

UNIT II

Subject Name	Subject Code	Semester	Prepared By
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CONCEPT OF COST OF CAPITAL

The term cost of capital refers to the minimum rate of return a firm must earn on its investments so that the market value of the company's equity shares does not fall. This is in consonance with the overall firm's objective of wealth maximisation. This is possible only when the firm earns a return on the projects financed by equity shareholders' funds at a rate which is at least equal to the rate of return expected by them. If a firm fails to earn return at the expected rate, the market value of the shares would fall and thus result in reduction of overall wealth of the shareholders. Thus, a firm's cost of capital may be defined as "the rate of return the firm requires from investment in order to increase the value of the firm in the market place."

There are three basic aspects of concept of cost:

It is not a Cost as Such A firm's cost of capital is really the rate of return that it requires on the projects available. It is merely a 'hurdle rate'. Of course, such rate may be calculated on the basis of actual cost of different components of capital.

It is the Minimum Rate of Return A firm's cost of capital represents the minimum rate of return that will result in at least maintaining (if not increasing) the value of its equity shares.

It Comprises **Three Components** A firm's cost of capital comprises three components: (a)

Return at zero risk level. This refers to the expected rate of return when a project involves no risk whether business or financial. (b) **Premium for business risk.** The term business risk refers to the variability in operating profit (EBIT) due to change in sales. In case a firm selects a project having more than the normal or average risk, the suppliers of funds for the project will expect a higher rate of return than the normal rate. The cost of capital will thus go up. The business risk is generally determined by the capital budgeting decision. (c) **Premium**

for financial risk. The term financial risk refers to the risk on account of pattern of capital structure (or debt-equity mix). In general, it may be said that a firm having a higher debt content in its capital structure is more risky as compared to a firm which has a comparatively low debt content. This is because in the former case the firm requires higher operating profit to cover periodic interest payment and repayment of principal at the time of maturity as compared to the latter. Thus, the chances of cash insolvency are greater in case of such firms.

The suppliers of funds would, therefore, expect a higher rate of return from such firms as compensation for higher risk.

The above three components of cost of capital may be put in the form of the following equation:

$K=r_0+b+f$ where: K = Cost of capital; r_0 = Return at zero risk level; b = Premium for business risk; f = Premium for financial risk.

IMPORTANCE OF COST OF CAPITAL

The determination of the firm's cost of capital is important from the point of view of both capital budgeting as well as capital structure planning decisions.

(i) Capital Budgeting Decisions In capital budgeting decisions, the cost of capital is often used as a discount rate on the basis of which the firm's future cash flows are discounted to find out their present values. Thus, the cost of capital is the very basis for financial appraisal of new capital expenditure proposals. The decision of the finance manager will be irrational and wrong in case the cost of capital is not correctly determined. This is because the business must earn at least at a rate which equals to its cost of capital in order to make at least a break-even.

(ii) Capital Structure Decisions The cost of capital is also an important consideration in capital structure decisions. The finance manager must raise capital from different sources in a way that it optimises the risk and cost factors. The sources of funds which have less cost involve high risk. Raising of loans may, therefore, be cheaper on account of income tax benefits, but it involves heavy risk because a slight fall in the earning capacity of the company may bring the firm near to cash insolvency. It is, therefore, absolutely necessary that cost of each source of funds is carefully considered and compared with the risk involved with it.

(iii) Deciding about the method of financing : A capable financial executive, must have knowledge of the fluctuations in the capital market and should analyse, the rate of interest on loans and normal dividend rates in the market from time to time. Whenever firm requires additional finance, he may have a better choice of the source of finance which bears the minimum cost of capital. Although cost of capital is an important factor in such decisions, equally important are the considerations of relating control and of avoiding risk.

(iv) Performance of top management : The cost of capital can be used to evaluate the financial performance of the top executives. Evaluation of the financial performance will involve a comparison of actual profitability of the project, undertaken with the projected overall cost of capital and an appraisal of the actual costs incurred in raising the required

funds.

(v) **Other areas of decisions making** : The concept of cost of capital is also used in many other areas of decision making, such as leasing, bond refunding dividend policy decisions, working capital management policies, etc. In social accounting, this concept is used in selecting the best investment opportunities which would maximise the social wealth and minimise the social costs.

Factors determining the Cost of Capital

Following are some of the factors which are relevant for the determination of cost of capital of the firm :

- (i) General economic conditions within the economy as well as the level of expected inflation. This economic variable is reflected in the risk less rate of return.
- (ii) Market conditions
- (iii) Operating and financing decisions
- (iv) Amount of financing

Types of Cost of Capital Cost of capital can broadly be classified as under :

- (i) Historical cost and Future cost
- (ii) Explicit cost and Implicit Cost
- (iii) Specific cost and Composite cost
- (iv) Average cost and Marginal cost :

Computation of Cost of Capital

1. **Cost of Debt** Cost of debt may be defined as the returns expected by the potential investors of debt securities of a firm. It measures the current cost to the firm of borrowing funds to finance the projects. It is generally determined by the following variables :

- (i) The current level of interest rates : As the level of interest rates increase the cost of debt will also increase;
- (ii) the default risk of the firm : As the default risk of the firm increases, the cost of debt will also increase. One way of measuring the default risk is to use the bond rating for the firm; higher credit rating leads to lower interest rates and lower rating leads to higher interest rates.
- (iii) The tax advantages associated with the debt : Since the interest is tax deductible. The after-tax cost of debt is a function of tax-rate. The tax benefit that accrues from paying interest makes the after tax cost of debt lower than the pre -tax cost.

The cost of debt is of two types i.e., cost of irredeemable debt and cost of redeemable debt.

1. COST OF IRREDEEMABLE DEBT : Irredeemable debt also known as perpetual _ debt refers to the debt which is not redeemable during the life time of the firm. Interest payable on such debt is called cost of irredeemable debt. It is calculated by using the following formula :

A. Cost of debt before tax (Kdb)

Kdb = Interest /Net proceeds (NP)

- (a) Interest on debt should be calculated only on the face value of debt irrespective of the issue price.
- (b) Net proceeds (NP) is to be ascertained as given below :
 - (i) Debt issued at par : NP = Face value -Issue expenses
 - (ii) Debt issued at premium :NP = Face value + Securities premium- Issue expenses
 - (iii) Debt issued at discount : NP = Face value- Discount- Issue expenses.

B. Cost of debt after tax (Kda)

As the interest on debt is tax deductible, the firm gets a saving in its tax liability. The interest works as a tax shield and the tax liability of the firm is reduced. Thus the effective cost of debt is lower than the interest paid to debt investors. The cost of debt is determined as given below :

Cost of debt after tax (Kda) = (Interest-Tax savings) / Net proceeds

The after tax cost of debt may also be determined by applying the formula given below :

Kda = Kdb (1- Tax rate)

2. COST OF REDEEMABLE DEBT :

Redeemable debt refers to the debt which is repayable after a stipulated period, say 5 or 7 or 10 years. The cost of this debt is determined as given below :

(A) Cost of debt before tax (Kdb)

Kdb = Annual cost before tax / Average value of debt

(a) Computation of Annual cost before tax

Interest on debt p.a.

Add : Issue expenses, amortised p.a. *****
Add : Discount on issue, amortised p.a. *****
Add : Premium on redemption of debt, *****
amortised p.a (In case of redemption at premium)

Less : Premium on issue of debt, *****
amortised p.a. (In case of issue at premium)

Annual cost before tax

Note: (i) While calculating annual cost, the issue expenses, discount on issue, premium on redemption and premium on issue are amortised over the tenure of debt.
(ii) Issue expenses (floatation costs) are to be calculated at face value of the issue price whichever is higher.

(b) Computation of average value of debt (AV)

The average value of debt is the average of net proceeds (NP) and redemption value (RV) of debt.

$$AV = (NP + RV) / 2$$

(B) Cost of debt after tax (Kda)

The cost of redeemable debt after tax is calculated as given below :

$$Kda = (Annual\ cost - Tax\ savings) / Average\ value\ of\ debt$$

The cost of redeemable debt after tax can also be ascertained by using the following formula :

$$Kda = Kdb (1 - Tax\ rate)$$

Ex 1: (Cost of irredeemable debt) S Ltd. issued 20,000 8% debentures of Rs. 100 each on 1st April 2019. The cost of issue was Rs. 50,000. The company's tax rate is 35%, Determine the cost of debentures (before as well as after tax) if they were issued (a)par; (b) at a premium of 10% and (c) at a discount of 10%.

Solution :

(a) Debentures issued at par

(i) Interest : (20,00,000 x 8%)	Rs 1.60000
Less : Tax (1,60,000 x 35%)	Rs.56,000

Interest after tax	Rs. 1,04,000

(ii) Gross proceeds : (20,000 x 100)	Rs.20,00,000
Less: Cost of issue	Rs. 50,000

Net proceeds	Rs.19,50,000
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Cost of debentures before tax (Kdb) = (Interest before tax / Net proceeds) x 100
= (160,000/ 19,50,000)*100= 8.21%

Cost of debentures after tax (Kda) = (Interest after tax / Net proceeds) x100
(104,000/19,50,000) x100 = 5.33%

(b) Debentures issued at a premium of 10%

Gross proceeds (20,000 x 110) = Rs.22,00,000

Less : Cost of issue	Rs.50,000
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Net proceeds	Rs.21,50,000
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Cost of debentures before tax (Kdb) = (1,60,000/21,50,000)* 100 = 7.44%

Cost of debentures after tax (Kda) = (1,04,000/21,50,000) *100=4.84%

(c) Debentures issued at a discount of 10%

Gross proceeds : (20,000*90)	Rs.18,00,000
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Less : Cost of issue	Rs.50,000
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Net proceeds	Rs.17,50,000
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Cost of debentures before tax (Kdb) = (1,60,000/17,50,000) *100=9 .14%

Cost of debentures after tax(Kda) = (104,000 /17,50,000)* 100=5. 94%

Note : Whether the debentures are issued at par (or) at premium (or) at discount, interest on debentures should be calculated only on the face value of debentures.

Ex. 2 (Cost of redeemable debt)

K Ltd. issued 50,000 10% debentures of Rs. 100 each, redeemable in 10 years' time at 10% premium. The cost of issue was 2.5%. The company's income tax rate is 35%. Determine the cost of debt (before as well as after tax) if they were issued (a) at par; (b) at a premium of 5% and (c) at a discount 10%.

Solution :

(a) Debentures issued at par and Redeemable at a Premium of 10%.

(i) Calculation of Annual cost

Interest : (50,00,000 x 10%)	Rs.5,00,000
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Add: Cost of issue:

50,00,000 x 2.5% = 1,25,000 /10 years	Rs. 12,500
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Premium on redemption	Rs.50,000
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50,00,000 x 10% = 5,00,000/10years	
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Annual cost before tax	Rs.5,62,500
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(ii) Calculation of Average value of debt

Gross proceeds (50,000 x 100)	Rs. 50,00,000
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Less: Cost of issue (50,00,000 x 2.5%)	Rs. 1,25,000
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Net proceeds	Rs. 48,75,000
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Redeemable value = 50,00,000 x 110% = Rs. 55,00,000

Average value = (Net proceeds + Redeemable Value)/2
= (48,75,000 + 55,00,000)/2 = Rs. 51 87 500.

Hence, Cost of debt before tax (Kdb) = (Annual cost before tax/Average value of Debt)*100
= (5,62,500/51,87,500)*100= 10.84%

Cost of debt after tax (Kda) = (Annual Cost after tax/Average of value of debt)* 100
= (365,625 / 31,87,500) *100=7.05%

Note: The debentures are redeemable after 10 years.Hence,cost of issue and premium on redemption are Spread over 10 years to arrive at annual cost.

(b) Debentures issued at a Premium of 5% and Redeemable at a premium of 10%) .

(i) Calculation of Annual cost

Interest (50,00,000 x 10%)	Rs. 5,00,000
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Add : Cost of issue (50,00,000 x 105% = 52,50,000 *2.5% =1,31,250/10 years	Rs.13,125
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Add : Premium on redemption (50,00,000*10%= 5,00,000/10 years)	Rs.50,000
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	Rs.5,63,125
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Less: Premium on issue: (50,00,000 x 5% =2, 50, 0000/10 years)	Rs.25,000
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Annual cost before tax	Rs. 5,38,125
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Less: Tax (5,38,125 x 35%)	3,49,781
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(ii) Calculation of Average value of debt .

Gross proceeds : (50,000 x 105)	Rs. 52,50,000
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Less : Cost of issue (52,50,000 x 2.5%)	Rs.1,31,250
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Net proceeds	Rs.51,18,750
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Redemption value: 50,00,000 x 110% =Rs. 55,00,000

Average value of debt = $(51,18,750 + 55,00,000) / 2 = \text{Rs. } 53,09,375$

Cost of debt before tax (Kdb) = $(5,38,125 / 53,09,375) \times 100 = 10.14\%$
 Cost of Debt after tax (Kda) = $(3,49,781 / 53,09,375) \times 100 = 6.59\%$

(c) Debentures issued at a discount of 10% and redeemable at a premium of 10%

(i) Calculation of Annual cost

Interest (50,00,000 x 10%)	Rs.5,00,000
Add: Cost of issue	
(50,00,000 x 2.5% = 1,25,000/ 10 years	Rs.12,500
Premium on redemption	
(50,00,000 x 10% = 5,00,000/ 10 years)	Rs.50,000
Discount on issue	
(50,00,000 x 10% = 5,00,000/10 years)	Rs.50,000

Annual cost before tax	Rs.6,12,500
Less : Tax (6,12,500 x 35%)	Rs.2,14,375

Annual cost after tax	Rs. 3.98,125

(ii) Calculation of Average value of debt	Rs.
Gross proceeds (50,000 x 90)	45,00,000
Less : Cost of issue (50,00,000 x 2.5%)	1,25,000

Net proceeds	43,75,000

Redemption value = $50,00,000 \times 110\% = \text{Rs. } 55,00,000$
 Average value of debt = $(43,75,000 + 55,00,000) / 2 = \text{Rs. } 49,37,500$
 Cost of debt before tax (Kdb) = $(6,12,800 / 49,37,300) \times 100 = 12.41\%$
 Cost of debt after tax (Kda) = $(3,98,125 / 49,37,500) \times 100 = 8.06\%$

Note: (i) Cost of debt will not be equal to the interest rate on debt. This is due to various reasons such as tax saving effect, issue at premium / discount, expenses of issue and difference between face value and net proceeds, redemption at premium and additional amount payable.
 (ii) Cost of issue has been calculated at face value or the i.e whichever is higher.

II. Cost of Preference Share Capital

A. COST OF IRREDEEMABLE PREFERENCE SHARE CAPITAL

In case of irredeemable preference shares, the dividend at the fixed rate will be payable to the preference shareholders perpetually. The cost of irredeemable preference share capital can be calculated with the help of the following formula :

Cost of preference share capital (Kp) = Annual Preference Dividend/Net proceeds (NP)

The net proceeds indicate the net amount realised from the issue of preference shares which can be determined as follows :

- (a) Issued at par : $NP = \text{Face value} - \text{Issue expenses}$
- (b) Issued at premium : $NP = \text{Face value} + \text{Securities premium} - \text{Issue expenses}$
- (c) Issued at discount $NP = \text{Face value} - \text{Discount} - \text{Issue expenses}$

(B) COST OF REDEEMABLE PREFERENCE SHARE CAPITAL (RPS)

If the preference shares are redeemable at the end of a specified period, then, the cost of preference share capital can be calculated by applying the formula,

Cost of Redeemable preference share capital = Annual cost / Average value of RPS

(a) Computation of Annual cost

Annual preference dividend	*****
Add : Issue expenses, amortised p.a.	*****
Discount on issue, amortised p.a (In case of issue at discount)	*****
Premium on redemption amortised p.a (In case of redemption at premium)	*****

Less : Premium on issue amortised p.a. (In case of issue at premium)	*****
Annual cost	----- *****

Note: The issue expenses, discount on issue, premium on redemption and premium on issue are to be amortised over the tenure of the preference shares to determine the annual cost.

b) Computation of average value of RPS

The average value of redeemable preference shares is the average of proceeds (NP) of the issue and the redemption value (RV).

Average value of redeemable preference shares = $(NP + RV) / 2$

The Net proceeds (NP) is to be ascertained as given below :

- (i) Issued at par : $NP = \text{Face value} - \text{Issue expenses}$**
- (ii) Issued at premium : $NP = \text{Face value} + \text{Securities Premium} - \text{Issue expenses}$**
- (iii) Issued at discount: $NP = \text{Face value} - \text{Discount} - \text{Issue expenses}$**

Ex 3: M Ltd. issued 60,000 15% irredeemable preference shares of Rs100 each. The issue expenses were Rs. 60,000. Determine the cost of preference Capital if shares are issued (a) at par; (b) at a premium of 10% and (c) at a discount of 5%.

Solution :

Cost of Redeemable Pref. share capital (Kp)
= $(\text{Annual pref. Dividend} / \text{Net proceeds}) * 100$

a) Preference shares issued at par

Annual pref. dividend : $60,000 \times 100 = 60,00,000 \times 15\% = \text{Rs. } 9,00,000$

	Rs.
Gross proceeds : $(60,000 \times 100) =$	60,00,000
Less : Issue expenses	60,000

Net proceeds	----- 59,40,000 -----
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Cost of preference share capital (Kp): $(9,00,000 / 59,40,000) \times 100 = 15.15\%$

(b) **Preference shares issued at a premium of 10%**

	Rs.
Annual pref. dividend = $(60,00,000, 15\%) =$	9,00,000

Gross proceeds : $(60,000 \times 110) =$	----- 66,00,000 -----
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Less : Issue expenses	60,000
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Net proceeds	----- 65,40,000 -----
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Ex 4:

Asin Ltd. issued 15,000 12% preference shares of Rs. 100, redeemable at 10% premium after 20 years. The floatation costs were 5%. Find out the cost of preference capital if shares are issued (a) at par; (b) at a premium of 5% and (c) at a discount of 10%.

Solution :

$$\text{Cost of Redeemable pref. share capital } (k_p) = \frac{\text{Annual cost}}{\text{Average value of RPS}} \times 100$$

(a) Issued at par, Redeemable at a premium of 10% :

(i) *Computation of Annual cost*

Preference dividend (15,000 × 100 = 15,00,000 × 12%)	Rs. 1,80,000
Add : Floatation costs (15,00,000 × 5% = 75,000/20 years)	3,750
Add : Premium on redemption (15,00,000 × 10% = 1,50,000/20 years)	7,500
Annual cost	1,91,250

(ii) *Computation of Average value of RPS*

Issue price (15,000 × 100)	Rs. 15,00,000
Less : Floatation costs (15,00,000 × 5%)	75,000
Net proceeds	14,25,000

Redemption value : 15,00,000 × 110% = Rs. 16,50,000

$$\begin{aligned} \text{Average value of RPS} &= \frac{\text{Net proceeds} + \text{Redemption value}}{2} \\ &= \frac{14,25,000 + 16,50,000}{2} \\ &= \text{Rs. } 15,37,500 \end{aligned}$$

$$\therefore \text{Cost of Red. pref. capital } (k_p) = \frac{1,91,250}{15,37,500} \times 100 = 12.44\%$$

(b) Issued at a premium of 5%, Redeemable at a premium of 10% :

(i) *Computation of Annual cost*

Preference dividend (15,00,000 × 12%)	Rs. 1,80,000
Add : Floatation costs (15,000 × 105 : 15,75,000 × 5% = 78,750/20 years)	3,937.50
Add : Premium on redemption (15,00,000 × 10% = 1,50,000/20 years)	7,500
	1,91,437.50
Less : Premium on issue (15,000 × 5 = 75,000/20 years)	3,750.00
Annual cost	1,87,687.50

(ii) Computation of Average value of RPS:

Issue price (15,000 × 105)	Rs. 15,75,000
Less : Floatation costs (15,75,000 × 5%)	78,750
Net proceeds	14,96,250
Redemption value = 15,00,000 × 110% = Rs. 16,50,000	
Average value of RPS = $\frac{14,96,250 + 16,50,000}{2}$	
= Rs. 15,73,125	

$$\therefore \text{Cost of Red. Pref. share capital (K}_P) = \frac{1,87,687.50}{15,73,125} \times 100$$

$$= 11.93\%$$

(c) Issued at a discount of 10%, Redeemable at a premium of 10% :

(i) Computation of Annual cost

Preference dividend	Rs. 1,80,000
Add : Floatation costs :	
(15,00,000 × 5% = 75,000/20years)	3,750
Add : Discount on issue	
(15,000 × 10 = 1,50,000/20 years)	7,500
Add : Premium on Redemption	
(15,00,000 × 10% = 1,50,000/20 years)	7,500
Annual cost	1,98,750

(ii) Computation of Average value of RPS

Issue price (15,000 × 90)	Rs. 13,50,000
Less : Floatation costs (15,00,000 × 5%)	75,000
Net proceeds -	12,75,500

$$\text{Redemption value: } 15,00,000 \times 110\% = \text{Rs. } 16,50,000$$

$$\text{Average value of RPS} = \frac{12,75,000 + 16,50,000}{2}$$

$$= \text{Rs. } 14,62,500$$

$$\therefore \text{Cost of Red. Pref. Capital} = \frac{1,98,750}{14,62,500} \times 100$$

$$= 13.59\%$$

Note : Floatation costs have been calculated at face value or the issue price whichever is higher.

Source: Financial Management – Dr.A.Murthy

III .Cost of Equity Capital

Computation of cost of equity is quite complex. Some people argue that the equity capital is cost free as the firm is not legally bound to pay divide, equity Shareholders. But this is not

true. Shareholders invest their funds with the expectation of dividends. The market value of equity share depends upon dividends expected by shareholders, the book value of firm and the growth in the value of firm. Thus the required rate of return which equates the present value of the expected dividends with the market value of equity share is the cost of equity capital. The cost of equity capital may be expressed as the minimum rate of return that must be earned on new equity share capital financed investment in order to keep the earnings to the existing equity shareholders of the firm unchanged.

The following are the different **methods for computing Cost of Equity Capital:**

(i) Dividend yield (or) Dividend price method

According to this method, the cost of equity is calculated on the basis of a required rate of return in terms of future dividends to be paid on equity shares for maintaining their present market price. The cost of new equity share can be determined according to the following

$$\text{Cost of equity (Ke)} = D / NP$$

where; D = Expected dividend per share;

NP = Net proceeds per share

Note : In case of new issue, the firm will have to incur some floatation costs such as fees to investment bankers, brokerage, underwriting commission and commission to agents etc. So, the net proceeds per share (Face value - Floatation costs) is considered for calculating cost of equity.

In case of existing equity shares, the cost of equity should be calculated on the basis of market price of firm's equity share according to the following formula :

$$\text{Cost of equity (Ke)} = D / MP$$

where . D = Expected dividend per share ;

MP = Market price per share

This method is simple and rightly emphasises the importance of dividend, but it suffers from two serious limitations : (i) It ignores the earnings on retained earnings which increases the rate of dividend on equity shares and (ii) it ignores growth in dividends, capital gains and future earnings. This method is suitable only when the firm has stable earnings and a stable dividend policy over a reasonable length of time.

Ajit Ltd. has a stable income and stable dividend policy. The average annual dividend payout is Rs. 25 per share (face value : Rs. 100). You are required to ascertain:

- Cost of equity capital
- Cost of equity capital if the market price of the share is Rs. 150.
- Expected market price in year 2 if cost of equity is expected to rise to 20%.
- Dividend payout in year 2 if the company were to have an expected market price of Rs. 160 per share, at the existing cost of equity.

Solution :

(a) Computation of cost of equity (k_e)

$$k_e = \frac{D_1}{NP}$$

D_1 = Expected dividend per share : Rs. 25

NP = Net proceeds = Rs. 100

$$\therefore k_e = \frac{25}{100} \times 100 = 25\%$$

(b) Computation of cost of equity if market price of share is Rs. 150

$$k_e = \frac{D_1}{MP}$$

D_1 = Rs. 25

MP = Market price = Rs. 150

$$\therefore k_e = \frac{25}{150} \times 100 = 16.67\%$$

Ex 5:

(c) Computation of market price if $k_e = 20\%$

$$k_e = \frac{D_1}{MP}$$

$$20\% = \frac{25}{MP} = 0.20 = \frac{25}{MP}$$

$$= 0.20 MP = 25$$

$$MP = \frac{25}{0.20} = \text{Rs. } 125$$

\therefore Expected market price = Rs. 125

(d) Computation of dividend per share if market price is Rs. 160 at the existing k_e of 25%

$$k_e = \frac{D_1}{MP}$$

$$25\% = \frac{D_1}{160}$$

$$D_1 = 160 \times 25\% = \text{Rs. } 40$$

\therefore Expected dividend per share = Rs. 40.

(ii) Dividend price plus growth (D/P +g) method

Under this method, the cost of equity is determined on the basis of the expected dividend rate plus the rate of growth in dividend. The growth rate in dividend is assumed to be equal to the growth rate in earnings per share and market price per share. The cost of equity, under this method, is determined by using the following formula :

(a) In case of new issue of share

$$\text{Cost of equity (Ke)} = (D / NP) + g$$

where, D, = Expected dividend per share;

NP = Net proceeds per share

g = Growth rate in dividend

(b) In case of existing shares

$$\text{Cost of equity (Ke)} = (D / MP) + g$$

where , D, = Expected dividend per share ; MP = Market price per share ; g = Growth rate in dividend.

Allen Ltd. pays a dividend of Rs. 4 per share. Its shares are quoted at Rs. 40 presently and investors expect a growth rate of 10% per annum. Calculate (a) cost of equity capital; (b) expected market price per share if anticipated growth rate is 11% and (c) Market price if dividend is Rs.4, cost of capital is 16% and growth rate is 10%.

Solution :

(a) Computation of cost of equity (k_e)

$$k_e = \frac{D_1}{MP} + g$$

D_1 = Expected dividend per share = Rs. 4

MP = Market price per share = Rs. 40

g = Growth rate in dividend = 10%

$$\therefore k_e = \left(\frac{4}{40} \times 100 \right) + 10\% = 20\%$$

(b) Computation of market price if growth rate is 11%

$$k_e = \frac{D_1}{MP} + g$$

$$20\% = \frac{4}{MP} + 11\%$$

$$20\% - 11\% = \frac{4}{MP}$$

$$9\% = \frac{4}{MP}$$

$$0.09 MP = 4$$

$$MP = \frac{4}{0.09} = \text{Rs. } 44.44$$

\therefore Market price per share = Rs. 44.44

(c) Computation of market price if $D_1 = \text{Rs. } 4$, $k_e = 16\%$ and $g = 10\%$

$$k_e = \frac{D_1}{MP} + g$$

$$16\% = \frac{4}{MP} + 10\%$$

$$16\% - 10\% = \frac{4}{MP}$$

$$6\% = \frac{4}{MP}$$

$$0.06 = \frac{4}{MP}$$

$$0.06MP = 4$$

$$MP = \frac{4}{0.06} = \text{Rs. } 66.67.$$

\therefore Market price per share = Rs. 66.67.

Source: Financial Management – Dr.A.Murthy

(iii) Earnings /price (E/P) Method

(iv) Under this method co-relate the earnings of the firm with the market price of its shares. Accordingly, the cost of equity-would be based upon the expected rate of earnings of the firm. The argument is that each investment expects a certain amount of earnings, whether distributed or not from the firm in whose shares he invests.

(a) In case of new issue of shares Cost of equity (Ke) = EPS / NP

where, EPS = Earnings per share ; NP = Net proceeds per share

b) In case of existing shares

Cost of equity (Ke)= EPS / MP

Where, EPS = Earning per share; MP = Market price per share

*This method is suitable when the EPS is expected to remain constant ;

* The payout is 100% (all the profits are distributed as dividends to shareholders) ;

* The firm does not use any debt.

Kaniska Ltd. wants to raise Rs. 30,00,000 by issue of new equity shares. The relevant information is given below :

No.of existing equity shares	50,000
Profit after tax	Rs. 3,00,000
Market value of existing equity shares	Rs. 20,00,000

(a) Compute the cost of existing equity capital

(b) Compute the cost of new equity capital if the shares are issued at a price of Rs. 35 per share and the floatation cost is Rs. 5 per share.

Solution :

(a) Computation of cost of existing equity (k_e)

$$\begin{aligned} \text{EPS (Earnings per share)} &= \frac{\text{Profit after tax}}{\text{No. of equity shares}} \\ &= \frac{3,00,000}{50,000} \\ &= \text{Rs. 6} \end{aligned}$$

$$\text{MP} = (\text{Market value per share}) = \frac{\text{Market value of equity}}{\text{No. of equity shares}}$$

$$= \frac{20,00,000}{50,000} = \text{Rs. } 40$$

$$\therefore k_e = \frac{6}{40} \times 100 = 15\%$$

(b) Computation of cost of new equity (k_e)

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

$$\text{NP (Net proceeds)} = \text{Issue price} - \text{Flotation cost}$$

$$= 35 - 5 = \text{Rs. } 30$$

$$\therefore k_e = \frac{6}{30} \times 100 = 20\%$$

Source : *Financial Management- Dr.A.Murthy*

(iv) Realised yield method

It has been suggested by many authors that the yield actually realised for a period of time by investors in a particular firm may be used as an indicator of the cost of equity. In other words, this method takes into consideration the basic factor of the D/P + g method, but instead of using the expected values of the dividends and capital appreciation, past yields are used to denote the cost of capital. This method is based upon the assumption that past behaviour will be repeated in future, and therefore, may be used to measure the cost of equity. This method is useful in the following conditions :

- (a) The shareholders expect the realised yield of the past in future as well.
- (b) The firm remains in the same risk class.
- (c) The market price of the shares does not change significantly.

IV. Cost of Retained Earnings

Retained earnings are the accumulated amount of undistributed profit belonging to the equity shareholders. They provide a major source of financial expansion and diversification of projects: Their cost is the opportunity cost of the funds. If these were distributed to the shareholders, they would have reinvested them in the same firm by purchasing its equity and earned on the additional shares the same rate of return as they are earning on their existing shares. Thus, the cost of retained earnings is the same as the cost of equity capital. However, unlike issue of equity shares, retained earnings do not involve the payment of personal income tax as well as any flotation cost. This makes their cost slightly lower than the cost of equity capital. The cost of retained earnings may be calculated as follows :

(i) Cost of equity (Ke)	* ** *
(ii) Less ; Tax on cost of equity	****

(iii) Less : Brokerage (% on (i)- (ii))	****

Cost of retained earnings	****

Alternatively, the cost of retained earnings can be ascertained by using the following formula ,

$$\text{Cost of retained earnings [Kr = Ke (1-t)(1- b)]}$$

where, Kr =cost of equity capital, t= tax rate, b= brokerage

Ex: 8 The rate of return available to the equity shareholders in the E Ltd. is 20% and the personal tax rate applicable to shareholders is 22%. It is expected that the shareholders will have to bear a brokerage cost of 3% when they invest their dividends in alternative securities. Compute the cost of retained earnings.

Solution:To determine the cost of retained earnings, adjustments for tax and brokerage are to be made as given below :

Cost of equity (Ke)	%
Less : Personal tax rate (20 x 22%)	4.0

	15.60
Less: Brokerage (19.6 6 x x 3%)	0.468

Cost of retained earnings (Kr)	15.132

Alternatively,

$$\text{Kr= Ke (1-Tax rate) x (1- Brokerage)}$$

$$=20(1-0.22) \times (1-0.03) = 20(0.78) \times (0.97) = 15.132\%$$

V. Weighted Average Cost of Capital (WACC)

After having ascertained the cost of each component of capital as explained above, the average or composite cost of all the sources of capital is to be determined. The cost of each component of the capital is weighted by the relative proportion of that type of funds in the capital structure. Then it is called Weighted Average Cost of Capital (WACC). WACC is defined as the average of the costs of each source of funds employed by the firm, properly weighted by the proportion they hold in the capital structure of the firm. The proportion or percentage or weight of each component may be determined based on either book value or market value of capital.

Computation of weighted average cost of capital :

The following steps are to be taken to calculate WACC.

Step 1: Calculate the cost of specific sources of funds, for exam debt, cost of equity etc.

Step 2: Multiply the cost of each source by its proportion in capital structure

Step 3: Add the weighted component costs to get the firm's WACC.

Ex 9

Following information is available with regards to the capital structure of Edwards Ltd :

	Amount Rs.	After tax cost of capital %
Debentures	12,00,000	5%
Preference share capital	4,00,000	10%
Equity share capital	8,00,000	15%
Retained earnings	16,00,000	12%

You are required to calculate weighted average cost of capital (WACC).

Solution:

Statement showing weighted average cost of capital

Source	Amount Rs.	Weights	After tax cost %	Weighted Cost
(1)	(2)	(3)	(4)	5 = (3 × 4)
Debentures	12,00,000	$\frac{12}{40} = 0.30$	5	1.5
Pref.share capital	4,00,000	$\frac{4}{40} = 0.10$	10	1.0
Equity share capital	8,00,000	$\frac{8}{40} = 0.20$	15	3.0
Retained earnings	16,00,000	$\frac{16}{40} = 0.40$	12	4.8
	<u>40,00,000</u>			<u>10.30</u>

∴ WACC = 10.30%

Source: Financial Management – Dr.A.Murthy

LEVERAGES

SS.C.Kuchhal: Leverage refers to meeting a fixed cost or paying' fixed return for employing resources or funds. The definitions given indicate that fixed cost or return is the fulcrum of leverage. There will be no leverage, if a firm is not required to pay fixed cost or return, Leverage is the result of the employment of an asset or funds having a fixed cost or return, The former may be termed as "fixed operating cost" whereas the latter may be termed as "fixed financial cost". As fixed cost return has to be paid irrespective of the volume of production or sales, it has considerable influence on the amount of profit available for the equity shareholders. When the volume of sales changes, leverage helps in increasing the firm's profit. A high degree of leverage implies that there will be a large change in profit as result of a relatively small change in sales and vice versa, Thus higher is the leverage, higher is the risk and higher is the expected return.

Types of Leverages

There are three commonly used measures of leverage in financial analysis, These are:

1. Operating Leverage
2. Financial Leverage
3. Combined Leverage

1. Operating Leverage

Operating leverage implies use of fixed cost in the operation of a firm. As pointed out earlier, every firm has to incur fixed cost irrespective of the volume of production or sales. Since fixed cost remains constant, even a small change in sales brings about a more than proportionate change in operating profit. This occurrence is termed as operating leverage. It is thus defined as “the firm’s ability to use fixed operating cost to magnify the effects of changes in sales on its earnings before interest and taxes (EBIT). It can be calculated by applying the following formula:

$$\text{Operating Leverage} = \text{Contribution} / \text{EBIT}$$

Where, Contribution = Sales Variable cost, EBIT = Operating profit.

Operating leverage may be favourable or unfavourable. Favourable operating leverage arises when contribution exceeds fixed cost and vice versa in the opposite case.

Degree of Operating Leverage The degree of operating leverage (DOL) represents percentage change in the operating profit resulting from a percentage change in the sales.

It may be put in the form of following equation:

$$\text{DOL} = \text{Percentage change in EBIT} / \text{Percentage change in sales}$$

Ex 10. From the following information, calculate operating leverage:

No. of units produced and sold : 30,000 ;Selling price per unit Rs. 20;

Variable cost per unit : Rs. 10

Solution :

Statement of profit

	Rs.
Sales (30,000 × 20)	6,00,000
Less : Variable cost (30,000 × 10)	3,00,000

Contribution	3,00,000
Less : Fixed cost (30,000 × 5)	1,50,000

EBIT	1,50,000

$$\text{Operating leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{3,00,000}{1,50,000} = 2 \text{ times}$$

Statement of profit (Variable cost is Rs. 12 per unit)

	Rs.
Sales (30,000 × 20)	6,00,000
Less : Variable cost (30,000 × 12)	3,60,000

Contribution	2,40,000
Less : Fixed cost	1,50,000

EBIT	90,000

$$\begin{aligned} \text{New operating leverage} &= \frac{\text{Contribution}}{\text{EBIT}} \\ &= \frac{2,40,000}{90,000} = 2.67 \text{ times.} \end{aligned}$$

Source : Financial Management – Dr.A.Murthy

Ex 11. Find out degree of operating leverage from the following data :

EBIT (2005) Rs.40,000	Sales (2005)	20,000 units
EBIT (2006) Rs. 50,000	Sales (2006)	28,000 units

Degree of operating leverage (DOL) = % Change in EBIT/ % Change in Sales

$$\text{Percentage \% Change in EBIT} = (10,000 / 40,000) \times 100 = 25\%$$

$$\text{\% Change in Sales} = (8,000/20,000) \times 100 = 40\%$$

$$\text{DOL} = (0.25/0.40) \times 100 = 62.5\%$$

Ex 12. Buddha Ltd has a choice of the three financial plans:

Buddha Ltd	Plan I Rs.	Plan II Rs.	Plan III Rs.
Equity share capital	6 lakh	5 lakh	2 lakh
10% Debentures	4 lakh	5 lakh	8 lakh
EBIT	2.5 lakh	2.5 lakh	2.5 lakh

You are required to ascertain the financial leverage in each case and interpret it.

Solution:

Profitability Statement

Particulars	Plan I Rs.	Plan II Rs.	Plan III Rs.
EBIT	2,50,000	2,50,000	2,50,000
Less : Interest on debentures @ 10%	40,000	50,000	80,000
EBT	<u>2,10,000</u>	<u>2,00,000</u>	<u>1,70,000</u>
Financial leverage : $\frac{\text{EBIT}}{\text{EBT}}$	$\frac{2,50,000}{2,10,000}$ = 1.19 times	$\frac{2,50,000}{2,00,000}$ = 1.25 times	$\frac{2,50,000}{1,70,000}$ = 1.47 times

Analysis : Financial leverage is a measure of the risk of operating with debt financing. From the above statement, it is quite evident that if the amount of debt financing is proportionately greater in comparison with the equity capital, the degree of financial leverage also will be higher as in the case of financial plan III (ie, 1.47 times).

2. Financial leverage - Financial leverage occurs when a firm uses fixed interest / dividend bearing securities i.e. Debentures and preference share capital along with owner's equity to improve the return on an equity investment. The fixed financial charges such as interest on debentures, dividend on preference shares etc. do not vary with the operating profit (EBIT). These charges have to be paid regardless of the amount of EBIT available to pay them. After paying them, the remaining EBIT belongs to equity shareholders. Financial leverage is concerned with the effect of changes in EBIT on the earnings available to the equity shareholders (EPS), It is thus, defined "as ability of a firm to use fixed financial charges to magnify the effect of changes in EBIT on the firm's earnings per share". It can be determined by using the following formula:

$$\text{Financial Leverage} = \text{EBIT} / \text{EBT}$$

here, EBIT = Earnings before interest and taxes, EBT = Earnings before taxes

Degree of Financial Leverage

The degree of financial leverage (DFL) is the percentage change in taxable profit as a result of percentage change in operating profit, i.e. the ability of the firm to utilize fixed financial costs in order to magnify the effect of changes in EBIT on EPS of the firm. The DFL can be computed as under:

$$\text{DFL} = \frac{\text{Percentage change in EPS}}{\text{Percentage change in EBIT}}$$

The financial leverage is favourable when the firm earns more on the investments / assets financed by the sources having fixed charges. It is obvious that shareholders gain in a situation where the firm earns a high rate of return and pays a lower rate of return to the suppliers of long term funds. Financial leverage in such cases is therefore also called "Trading on Equity".

Ex 13.

Financial Leverage = EBIT/EBT

$$\text{FL} = 1,25,000/65,000 = 1.92 \text{ times}$$

Martin Ltd. has the following capital structure :

	Rs.
25,000 Equity shares of Rs. 10 each	2,50,000
2,000 9% Pref. shares of Rs. 100 each	2,00,000
3,000 10% Debentures of Rs. 100 each	3,00,000

The company's EBIT is Rs. 1,25,000. Calculate the financial leverage assuming that the company is in 40% tax bracket.

Solution:

Statement showing Earnings before tax

	Rs.
EBIT	1,25,000
Less : Interest on debentures (3,00,000 × 10%)	30,000
Pref. dividend (Pre tax basis) (2,00,000 × 9% = 18,000 × $\frac{100}{60}$)	30,000
EBT	65,000

Ex 14.

Ascertain financial leverage from the information given below :

Net worth : Rs. 20,00,000

Debt/Equity ratio : 3 : 1

Interest rate = 10%

Operating profit = Rs. 18,00,000

Solution:

$$\text{Financial leverage} = \frac{\text{EBIT}}{\text{EBT}}$$

(i) Calculation of amount of debt

$$\frac{\text{Debt}}{\text{Equity}} = \frac{3}{1}$$

$$\text{Equity} = 1 = \text{Rs. } 20,00,000$$

$$\text{Debt} = \frac{20,00,000}{1} \times 3 = \text{Rs. } 60,00,000$$

(ii) Calculation of EBT

EBIT	Rs. 18,00,000
Less : Interest on debt (60,00,000 × 10%)	6,00,000
EBT	<hr/> 12,00,000 <hr/>

$$\therefore \text{Financial leverage} = \frac{18,00,000}{12,00,000} = 1.5 \text{ times.}$$

Source : Financial Management – Dr.A.Murthy

3. Combined Leverage - Operating leverage measures percentage change in operating profit as a result of percentage change in sales and financial leverage measures percentage change in taxable profit or EPS due to percentage change, in operating profit. Whereas operating leverage indicates the degree of Operating risk, financial leverage indicates the degree of financial risk. Both these leverages are closely concerned with the firm's capacity to meet its fixed costs. If both these leverages are combined, the result obtained will reveal the effect of changes in sales over changes in taxable profit or EPS.

Combined leverage thus establishes relationship between sales (ie,contribution) and the corresponding variation in taxable income. It can be computed by adopting the following formula:

Combined Leverage = Operating Leverage x Financial Leverage

Combined Leverage = (Contribution/ EBIT)*(EBIT/ EBT)

Combined Leverage = Contribution/ EBT

Ex 15: P Ltd has sales of 12 lakhs. The variable cost is 50% of sales, while the fixed cost amounts to Rs.3,60,000. The amount of interest on long term debt is Rs.1,20,000. You are required to calculate the combined leverage and show its impact if sales increases by 10%.

Solution:

Profitability statement	
	Rs.
Sales	12,00,000
Less : Variable cost (12,00,000 × 50%)	6,00,000
Contribution	6,00,000
Less : Fixed cost	3,60,000
EBIT	2,40,000
Less : Interest on debt	1,20,000
EBT	1,20,000

$$\text{Combined leverage} = \frac{\text{Contribution}}{\text{EBT}} = \frac{6,00,000}{1,20,000} = 5 \text{ times}$$

The combined leverage of 5 times indicates that with every increase Re.1 in sales, the EBT will increase by Rs. 5 (1 × 5)

Profitability Statement (Sales increases by 10%)	
	Rs.
Sales (12,00,000 × 110%)	13,20,000
Less : Variable cost (13,20,000 × 50%)	6,60,000
Contribution	6,60,000
Less : Fixed cost	3,60,000
EBIT	3,00,000
Less : Interest on debt	1,20,000
EBT	1,80,000

It is clear that on account of sales by 10%, the EBT has increased by 50%. This can be verified as follows:

Percentage increase in profit = (Increase in profit / Base profit) * 100

$$= 60,000/1,20,000 * 100$$

$$= 50\%$$

Ex 16.

The following figures relate to two companies. You are required to (a) calculate the operating, financial and combined leverages of the two companies and (b) comment on their relative risk position.

	X Ltd. Rs.	Y Ltd. Rs.
Sales	4,00,000	8,00,000
Less : Variable cost	1,60,000	2,40,000
Contribution	2,40,000	5,60,000
Less : Fixed cost	1,28,000	2,80,000
Operating profit (EBIT)	1,12,000	2,80,000
Less : Interest	48,000	1,20,000
Profit before tax	64,000	1,60,000

Solution :

$$(i) \text{ Operating leverage} = \frac{\text{Contribution}}{\text{EBIT}}$$

$$\text{X Ltd} = \frac{2,40,000}{1,12,000} = 2.14 \text{ times}$$

$$\text{Y Ltd} = \frac{5,60,000}{2,80,000} = 2 \text{ times}$$

Analysis: Operating leverage is higher for X Ltd. than Y Ltd. Hence X Ltd has greater degree of business risk. In other words, the tendency of net income (EBIT) to vary disproportionately with sales is greater in case of X Ltd than Y Ltd.

Ltd.

$$(ii) \text{ Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}}$$

$$\text{X Ltd} : \frac{1,12,000}{64,000} = 1.75 \text{ times}$$

$$\text{Y Ltd} : \frac{2,80,000}{1,60,000} = 1.75 \text{ times}$$

Analysis: Both companies have the same degree of financial risk. It means that the tendency of residual net income (EBT) to vary disproportionately with net income (EBIT) is the same in case of both the companies.

$$(iii) \text{ Combined leverage} = \frac{\text{Contribution}}{\text{EBT}}$$

$$\text{X Ltd} = \frac{2,40,000}{64,000} = 3.75 \text{ times}$$

$$\text{Y Ltd.} = \frac{5,60,000}{1,60,000} = 3.50 \text{ times}$$

Analysis: Overall business risk is slightly high for X Ltd. due to high degree of operating leverage even if degree of financial leverage is the same.

Source : Financial Management – Dr.A.Murthy

The contents in this E-Material have been prepared from the text books and Reference Books in the syllabus.

