Type of Capital	**Book Value `**	**Market Value `**	**Specific Cost** %
Debt.	4,00,000	3,80,000	5
Preference	1,00,000	1,10,000	8
Equity	6,00,000	12,00,000	13
Retained earnings	2,00,000		9
	13,00,000	**16,90,000**	

Determine the W.A.C.C using:

(a) B.V. weights

(b) Market value weights

19. Three companies a, b and c are in same type of business and hence have similar operating risks. However, the capital structure of each of them is diff. and the following are the details:

	A	**B**	**C**
Equity share capital ` (face value ` 10 per sh.)	4,00,000	2,50,000	5,00,000
Market value per share	15	20	12
Dividend per share `	-2.70	4	2.88
Debentures ` (face value per debenture is ` 100)	Nil	1,00,000	2,50,000
Market value per Debenture `	-	125	80
Interest rate	-	10%	8%

Assume that the current levels of dividends are generally expected to continue indefinitely and the income-tax rate at 50%.

You are reqd. To compute W.A.C.C. at market value of each company.

20. The folll info has been extracted from the balance sheet of fashions Ltd.

As on 31st March, 2003

	(`in lakhs)
12% debentures	400
Eq. Shares	400
Term loan (interest 18%)	1,200
	2,000

(a) Determine the W.A.C.C. of the company. It had been paying dividends at a consistent rate of 20% p.s.

(b) What difference will it make if the current price of equity share of the ` 100 share is ` 160?

Whenever income tax rate is not given assume 50%.

21. Computation of cost of equity capital, cost of debentures, cost of preference share and weighted avg. Cost of capital. You are required to determine the W.A.C.C. (Ko) of the K.C. Ltd. Using:

(a) B.V. weights: and

(b) Market value weights.

The foll information is available for you perusal.

The K.C. Ltd's present book value capital structure is:

	`
Debentures (` 100 per debenture)	8,00,000
Eq. Shares (` 10 per share)	10,00,000
Pref. Sh. (` 100 per share)	2,00,000
	20,00,000

All these securities are trade in the capital markets. Recent prices are debentures @ ` 110, pref. shares @ ` 120 and eq. Shares @ ` 22. Anticipated external financing opportunities are:

(a) ` 100 per debenture redeemable at par:

20-yr maturity, 8% interest rate, 4% flotation cost, sale price ` 100

(b) ` 100 pref. Sh redeemable at par:

15-yr maturity, 10% dividend rate, 5% flotation cost, sale price ` 100

(c) Eq. Shares ` 2 per sh. Flotation costs, sales price ` 22.

In addition, the dividend expected on the equity share at the end of the year ` 2 per share: the anticipated growth rate in dividends is 5% and the compant has the practice of paying all its earning in the form of dividends. The corporate tax is 50%.

22. From the foll capital structures of a ltd., co. You are reqd. To calculate over all cost of capital using:

(a) B.V. weights and

(b) Market value weights

Source	Book Value `	Market Value (`)
Eq. Sh. Capital (` 10 shares)	45,000	90,000
Retained earnings	15,000	-
Pref. Sh. Capital	10,000	10,000
Debentures	30,000	30,000

The after tax cost of diff. Source is as follows:

Eq. Sh. Capital	14%
Retained earnings	13%
Pref. Sh. Capital	10%
Debentures	5%

23. The capital structure of H Ltd. As on 31st Dec. 2002 is as follows:

Eq. Sh. Capital: 10 lakhs of shares of ` 10 each. = ` 1 crore

Reserves = ` 20 lakhs

14% debentures of ` 100 each = ` 30 lakhs

For the year ended 31st December, 2002, the company has paid equity dividend at 20%. As the company is a market leader with good future, dividend is likely to grow by 5% every year. The equity shares are now traded at ` 80 per share in the stock exchange. Income tax rate is applicable to the company is 40%. You are reqd. To calculate:

(a) The current W.A.C.C

24. Calculate the weighted avg. Cost of capital from the foll data of blazing arrow co. Ltd. Ignore taxation.

	`
7% debentures	1,30,000
8% pref. shares	70,000
Eq. Shares (of Rs.100 fv)	6,00,000
	8,00,000

(There are no retained profits or securities premium)

A dividend of 10% a yr. Has been paid on the eq. Shares in recent yea ` All of the company's securities are quoted on the local stock exchange. The prices of these securities have recently been at par (i.e. market or issue price same).

25. The Aaroha company has the following capital structure:

	`
Common shares (4,00,000 Sh.)	80,00,000
6% pref. Sh.	20,00,000
8% deb.	60,00,000
	1,60,00,000

The share of the Co. Sells of ` 20. It is expected that the company will pay next year a dividend of ` 2 per. Sh. Which will grow at 7% forever. Assume a 35% tax rate.

(a) Compute a weighted avg. cost of capital based on existing capital structure.

(b) Compute the new weighted avg. Cost of capital if the co. Raises an additional ` 40,00,000 debt by issuing 10% deb. This would result in increasing the expected dividend to ` 3 and leave growt rate unchanged, but the price of share will fall at ` 15 per sh.

26. Present Glory Co. Ltd. Is considering raising funds of about ` 400 lakhs by one of two alternative methods, viz, 16% institutional term loan and 13% non-convertible debentures, the term option would attract no major incidental cost. The debentures would have to be issued at a disc. Of 2.5% and would involve cost of issue of ` 2 lacs. Advise the co. As to better option based on the effective cost of capital in each case. Assume tax rate of 50%.

27. The following is the capital structure of sweeping success Co. Ltd.

	`	**Proportion**
Eq. Sh. Capital	4,50,000	45%
Retained earning	1,00,000	10%
Pref. Sh. Capital	1,00,000	10%
Term loan	3,50,000	35%
	10,00,000	**100%**

The firms after tax component costs of the various sources of finance are as follows:

Source	**Cost**
Eq. Capital	15%
Retained earnings	13%
Preference capital	11%
Term loan	75%

You are reqd. to calculate weighted avg. Cost of capital of the firm.

28. G.g. ltd. Has the following capital structures as on 31st march 2002.

	`
Ordinary shares	80,00,000
10% pref. Shares	20,00,000
14% debentures	60,00,000

The shares of the company are presently selling at ` 20 per sh. It is expected that the co. Will pay next yr. Dividend of ` 2 per sh. Which will grow @ 7% forever. Assume tax rate of 40%. You are reqd. To:

(a) Compute the weighted avg. cost of capital based on existing capital structure.

(b) If the company raises an additional ` 40 lakhs debt by issuing 15% debentures, the expected dividend at year end will be ` 3, the market price per share will fall to ` 15 per share, the growth rate remaining unchanged. Calculate the new weighted avg. Cost of capital.

29. Calculate the marginal cost of capital from the foll:

	` lakhs
Equity capital	400
Internal generation	200
12% pref. Shares	100
13% debentures	800
12% cash cr. From banks	700
Current liabilities	300
	2,500

The required after tax rate of return on equity is 18% and on internal cash generation is 15%. The tax rate is 40%.

30. EXE Ltd. has the following capital structure as an 31st march, 2000.

	`
10% debentures	3,00,000
9% pref. Shares	2,00,000
Eq. Shares of ` 100 each	5,00,000
Total	**10,00,000**

The eq. Shares of the Co. arev quoted at ` 102 and the co. Is expected to declare a dividend of ` 9 per share. For the year.

Required:

(a) Assuming the tax rate applicable to the co. To be 50%, calculate the cost of capital. State clearly the assumptions you make.

(b) Assuming that the company can raise additional term loan at 12% for ` 5,00,000 to finance an expansion, calculate the revised weighted cost of capital. The company's assessment is that it will be in a position to increase the dividend from ` 9 per sh. To ` 10 per sh., but the business risk associated with new financing may bring down the market price from ` 102 to ` 96 per sh.

31. From the following capital structure of perfect ltd. Calculate overall cost of capital, using: (a) book value weights and (b) market value weights.

	Book Value	**Market Value**
Equity capital	4,50,000	9,00,000
Retained earnings	1,50,000	-
Pref. Share capital	1,00,000	1,00,000
Debentures	3,00,000	3,00,000

The after tax cost of different sources of finance are equity share capital 14%, retained earnings 13%, pref. shares 10% and debentures 5%.

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