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Managerial Economics

Chapter 4: Cost of Capital

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30 Cost of Capital

A crucial aspect of capital budgeting is the cost of capital. (Cost of capital may be defined as the rate that must be paid to obtain funds for the operation of the firm.) It provides a yardstick to determine the minimum rate of return that should be obtained from any project to determine its worthwhileness. In other words, it provides a cut-off point to decide whether to reject or to accept a project. Hence it is necessary to determine the cost of capital obtained by a firm.

A firm's supply of capital may come from several sources, each source having a different cost. Therefore, it is essential to calculate a weighted average cost of capital for the company's entire capital structure. As the cost of capital of a particular company depends upon its capital structure, it is possible to minimize the cost of capital by a change in the company's capital structure, of course, subject to certain Government regulations. Thus determination of the cost of each source of capital is necessary to plan the optimum capital structure of the firm.

We shall first calculate separately the cost of each type of capital, *viz.*, debt capital, preference share capital, equity capital and retained earnings. Thereafter, a composite cost of capital will be calculated on the basis of weighted average. At present, the rate of interest allowed on debentures is up to 15 per cent, the dividend paid on preference shares ranges between 11 per cent and 13.5 per cent, and the equity dividend has a very wide range between 9 per cent and 25 per cent or so. For our calculations, we will take the rate of interest on debentures to be 15 per cent, the preference dividend to be 13.5 per cent and equity dividend to be 15 per cent. Corporate taxation at present is 35 per cent.

COST OF DEBT CAPITAL

It is very easy to calculate the cost of debt capital. The interest paid on any debt is precisely known. But this interest has to be related to the net proceeds of the loan, i.e., the net amount received after deducting the costs of issue like the expenses involved in the issue of prospectus, brokerage paid to brokers and bankers, etc. Suppose a company issues 15 per cent debentures of Rs. 1,000 each, repayable after 15 years. The costs of issue average 7.5 per cent,¹ and the net proceeds per debenture are Rs. 925. The interest per debenture per year comes to Rs. 150.

Since the proceeds of a debenture are Rs. 925 but on maturity a sum of Rs. 1,000 is to be paid, we may assume that the difference of Rs. 75 per debenture is set aside uniformly over the 15-year period at the rate of Rs. 5 per year per debenture. Thus, the total annual cost of the debenture would be Rs. $150 + 5 = 155$.

Only the actual interest is paid each year; the company holds Rs. 5 set aside by it each year over the 15-year period. Thus the company has the use of not Rs. 925 but of Rs. 962.50 which is the average of Rs. 925 originally received and Rs. 1,000, the final accumulated value of the debenture at maturity.

(The process of accumulation will be as follows: 930, 935, 940, 945 till 1,000 is reached at the time of maturity.)

¹ According to a study conducted by the Institute of Company Secretaries of India, the cost of public issue ranges between 5 and 18 per cent depending upon the quantum of issue and the public response.

To reduce the high cost of public issues, in a communication to the stock exchanges dated May 7, 1985, the Government of India has fixed the maximum limit for the various components of the cost of issue. Even under these guidelines, the cost of issue is not likely to be less than 7 to 8 per cent.

According to an article in the *Hindu* dated August 19, 1993, the cost of capital may exceed 10 per cent. The more difficult an issue is to sell, the higher is the cost of issue.

A study reported in the *Economic Times* (September 1, 1999), pointed out that the average cost of share issue between 1950-73 was between 15 to 20 per cent.

The cost of debt capital is, therefore,

$$\frac{155}{962.50} \times 100 = 16.1\%$$

The formula for calculating the cost of debt capital is as follows:

$$C_d = \frac{i + \frac{MV - NP}{n}}{\frac{MV + NP}{2}} \times 100$$

where

- i = Annual interest payment,
- MV = Value payable on maturity,
- NP = Net proceeds, and
- n = Number of years after which the debenture is to be paid.

Applying the above formula to our example,

$$C_d = \frac{150 + \frac{1000 - 925}{15}}{\frac{1000 + 925}{2}} \times 100 = 16.1\%$$

This is the 'before-tax' cost of debt capital. If we have to calculate the 'after tax' cost of debt capital, the formula will be as under:

$$\text{After-tax cost} = \text{Before-tax cost} (1 - \text{Tax rate})$$

$$= 16.1(1 - 0.35) = 16.1(0.65) = 10.47$$

We have assumed that the debenture is both issued and repayable at par. But even if the debenture issue is made at a discount or premium or is repayable at premium, the above formula can be applied equally effectively. Then MV = the amount to be paid at maturity including the premium, and NP = the net proceeds + any premium on issue - any discount on issue.

COST OF PREFERENCE SHARE CAPITAL

There is an important point of difference between the interest on debentures and the dividend on preference share capital. While the interest on debentures is allowed as a deduction for purposes of determining the taxable income, no such deduction is allowed in the case of preference share dividend. Thus, while the specified interest on the debt capital is the before-tax cost of debt capital, the specified dividend in the case of preference shares is the after-tax cost of preference share capital. Hence it is considered necessary to calculate the before-tax cost of preference share capital.

Preference shares can be of two types—redeemable preference shares and irredeemable preference shares.

However, the rate of dividend is specified in both the cases. And this rate has to be related to the net proceeds of the preference issue. For example, if the preference share is of Rs. 100, the dividend rate is 13.5 per cent, and the costs of issue are 7.5 per cent, the net proceeds are Rs. 92.50 and the dividend rate has to be related to this figure.

Under the new scheme of taxation, while dividends would be exempt from tax in the hand of individual shareholders, the company will have to pay 10 per cent of the dividends paid to the Government. Thus to pay 13.5 per cent as preference dividend, the company will have to fork out 13.5 + 10 per cent thereof or 14.85 per cent.

If the preference share is redeemable, say, within 15 years, the cost of capital can be calculated in the same way as in the case of debt capital except that the rate so

calculated would be the after-tax cost and not the before-tax cost as in the case of debt capital. The formula is:

$$\text{Cost of Preference Capital } (C_p) = \frac{PD + \frac{MV - NP}{n}}{\frac{MV + NP}{2}} \times 100$$

where PD = Amount of annual preference dividend

MV = Amount to be paid on maturity

NP = Net proceeds, and

n = Number of years after which the preference shares are to be repaid.

Applying the above formula,

$$C_d = \frac{14.85 + \frac{100 - 92.5}{15}}{\frac{100 + 92.5}{2}} \times 100 = \frac{15.35}{96.25} \times 100 = 15.95\%$$

The above cost (15.95%) is the after-tax cost. To calculate the before-tax cost, the formula is:

$$\text{Before-tax cost} = \text{After-tax cost} \left(\frac{1}{1 - \text{Tax rate}} \right)$$

Assuming the tax rate to be 35 per cent, the before-tax cost, in our example, would be:

$$15.95 \left(\frac{1}{1 - 0.35} \right) = 15.95 \left(\frac{1}{0.65} \right) = 24.54\%$$

If the preference issue is irredeemable, the excess of the maturity value over the net proceeds is ignored for the purpose of calculating the cost of capital. No doubt, the amount may have to be paid eventually but the possibility is so uncertain at the time of issue that it can be ruled out of consideration at that time.

The cost of preference capital would, therefore, be found out simply by relating the preference dividend to the net proceeds. The formula is:

$$\text{After-tax } C_p = \frac{PD}{NP} \times 100$$

where PD stands for preference dividend amount, and

NP stands for net proceeds.

Applying this formula to our example, we get

$$\frac{14.85}{92.50} \times 100 = 16.05\%$$

We can convert this rate into before-tax rate by applying the formula stated above as:

$$16.05 \times \frac{1}{1 - 0.35} = 24.69\%$$

Thus cost of preference capital is the dividend rate divided by the net proceeds converted into a before-tax basis.

Now preference shares are emerging as a popular instrument in the capital market due to (1) removal of double taxation on dividends, (2) the removal of cap on bank investment in preference shares and debentures, (3) a dull primary market and (4) the easier and inexpensive route of private placement.

COST OF EQUITY CAPITAL

The management has always to look to the interest of the existing equity shareholder, i.e., at least their present position should not be adversely affected.

This would be so only if the funds obtained by the issue of new equity shares, when invested, earn at least so much that the new earnings per share (EPS) of the company do not fall below the existing EPS.

In other words, the cost of equity capital is an imputed cost which is measured by current earning per share relative to the current market price per share. This is the Earning/Price ratio (E/P ratio)¹.

Suppose a Khatau share (paid-up value Rs. 100) is being quoted in the market at Rs. 237.50 and the earnings per share are Rs. 23.16. The earnings price ratio, therefore, is 1 to 10.25. If a new issue of Khatau shares is contemplated, the fresh funds must earn so much that the new EPS is at least Rs. 23.16.

Now, if a new issue is contemplated, the issue will have to be priced at something less than Rs. 237.50, the present market price of the share, to facilitate the sale of new shares. Let us say, it is priced at Rs. 200. Now, the net proceeds of this issue will be something less than Rs. 200 or if the costs of issue are 7.5 per cent, the net proceeds would be Rs. 185. This Rs. 185 should earn at least Rs. 23.16 which comes to 12.52 per cent. The imputed cost of equity capital, therefore, would be 12.52 per cent in our example. The formula can be stated as follows:

$$C_e = \frac{EPS}{NP} \times 100$$

where EPS = the minimum earning that a new share must earn, and
 NP = net proceeds per share.

Applying the formula to our example:

$$C_e = \frac{23.16}{185} \times 100 \text{ or } 12.52 \text{ per cent.}$$

But this is the after-tax cost. To convert it into before-tax cost, we have to multiply it by $\frac{1}{(1 - \text{tax rate})}$

$$\text{i.e., } 11.13 \left(\frac{1}{1 - 0.35} \right) \text{ or } 19.26 \text{ per cent.}^2$$

The company would have to pay 10 per cent of the equity dividend paid to the Government. But as we are not taking dividend paid into consideration, we have ignored this point in our calculations.

COST OF RETAINED EARNINGS

Retained earnings should not be considered as cost-free funds. It is quite possible that shareholders might earn more by investing the funds they are deprived of if the company decides to retain earnings rather than pay them as dividends. Viewed in this light, the cost of retained earnings is an opportunity cost to be measured in terms of the income forgone by the shareholders that they could have earned by investing the funds they would have received as dividends had earnings not been retained.

However, as retained earnings are internally generated funds, there are no costs of issue involved. Hence the desired rate of return can be related to the market price of the share.

Expressed as a formula, the cost of retained earnings would be:

$$C_{re} = \frac{EPS}{MP} \times 100$$

- ¹ There is a viewpoint that in the Indian context, for the cost of equity capital and retained earnings, we should take into consideration not the EPS but the equity dividend per share. If equity dividend is to be taken as the base, we can substitute 'equity dividend per share' for 'earnings per share' in the formula stated above.
- ² While calculating the cost of equity capital and of retained earnings, we have not gone into the niceties and controversies raised on these points as these belong more to the domain of financial management than managerial economics.

Retained earnings is the amount of net income left over for the business after it has paid out dividends to its shareholders, but it can also be reinvested back into the company for growth purposes. The money not paid to its shareholders is counted as retained earnings.

where C_{re} = Cost of retained earnings
 EPS = Earnings per share
 MP = Market price per share.

Applying this formula to our example, the cost of retained earnings comes to:

$$\frac{23.16}{237.50} \times 100 = 9.75 \text{ per cent.}$$

This will, however, be the after-tax cost. To convert it to before-tax cost, we have to apply the usual formula, i.e.,

$$\text{Before-tax cost} = \text{After-tax cost} \left(\frac{1}{1 - \text{tax rate}} \right)$$

$$\text{Before-tax cost} = 9.75 \left(\frac{1}{1 - \text{tax rate}} \right) = 15.00 \text{ per cent.}$$

Two points need mention in connection with retained earnings. Firstly, there are no costs of issue in case of retained earnings unlike issue of equity shares or of preference shares or of debentures. Again, the imputed cost of financing by retained earnings is always less than the imputed cost of new equity shares. But the extent to which we can depend upon this source is limited by the availability of earnings and the willingness of the shareholders to forgo their dividends.

AVERAGE COST OF CAPITAL

Average cost of capital means the overall or composite cost of capital arrived at by calculating the weighted average cost of each specific type of capital. The proportion of each specific type of capital in the overall capital structure of the firm constitutes the necessary weights for this purpose.¹ The formula for calculating the average cost of capital is as follows:

$$\text{Average Cost} = a_1 C_e + a_2 C_p + a_3 C_d + a_4 C_{re}$$

where a_1, a_2, a_3 and a_4 are the proportions of the four types of capital in the total.

As stated earlier, for calculating the cost of capital of a company, we have to make a certain assumption about the capital structure of the company. Let us assume that the proposed capital structure of our company after new financing would be as follows:

Equity	25 per cent
Debt	50 per cent
Preference Capital	10 per cent
Retained Earnings	15 per cent

So far, we have calculated the cost of different types of capital as follows:

	After-tax per cent	Before-tax per cent
Debt Capital	10.47	16.10
Preference Capital	15.95	24.54
Equity Capital	12.52	19.26
Retained Earnings	9.75	15.00

With these figures, it is possible to calculate the average cost of capital for the company.

¹ A view is often expressed that the average cost of capital should be calculated on the basis of market value weights for two reasons: (i) market values of securities closely approximate the actual amount to be received from their sales, and (ii) costs of specific sources of finance are calculated on the basis of prevailing market prices. But in practice, calculating the market value of securities presents difficulties. Again, weights based on market value are likely to fluctuate widely.

Table 1: Average Cost of Capital

Type of Capital (1)	Proportion in the new capital structure (2)	Before-tax cost of capital (3)	2 × 3 (WX) (4)
Equity Capital	25	19.26	481.50
Preference Capital	10	24.54	245.40
Debt Capital	50	16.10	805.00
Retained Earnings	15	12.00	225.80
	SW = 100		SWX = 1,756.90

Before-tax Cost of Capital

$$= \frac{\Sigma WX}{\Sigma W} = \frac{1756.90}{100} = 17.57 \text{ per cent.}$$

After-tax Cost of Capital

$$= \text{Before-tax Cost} (1 - \text{tax rate}) = 17.57 (1 - 0.35) = 17.57 \times 0.65 = 11.52\%$$

This average cost of capital provides us a measure of the minimum rate of return which the proposed investment must earn to become acceptable. Moreover, the Weighted Average Cost of Capital (WACC) concept is of great practical relevance because it helps in enhancing competitiveness by bringing down WACC through accessing external commercial borrowings, lowest possible tax out-go and profitable growth through internal accruals and sustainable borrowings. It is also important that cost of capital has to be globally competitive in case of world players.¹

COST OF CAPITAL—THE OPPORTUNITY COST CONCEPT

We have so far been using the term cost of capital in the sense of a borrowing rate. The borrowing rate is that rate which a given firm will have to pay for obtaining capital in the market, be it from shareholders or other lenders. Even if the firm is using retained profits or ploughing back, this is simply another way of obtaining funds from the shareholders.

An alternative concept of cost of capital is the opportunity cost concept. Accordingly, the cost of capital may be defined as the rate of return on the best alternative investment opportunity available to the firm. To take an example, if a firm finds that it can earn 15 per cent on its surplus funds by investing them outside the firm, then any investment project under consideration must offer a rate of return of at least 15 per cent. This will be true even if the firm has borrowed funds at a lower rate, 6 per cent. This 15 per cent, which can be earned by investing the funds elsewhere, is the opportunity cost of investing in this particular project. It is the sacrificed alternative return. The cost of capital in this sense is commonly known as 'lending rate' because this rate would be earned by the firm if it were to lend its excess funds outside.

Borrowing Rate vs. Lending Rate

We have already explained the two senses in which the phrase 'cost of capital' is used in the literature on capital budgeting, viz., the borrowing rate and the lending rate.² The borrowing rate is relevant where the firm wants to know what rate it should

¹ For a detailed discussion of the subject, see Van Horne, *Op. cit.*, pp. 392-95. The figure can also be found out by the following formula:-

$$\frac{X(1 - TR)}{\text{no. of shares without debt financing}} = \frac{(X - \text{Debt interest})(1 - TR)}{\text{no. of shares with debt financing}}$$

where X is the EBIT level which gives equal EPS.

In our example,

$$\frac{X - .65}{3000} = \frac{(X - 30,000) \times .65}{1000}$$
$$650X = 1950X - 5,85,00,000$$
$$X = 45,000$$

or

² The distinction was first made by F. and V. Lutz, *The Theory of Investment of the Firm* (Princeton, N.J., Princeton University Press, 1951).

offer to obtain capital. Besides, a firm may have to decide whether to invest its funds in a given project and here both the borrowing rate and the lending rate may have to be considered for deciding which rate to choose for discounting purposes.

Frequently, the borrowing rate differs from the lending rate; it may be more or less than the latter. Where the borrowing rate is above the lending rate the former becomes the relevant rate of discount; if the lending rate is higher, it is this rate which becomes the rate for discounting purposes.

The borrowing rate may be higher in a situation where the company is having idle funds with little investment opportunities outside. The lending rate will possibly be higher than the borrowing rate where the company concerned can get funds at considerably lower rates in view of its highly sound financial position or great influence with institutional investors. The lending rate will also be usually higher where a company provides finance to its subsidiaries. An outstanding example in the Indian context is that of Scindia Steam Navigation Company which could borrow huge funds from the Shipping Development Fund Committee (SDFC) to be used for financing subsidiaries yielding much higher rates of interest than what the company had to pay to SDFC.¹

To conclude, the term 'cost of capital' is used in two senses: the borrowing rate and the lending rate. Of these, whichever rate is higher, is to be used for discounting purposes while making investment decisions.

GOVERNMENT REGULATIONS AFFECTING CHOICE OF CAPITAL STRUCTURE

There are, however, a number of regulations which curtail the freedom of a company to choose its capital structure, even when it is in a position to raise all the capital it needs. The financial institutions have evolved a norm between debt and equity where debt denotes long-term borrowings with maturity of over three years. The ratio for large projects is 2 : 1 although relaxations in the norm are made depending upon the emergencies of the situation. For small-scale units, the ratio is 3 : 1 and for shipping companies, it is as high as 6 : 1.² The financial institutions and stock exchanges also impose certain conditions while extending loans or permitting issue of shares and debentures. Very often, financial institutions reserve the right to convert a part of the loan into shares. In terms of the directions received from the Government, all-India financial institutions attach an option to convert into equity a part of their loan to the companies, if the aggregate assistance (both existing and proposed) exceeds Rs.100 lakhs. However, for new loans, the convertibility clause has been abolished. Thus Indian companies can practise only what might be termed as controlled financial leverage.

LEARNING OBJECTIVES :

Once you have gone through this chapter, you should be able to :

- **identify** the various sources of financing investments
- **state** the various elements that go into the measurement of cost of each source of finance
- **understand** the method of measuring the cost of capital
- **describe** the process of planning capital structure of a firm.

(“The cost of capital is defined to be that rate of return that a project must earn in order to leave the market value of the firm unchanged.”) Thus, the cost of capital measures the real and opportunity cost to the firm of financing investment opportunities and is critical for sound management decision. It is this discount rate which should be used while calculating net present value of a project.

While discussing the various methods of evaluating investment proposals, we assumed a certain cost of capital. We did not discuss how cost of capital is calculated. The cost of capital is the required rate of return (also known as the *hurdle rate*, or the *cutoff rate*) on debt and equity of the firm that justifies the use of the funds. A brief description of the methods of calculating cost of capital is in place.

To invest in capital projects, funds are needed. These funds can come from many sources—each source having different cost. It is the weighted average of the cost of finance of these sources which give us an average cost of capital.

22.1. THE SOURCES OF FUNDS FOR LONG-TERM FINANCING

The sources of funds for capital investment can be divided into two broad categories :

- (1) External sources of finance; and
- (2) Internal sources of finance.

The potential sources of external finance include debt in terms of short, intermediate and long-term bonds, preferred stock and equity (which include common stock, retained earnings and capital surplus).

The internal source of investible funds is mainly the income of the firm net of tax and depreciation. There has, however, been a major debate whether depreciation should or should not be included in the list of internal source of funds. If the working capital is defined as funds, then a negative change in fixed capital amount (*i.e.*, depreciation) can be treated as internal source; otherwise not. Thus, its inclusion depends on how one would like to define the word *funds*.

Though a firm depends on short, intermediate as well as long-term sources of finance, for the computation

of cost of capital we should exclude the short and intermediate term sources. The reason for this exclusion is primarily because capital investment is generally long term in nature.

Thus, the specific sources of funds for capital investment to be included in the computation of cost of capital are :

- (a) Long term debt;
- (b) Preferred stock;
- (c) Common stock; and
- (d) Retained earnings.

22.2. COST OF DEBT

The cost of borrowings, in the simplest way, can be stated as the net or after-tax rate of interest paid on the amount borrowed. Because interest, unlike dividends on stock, is deductible from income when computing income taxes, it is the after-tax cost that need to be considered.¹ The cost of debt (C_d) is, therefore, found as :

$$\text{Interest rate} \times (1 - \text{Tax rate})$$

For example, if the firm borrows at 20 per cent interest rate and faces a 30 per cent tax rate, its after-tax cost of debt would be,

$$C_d = 0.20 (1 - 0.30) = 0.14, \text{ i.e., } 14 \text{ per cent.}$$

Two important considerations need mention here :

- (1) If the firm is not earning profits, its pre-tax and post-tax interest rates would be same, as the marginal tax would be zero.
- (2) The firm is not concerned with average cost of capital but with marginal cost of capital. That is, the rate being paid on past debt is not relevant, rather what is relevant is the interest cost which the firm would have to pay if it borrows today.

The above calculations were done under the condition that the debenture is both issued and repayable at par. The basic logic of the method remains the same even when these conditions are not there. In case of any premium of discount, one only needs to make the required adjustments in the value of V and P before proceeding to calculate the cost.

22.3. COST OF PREFERRED STOCK (OR PREFERENCE SHARE CAPITAL)

A security sold in a market place promising a fixed rupee return per period is known as a *preference share* or *preferred stock*. Dividends on preferred stock are cumulative in the sense that if the firm is unable to pay when promised by it, then these keep on getting accumulated until paid, and these must be paid before dividends are paid to ordinary shareholders. The rate of dividend is specified in case of preference shares. Preference shares are of two kinds : the redeemable and irredeemable preference shares. In case of redeemable preference shares the period of repayment is specified, while for irredeemable ones this is not done.

The important difference in the true cost of debentures and preference shares must be noted. Interest on

1. This ignores the fact that the firm must have incurred some expenses during the process of acquiring the debt like the cost of issuing prospectus, brokerage, advertisement, etc. The amount that a company actually receives is less than what has been paid by the lenders. Suppose a company issues a debenture of value (V) of Rs. 1,000 whose net proceeds (P) to the company is Rs. 950, then the cost of issue of debenture would be $(V - P) = \text{Rs. } 50$. If the life of the debenture is 10 years, the annual cost of the issue $(V - P)/n$ would be Rs. 5 per debenture. In other words, the company uses Rs. 950, 955, ..., 1,000 as the amount from year 1 to 10, or an average net proceed of Rs. $(1000 + 950)/2 = \text{Rs. } 975$ for 10 years.

Now, at 10 per cent interest rate the interest cost of debentures (r) of Rs. 1,000 would be Rs. 100. Thus, the annual cost of debenture would be $(r + (V - P)/n) = \text{Rs. } 100 + 5 = \text{Rs. } 105$. Since firm pays Rs. 105 per debenture whose average

net proceed is Rs. 975, the pre-tax cost of debenture would be $[r + (V - P)/n] \div [(V + P)/2] \times 100 = \frac{105}{975} \times 100$.

debentures is considered as an expense by tax authorities and is, therefore, deducted from company's income for tax purposes. That is why the true cost of debentures is the *after tax cost*. On the other hand, the dividends are paid to preference shareholders after the company has paid tax on its income (including that portion of income which is to be paid to preference shareholders). Therefore, the true cost of preference capital is the *before tax cost*² which may be found as :

$$C_p \text{ (before-tax)} = \text{Rate of Dividend} \left(\frac{1}{1 - \text{corporate tax rate}} \right) \times 100$$

For example, if dividend rate is 10% and a corporate tax 65%, the cost of preference capital is:

$$C_p = 0.10 \left(\frac{1}{1 - 0.65} \right) \times 100 = 28.6\%$$

22.4. COST OF EQUITY CAPITAL, OR, COMMON STOCK

Cost of this source of capital is very difficult to measure. Many methods have been suggested, but no method is clearly the best. Here, three popular approaches for estimating cost of equity capital are presented. Like preference capital, cost of equity capital is also calculated before-cost, as tax does not affect this cost.

Method I. The Risk-Free Rate Plus Risk Premium. Since the equity holders are paid only after the debt servicing is done, it is generally found that investment in equity is riskier than investment in bonds. Therefore, an investor will demand a return on equity (r_e) which will consist of: (i) a risk free return usually associated with return on government bonds, plus (ii) a premium for additional risk. There are two sources of risk which affect the risk premium :

- (1) the additional risk undertaken by investing in private securities rather than government securities.
- (2) The risk of buying equity stock rather than bond of a private firm.

The first type of risk is calculated by taking a difference between the interest on firm's bonds and on government bonds. For the second type of risk, a rule of thumb is used. Based on their judgement, the financial analysts have come to believe that the return on firm's equity is about 3 to 5 per cent more than that on the debt. We may take its mid-point (*i.e.*, 4 per cent) as an estimate of premium for second type of risk. Now, suppose risk free rate is 10 per cent and firm's bond yield 15 per cent, the total risk premium (p) can be calculated as :

$$p = (0.15 - 0.10) + 0.04 = 0.09$$

The firm's cost of equity capital (C_e) (which is the sum of risk-free return plus premium for additional risk) would, therefore, be

$$C_e = 0.10 + 0.09 = 0.19, \text{ or } 19 \text{ per cent.}$$

Method II. Dividend Valuation Method. This is also known as Dividend Growth Model. The underlying logic of this method is the same as the internal rate of return method of evaluating investments. According to this method, the cost of equity capital is that discount rate which equates the current market price of the equity (P) with the sum of present value of expected dividends. That is,

2. Nature of problem in case of cost of preference shares is similar to that of cost of debentures. Cost of redeemable preference share (after tax) can be found as : $C_p \text{ (after tax)} = \left[\left(D + \frac{V - P}{n} \right) + \left(\frac{V + P}{2} \right) \right] \times 100$, where D is dividend rate, V the amount payable at maturity, P the net proceeds and n the number of years for which the dividend is issued.

In case of irredeemable preference shares the period of repayment is not specified. It is, therefore not possible to know the difference between maturity value (V) and net proceeds (P) in such a case. We, therefore, ignore the difference between V and P . The cost of irredeemable preference shares is found as :

$$C_p \text{ (after tax)} = \frac{D}{P} \times 100.$$

$$P = \frac{D_1}{(1+C_e)} + \frac{D_2}{(1+C_e)^2} + \dots + \frac{D_n}{(1+C_e)^n} + \dots$$

where D_1, D_2, \dots are the dividends expected during each time period (1, 2, ...) and C_e is the cost of equity or the discount rate.

The basic problem here is that all the shareholders would have different expectations. This method of calculating the cost of equity would, therefore, need an assumption that all investors have exactly similar dividend expectations. Another problem relates to the determination of future stream of expected dividends. In order to overcome this problem, it has been suggested that we should assume a *constant growth rate* in dividend. Let D_0 be the current dividend, D_n be the dividend in year n , and g be the constant growth rate of dividend. Then,

$$D_n = D_0(1+g)^n$$

Therefore,

$$P = \frac{D_0(1+g)}{(1+C_e)} + \frac{D_0(1+g)^2}{(1+C_e)^2} + \dots + \frac{D_0(1+g)^n}{(1+C_e)^n} + \dots$$

This being a geometric series we can write it as

$$P = \frac{D_0(1+g)}{(1+C_e)} \cdot \frac{1}{1 - \frac{(1+g)}{(1+C_e)}} = D_0 \frac{(1+g)}{(C_e - g)}$$

\therefore

$$C_e = \frac{D_0(1+g)}{P} + g = \frac{D_1}{P} + g.$$

Though this method is scientific, one is not sure how to determine the growth rate of dividend (g).

Method III : Capital Asset Pricing Model (CAPM). This approach is based on the principle that risk and return³ of an investment are positively correlated—more risky the investment, higher are the desired returns. This model emphasizes not only the risk differential between equity (or common stock) and government bond but also risk differential among various common stocks.

The β coefficient is used as a risk-index. It measures relative risk among stocks. The beta coefficient may be defined as "the ratio of variability in return on a given stock to variability in return for all stocks." The β is calculated by regression analysis, using regression equation $k_i^a = a + \beta k_i^m$, where k_i^a is the return on equity of firm a in the i th period and K_i^m is the return on all equity in the market in the i th period. The estimated value of β is known as the beta coefficient. A beta coefficient of value 1.0 means the stock's return is as volatile or risky as the market's. $\beta > 1$ and $\beta < 1$ means the stock's return are more volatile and less volatile respectively compared to the return on total stock market portfolio.

In this model the cost of equity capital (r_e) is:

$$r_e = R_f + \beta (r_m - R_f)$$

where, R_f refers to risk free rate and r_m to return on market portfolio. Here cost of equity capital is composed of two components : (1) the risk-free rate (R_f), and (2) the weighted risk component where $(r_m - R_f)$ refers to the overall risk premium, while the risk associated with the firm in question (β) is used as weights.

Illustration 1. Suppose in a market the average return on common stock is 10 per cent, while the return on government bonds is 6 per cent. Find out the cost of capital, using CAPM, if : (i) $\beta = 1$, (ii) $\beta = 0.5$.

Solution. Here $r_m = 10$, and $R_f = 6$.

(i) When $\beta = 1$, $r_e = 0.06 + 1.0 (0.10 - 0.06) = 0.10$ (or, 10%)

3. Return is calculated as : dividend \pm change in stock value.

(ii) When $\beta = 0.5$, $r_e = 0.06 + 0.5(0.10 - 0.06) = 0.08$ (or, 8%)

This model suffers from two main shortcomings :

(1) It tries to predict the cost of equity (both present and future) with the help of past data. This is possible only when the past relationship between the return on the stock in question and the market return continues in future also. But this is very likely.

(2) The value of β is also not stable as it depends upon the quality of relevant data and its availability as well as the method used to estimate it.

22.5. COST OF RETAINED EARNINGS

The part of income which a firm is left with after paying interest on debt capital and dividend to its shareholders is called retained earnings. These also involve cost in the sense that by withholding the distribution of part of income to shareholders the firm is denying them the opportunity to invest these funds elsewhere and earn income. In this sense the cost of retained earnings is the opportunity cost.

It must be noted that retaining the earnings is equal to forcing the shareholders to increase their equity position in the firm by that amount. But retained earnings are cheaper when it is realised that shareholders would have to pay personal tax on the additional dividends, if distributed. Retained earnings avoid the payment of personal income tax on dividends and the brokerage fee connected with any reinvestment. However, the amount to be paid as personal income tax differs from shareholder to shareholder, depending upon the tax bracket to which he belongs. Thus, before-tax cost of retained earnings (C_{re}) and before-tax cost of equity capital (C_e) are equal; but once the impact of tax is also included then the cost of retained earnings is less than the cost of equity capital, the difference being the personal income tax. For example, assume that the company has Rs. 100 of retained earnings and that there is a uniform personal income tax rate of 30 per cent. This means that if to shareholders are distributed Rs. 100 of retained earnings, their income would in fact increase by Rs. 70 (= Rs. 100 - Rs. 30). In other words, the after-tax opportunity cost of retained earnings is Rs. 70. Or, the cost of retained earnings is about 70% of the cost of equity capital.

Though the cost of retained earnings is always lower than cost of equity capital, a company can depend upon this source of finance only to the extent of availability of funds and willingness of shareholders. The cost of retained earnings can be stated with the help of the following formula :

$$C_{re} = \frac{E(1 - T_p)}{MP} \times 100$$

where, C_{re} is the cost of retained earnings; E is the earnings per equity; T_p is the personal income tax; and MP is the market price of the share.

Illustration 2. Consider a firm whose equity of Rs. 100 has a market price of Rs. 280. It has declared a dividend of Rs. 20 on its shares and the shareholders pay personal income tax at the rate of 30%. What is the cost of retained earnings (C_{re})?

$$\text{Solution : } C_{re}(\text{after tax}) = \frac{20(1 - 0.3)}{280} \times 100 = \frac{20 \times 0.7}{280} \times 100 = 5\%$$

$$\text{And, } C_{re}(\text{before tax}) = C_{re} \text{ after tax} \left(\frac{1}{1 - (\text{tax rate})} \right) = 5 \left(\frac{1}{1 - 0.3} \right) = 7.14\%$$

22.6. THE WEIGHTED COST OF CAPITAL

Since there are more than one source of financing investment, it is, therefore, logical to consider the cost of different sources of funds together. Consequently, it is often recommended that the calculation of cost of capital should be based on a *weighted average of all sources of financing* that the firm currently uses. Further, the estimates should be based on current market costs of debt and equity rather than on historical costs or book values, because the decisions are to be made in the present on the basis of current information. Table

22.1 illustrates the weighting procedure used to calculate the cost of capital based on weighted average of all sources of financing.

Table 22.1 : Calculating Cost of Capital

Methods of financing	Current market value	Proportion of total	Current interest cost		Weighted cost (3) × (5)
			Before taxes	After taxes (50%)	
(1)	(2)	(3)	(4)	(5)	(6)
Long term debt	Rs. 60,000	30%	12%	6%	1.80%
Preferred stock	30,000	15	15	15	2.25
Common Stock	50,000	25	14	14	3.50
Retained earnings	60,000	30	18	18	5.40
Total	Rs. 2,00,000	100%			12.95%

Note from Table 22.1 that the cost of debt is an expense or deductible item for income tax purposes, whereas the cost of equity is not. The cost of capital (in the present case being 12.95 per cent) is the *minimum* that must be earned on the total assets of any proposed project.