3.1 Operating & Financial Leverage

Leverage

- **Leverage refers to the use of an asset or source of funds which involves fixed costs or fixed returns. As a result, the earnings available to the shareholders/owners are affected as also their risk. There are three types of leverage, namely,**

1) **Operating**
2) **Financial**
3) **Combined**

Operating Leverage

•Leverage associated with asset acquisition or investment activities is referred to as the operating leverage. It refers to the firm's ability to use fixed operating costs to magnify the effect of changes in sales on its operating profits (EBIT) and results in more than a proportionate change (±) in EBIT with change in the sales revenue.

Degree of operating leverage (DOL) is computed in two ways:

- **Percentage change in EBIT/Percentage change in sales and**
- **(Sales – Variable costs)/EBIT.**

Operating Leverage

- **The operating leverage is favourable when increase in sales volume has a positive magnifying effect on EBIT. It is unfavourable when a decrease in sales volume has a negative magnifying effect on EBIT. Therefore, high DOL is good when sales revenues are rising and bad when they are falling.**
- **The DOL is a measure of the business/operating risk of the firm. Operating risk is the risk of the firm not being able to cover its fixed operating costs. The larger is the magnitude of such costs, the larger is the volume of sales required to recover them. Thus, the DOL depends on fixed operating costs.**

Example 1

A firm sells products for Rs 100 per unit, has variable operating costs of Rs 50 per unit and fixed operating costs of Rs 50,000 per year. Show the various levels of EBIT that would result from sale of (i) 1,000 units (ii) 2,000 units and (iii) 3,000 units.

Solution

If sales level of 2,000 units are used as a base for comparison, the operating leverage is illustrated in Table 1

Table 1 EBIT for Various Sales Levels

	Case 2 – 50%	Base	Case 1 + 50%
1. Sales in units	1,000	2,000	3,000
2. Sales revenue	Rs 1,00,000	Rs 2,00,000	Rs 3,00,000
3. Less: Variable operating cost	50,000	1,00,000	1,50,000
4. Contribution	50,000	1,00,000	1,50,000
5. Less: Fixed operating cost	50,000	50,000	50,000
6. EBIT	Zero	50,000	1,00,000
	–100%		+100%

From the results contained in Table 1, certain generalisations follow:

1) Case 1: A 50 per cent increase in sales (from 2,000 to 3,000 units) results in a 100 per cent increase in EBIT (from Rs 50,000 to Rs 1,00,000).
2) Case 2: A 50 per cent decrease in sales (from 2,000 to 1,000 units) results in a 100 per cent decrease in EBIT (from Rs 50,000 to zero).

Example 2

A firm sells its products for Rs 50 per unit, has variable operating costs of Rs 30 per unit and fixed operating costs of Rs 5,000 per year. Its current level of sales is 300 units. Determine the degree of operationg leverage. What will happen to EBIT if sales change: (a) rise to 350 units, and (b) decrease to 250 units?

Solution: The EBIT for various sales levels is computed in Table 2.

Table 2: EBIT at Various Sales Levels

	Case 2 –16.7%	Base	Case 1 +16.7%
1. Sales in units	250	300	350
2. Sales revenue	Rs 12,500	Rs 15,000	Rs 17,500
3. Less: Variable cost	7,500	9,000	10,500
4. Contribution	5,000	6,000	7,000
5. Less: Fixed operating cost	5,000	5,000	5,000
6. EBIT	Zero	1,000	2,000
	– 100%		+ 100%

Interpretation

In case 2, 16.7 per cent decrease in sales volume (from 300 units to 250 units) leads to 100 per cent decline in the EBIT (from Rs 1,000 to zero). On the other hand, a 16.7 per cent increase in the sales level in case 1 (from 300 units to 350 units) results in 100 per cent increase in EBIT (from Rs 1,000 to Rs 2,000).

The two illustrations (Tables 1 and 2) clearly show that when a firm has fixed operating costs, an increase in sales volume results in a more than proportionate increase in EBIT. Similarly, a decrease in the level of sales has an exactly opposite effect. This is operating leverage; the former being favourable leverage, while the latter is unfavourable. Leverage, thus, works in both directions.

Alternative definition of Operating Leverage

When proportionate change in EBIT as a result of a given change in sales is more than the proportionate change in sales, operating leverage exists. The greater the DOL, the higher is the operating leverage. Symbolically,

$$DOL = \frac{\text{Percentage change in EBIT}}{\text{Percentage change in sales}} > 1 \qquad (1)$$

$$\text{Alternatively, } DOL = \frac{\Delta EBIT \div EBIT}{\Delta Q \div Q}$$

$$EBIT = Q(S - V) - F, \; \Delta EBIT = \Delta Q(S - V)$$

Where

Q = Sales quantity in units

S = Selling price per unit

V = Variable cost per unit

F = Total fixed costs.

$$DOL = \frac{\Delta Q(S - V)}{Q(S - V) - F} \times \frac{Q}{\Delta Q} = \frac{Q(S - V)}{Q(S - V) - F} = \frac{\text{Total Contribution (at base level)}}{\text{EBIT (at base level)}} \qquad (2)$$

Applying Equations 1 and 2 to Example 1 we get,

$$\text{DOL} = \frac{+100\%}{+50\%} = 2 \text{ (Case 1)}, \frac{-100\%}{-50\%} = 2 \text{ (Case 2)}$$

$$= \frac{\text{Rs } 1,00,000}{\text{Rs } 50,000} = 2$$

Similarly, in Example 2,

$$\text{DOL} = \frac{+100\%}{+16.7\%} = 6 \text{ (Case 1)}, \frac{-100\%}{-16.7\%} = 6 \text{ (Case 2)}$$

$$= \frac{\text{Rs } 6,000}{\text{Rs } 1,000} = 6$$

Since the DOL exceeds 1 in both the illustrations, operating leverage exists. However, the degree of operating leverage is higher (3 times) in the case of the firm in Example 2 as compared to the firm in Example 1, the respective quotients being 6 and 2. The quotients mean that for every 1 per cent change in sales, there will be 6 per cent (Examples 2) and 2 per cent (Example 1) change in EBIT in the direction the sales change.

Operating leverage exists only when there are fixed operating costs. If there are no fixed operating costs, there will be no operating leverage. Consider Example 3.

Example 3

Particulars	Base Level	New Level
1. Units sold	1,000	1,100
2. Sales price per unit	Rs 10	Rs 10
3. Variable cost per unit	6	6
4. Fixed operating cost	Nil	Nil

Solution The relevant computations are given in Table 3.

TABLE 3 EBIT for Various Sales Volume

Particulars	Base Level	New Level
1. Sales revenues	Rs 10,000	Rs 11,000
2. Less: Variable costs	6,000	6,600
3. Less: Fixed costs	—	—
4. EBIT	4,000	4,400

Applying Equation 1, DOL = 1. Since the quotient is 1, there is no operating leverage.

Financial Leverage

- **Financial leverage is related to the financing activities of a firm. It results from the presence of fixed financial charges (such as interest on debt and dividend on preference shares). Since such financial expenses do not vary with the operating profits, financial leverage is concerned with the effect of changes in EBIT on the earnings available to equity-holders. It is defined as the ability of a firm to use fixed financial charges to magnify the effect of changes in EBIT on the earnings per share (EPS).**

Financial Leverage

- **Financial leverage involves the use of funds obtained at a fixed cost in the hope of increasing the return to the equity-holders. When a firm earns more on the assets purchased with the funds than the fixed cost of their use, the financial leverage is favourable. Unfavourable leverage occurs when the firm does not earn as much as the funds cost.**
- **High fixed financial costs increase the financial leverage and, thus, financial risk. The financial risk refers to the risk of the firm not being able to cover its fixed financial costs. In case of default, the firm can be technically forced into liquidation. The larger is the amount of fixed financial costs, the larger is EBIT required to recover them. Thus, the DFL depends on fixed financial costs.**

Example 4

The financial manager of the Hypothetical Ltd expects that its earnings before interest and taxes (EBIT) in the current year would amount to Rs 10,000. The firm has 5 per cent bonds aggregating Rs 40,000, while the 10 per cent preference shares amount to Rs 20,000. What would be the earnings per share (EPS)? Assuming the EBIT being (i) Rs 6,000, and (ii) Rs 14,000, how would the EPS be affected? The firm can be assumed to be in the 35 per cent tax bracket. The number of outstanding ordinary shares is 1,000.

Solution

TABLE 4 EPS for Various EBIT Levels

	Case 2	Base	Case 1
	–40%		+40%
EBIT	Rs 6,000	Rs 10,000	Rs 14,000
Less: Interest on bonds	2,000	2,000	2,000
Earnings before taxes (EBT)	4,000	8,000	12,000
Less: Taxes (35%)	1,400	2,800	4,200
Earning after taxes (EAT)	2,600	5,200	7,800
Less: Preference dividend	2,000	2,000	2,000
Earnings available for ordinary shareholders	600	3,200	5,800
Earnings per share (EPS)	0.6	3.2	5.8
	– 81.25%		+81.25%

The interpretation of Table 4 is as follows:

Case 1:

A 40 per cent increase in EBIT (from Rs 10,000 to Rs 14,000) results in 81.25 per cent increase in EPS (from Rs 3.2 to Rs 5.8).

Case 2:

A 40 per cent decrease in EBIT (from Rs 10,000 to Rs 6,000) leads to 81.25 per cent decrease in EPS (from Rs 3.2 to Re 0.6).

Example 5

A company has Rs 1,00,000, 10% debentures and 5,000 equity shares outstanding. It is in the 35 per cent tax-bracket. Assuming three levels of EBIT (i) Rs 50,000, (ii) Rs 30,000, and (iii) Rs 70,000, calculate the change in EPS (base level of EBIT = Rs 50,000).

Solution

TABLE 5 EPS at Various EBIT Levels

	Case 2	Base	Case 1
	–40%		+40%
EBIT	Rs 30,000	Rs 50,000	Rs 70,000
Less: interest	10,000	10,000	10,000
Earnings before taxes	20,000	40,000	60,000
Less: Taxes	7,000	14,000	21,000
Earning after taxes	13,000	26,000	39,000
Earnings per share (EPS)	2.6	5.2	7.8
	– 50%		+50%

Thus, a 40 per cent increase in EBIT in case 2 from the base level of EBIT has led to 50 per cent increase in EPS. And a decrease of 40 per cent in EBIT has decreased the EPS by 50 per cent.

Alternative Definition of Financial Leverage

The procedure outlined above is merely indicative of the presence or absence of financial leverage. Financial leverage can be more precisely expressed in terms of the degree of financial leverage (DFL). The DFL can be calculated by Eq. (3)

$$\text{DFL} = \frac{\text{Percentage change in EPS}}{\text{Percentage change in EBIT}} > 1 \qquad (3)$$

$$\text{Alternatively, DFL} = \frac{\Delta\text{EPS} \div \text{EPS}}{\Delta\text{EBIT} \div \text{EBIT}}$$

$$\text{EPS} = \frac{[(\text{EBIT} - I)(1-t) - D_p]}{N}$$

$$= \frac{[Q(S-V) - F - I](1-t) - D_p}{N}$$

Since, F, I and D_p are constants,

$$\Delta\text{EPS} = [\Delta Q(S-V)](1-t)/N$$

$$\frac{\Delta\text{EPS}}{\text{EPS}} = \frac{[\Delta Q(S-V)](1-t)}{[Q(S-V) - F - I](1-t) - D_p}$$

Dividing numerator and denominator by $(1-t)$

$$= \frac{[\Delta Q(S-V)]}{[Q(S-V) - F - I] - D_p/(1-t)}$$

$$\text{DFL} = \frac{[\Delta Q(S-V)]}{[Q(S-V) - F - I] - D_p/(1-t)} \times \frac{Q(S-V) - F}{Q(S-V)}$$

$$= \frac{Q(S-V) - F}{[Q(S-V) - F - I] - D_p/(1-t)} = \frac{\text{EBIT}}{\text{EBIT} - I - D_p/(1-t)} \qquad (4)$$

Applying Equations 3 to Case 1 and Case 2 in Examples 4 and 5,

(i) For Example 4 : Case 1 $= \frac{+81.25\%}{+40\%} = 2.03$, Case 2 $= \frac{-81.25}{-40\%} = 2.03$

$$= \frac{\text{Rs } 10,000}{\text{Rs } 10,000 - \text{Rs}2,000 - [\text{Rs } 2,000/(1-0.35)]} = 2.03$$

(ii) Example 5 : Case 1 $= \frac{+50\%}{+40\%} = 1.25$, Case 2 $= \frac{-50\%}{-40\%} = 1.25$

$$= \frac{\text{Rs } 50,000}{\text{Rs } 50,000 - \text{Rs } 10,000} = 1.25$$

As a rule, when a percentage change in EPS resulting from a given percentage change in EBIT is greater than the percentage change in EBIT, financial leverage exists. In other words, financial leverage occurs when the quotient in Equation 3 is more than one.

In both the examples, the relevant quotient is larger than one. Therefore, financial leverage exists. But the degree of financial leverage is higher in Example 4 (2.03) than in Example 5 (1.25). The higher the quotient of percentage change in EPS due to percentage change in EBIT, the greater is the degree of financial leverage. The quotient of 2.03 implies that 1 per cent change in EBIT will cause 2.03 per cent change in EPS in the same direction (± increase/decrease) in which the EBIT changes. With 1.25 quotient the proportionate change in EPS as a result of 1 per cent change in EBIT will be comparatively less, that is, 1.25 per cent in either direction.

There will be, however, no financial leverage, if there is no fixed-charged financing. (Table 6).

TABLE 6 EPS at Various EBIT Levels

	Case 2	Base	Case 1
	– 40%		+40%
EBIT	Rs 30,000	Rs 50,000	Rs 70,000
Less: Taxes (0.35)	10,500	17,500	24,500
Earnings available for equity-holders	19,500	32,500	45,500
Number of shares	10,000	10,000	10,000
EPS	1.95	3.25	4.55
	– 40%		+40%

Degree of financial leverage (DFL): Applying Eq. (3)

(i) Case 1 = (+40% / + 40%) = 1

(ii) Case 2 = (-40% / -40%) = 1

Thus, the quotient is 1. Its implication is that 1 per cent change in EBIT will result in 1 per cent change in EPS, that is, proportionate. There is, therefore, no magnification in the EPS.

COMBINED LEVERAGE: TOTAL RISK

Combined leverage is the product of operating leverage and financial leverage.

Total risk is the risk associated with combined leverage.

DCL = DOL X DFL (11)

$$DCL = \frac{\%\text{change in EBIT}}{\%\text{ change in sales}} \times \frac{\%\text{change in EPS}}{\%\text{change in EBIT}} = \frac{\%\text{change in EPS}}{\%\text{change in sales}} \quad (12)$$

$$DCL = \frac{\text{Contributi on}}{\text{EIBT}} \times \frac{\text{EBIT}}{\text{EBIT} - I} = \frac{\text{Contributi on}}{\text{EBIT} - I} \quad (13)$$

Thus, the DCL measures the percentage change in EPS due to percentage change in sales. If the degree of operating leverage of a firm is 6 and its financial leverage is 2.5, the combined leverage of this firm would be 15(6 x 2.5). That is, 1 per cent change in sales would bring about 15 per cent change in EPS in the direction of the change in sales. The combined leverage can work in either direction. It will be favourable if sales increase and unfavourable when sales decrease because changes in sales will result in more than proportionate returns in the form of EPS.

PROBLEM 14.4 Consider the following information for Kaunark Enterprise:

	₹ *in lakh*
EBIT	1,120
PBT	320
Fixed cost	700

Calculate percentage change in earnings per share if sales increased by 5 per cent.

SOLUTION:

(*a*) Degree of operating leverage

$$\text{DOL} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{\text{EBIT + Fixed Cost}}{\text{EBIT}}$$

$$= \frac{1{,}120 + 700}{1{,}120} = 1.625$$

(*b*) Degree of financial leverage

$$\text{DFL} = \frac{\text{EBIT}}{\text{PBT}} = \frac{1{,}120}{320} = 3.5$$

(*c*) Degree of combined leverage

$$\text{DCL} = \text{DOL} \times \text{DFL} = 1.625 \times 3.5 = 5.6875$$

Change in EPS can be calculated as:

$$\text{DCL} = \frac{\%\ \text{Change in EPS}}{\%\ \text{Change in Sales}}$$

$$5.6875 = \frac{\%\ \text{Change in EPS}}{5}$$

$$\%\ \text{change in EPS} = 5 \times 5.6875 = 28.4375\%$$

PROBLEM 14.1 *AB* Ltd needs ₹10 lakh (one million) for expansion. The expansion is expected to yield an annual EBIT of ₹160,000. In choosing a financial plan, *AB* Ltd has an objective of maximizing earnings per share. It is considering the possibility of issuing equity shares and raising debt of ₹100,000, or ₹400,000 or ₹600,000. The current market price per share is ₹25 and is expected to drop to ₹20 if the funds are borrowed in excess of ₹500,000. Funds can be borrowed at the rates indicated below: (*a*) up to ₹100,000 at 8%; (*b*) over ₹100,000 up to ₹500,000 at 12%; (*c*) over ₹500,000 at 18%.

Assume a tax rate of 50 per cent. Determine the EPS for the three financing alternatives.

Solution

SOLUTION:

The EPS is determined as follows:

	Alternatives		
	I (₹100,000 debt) ₹	*II* (₹400,000 debt) ₹	*III* (₹600,000 debt) ₹
EBIT	160,000	160,000	160,000
Interest	8,000	44,000	74,000
PBT	152,000	116,000	86,000
Taxes at 50%	76,000	58,000	43,000
PAT	76,000	58,000	43,000
No. of shares	36,000	24,000	20,000
EPS	2.11	2.42	2.15

The second alternative maximizes EPS; therefore, it is the best financial alternative in the present case.

The interest charges for alternatives II and III are calculated as follows:

Interest Calculation, Alternative II

₹		₹
100,000 @	8%	8,000
300,000 @	12%	36,000
	Total	44,000

Interest Calculation, Alternative III

₹		₹
100,000 @	8%	8,000
400,000 @	12%	48,000
100,000 @	18%	18,000
	Total	74,000

The number of shares are found out by dividing the amount to be raised through equity issue by the market price per share. The market price per share is ₹25 in case of first two alternatives and ₹20 in case of the last alternative.

EBIT-EPS Analysis

To devise an appropriate capital structure, the amount of EBIT under various financing plans should be related to EPS. The EBIT-EPS analysis is a widely-used method of examining the effect of financial leverage/use of debt. A financial alternative that ensures the largest EPS is preferred, given the level of EBIT.

Example 6

Suppose a firm has a capital structure exclusively comprising of ordinary shares amounting to Rs 10,00,000. The firm now wishes to raise additional Rs 10,00,000 for expansion. The firm has four alternative financial plans:

(A) It can raise the entire amount in the form of equity capital.

(B) It can raise 50 per cent as equity capital and 50 per cent as 5% debentures.

(C) It can raise the entire amount as 6% debentures.

(D) It can raise 50 per cent as equity capital and 50 per cent as 5% preference capital.

Further assume that the existing EBIT are Rs 1,20,000, the tax rate is 35 per cent, outstanding ordinary shares 10,000 and the market price per share is Rs 100 under all the four alternatives.

Which financing plan should the firm select?

Solution

TABLE 7 EPS Under Various Financial Plans

Particulars	Financing plans			
	A	B	C	D
EBIT	Rs 1,20,000	Rs 1,20,000	Rs 1,20,000	Rs 1,20,000
Less: Interest	—	25,000	60,000	—
Earnings before taxes	1,20,000	95,000	60,000	1,20,000
Taxes	42,000	33,250	21,000	42,000
Earnings after taxes	78,000	61,750	39,000	78,000
Less: Preference dividend	—	—	—	25,000
Earnings available to ordinary shareholders	78,000	61,750	39,000	53,000
Number of shares	20,000	15,000	10,000	15,000
Earnings per share (EPS)	3.9	4.1	3.9	3.5

The calculations in Table 7 reveal that given a level of EBIT of Rs 1,20,000, the financing alternative B, which involves 50 per cent ordinary shares and 50 per cent debt, is the most favourable with respect to EPS. Another disclosure of the table is that although the proportion of ordinary shares in the total capitalisation under the financing plan D is also 50 per cent, that is, equal to plan B, EPS is considerably different (lowest). The difference in the plans B and D is due to the fact that interest on debt is tax-deductible while the dividend on preference shares is not. With 35 per cent income tax, the explicit cost of preference shares would be higher than the cost of debt.

Indifference point EBIT level beyond which benefits of financial leverage accrue with respect to EPS.

The indifference point between two methods of financing can be obtained mathematically (algebraic approach) as well as graphically.

Algebraic Approach

Mathematically, the indifference point can be obtained by using the following symbols:

- X = earnings before interest and taxes (EBIT) at the indifference point
- N_1 = number of equity shares outstanding if only equity shares are issued
- N_2 = number of equity shares outstanding if both debentures and equity shares are issued
- N_3 = number of equity shares outstanding if both preference and equity shares are issued
- N_4 = number of equity shares outstanding if both preference shares and debentures are issued
- I = the amount of interest on debentures
- D_P = the amount of dividend on preference shares
- t = corporate income tax rate
- D_t = tax on preference dividend

For a New Company

The indifference point can be determined by using the following equations:

(i)Equity shares versus Debentures : $$\frac{X(1-t)}{N_1}=\frac{(X-I)(1-t)}{N_2} \quad (6)$$

(ii)(a) Equity shares versus Preference shares : $$\frac{X(1-t)}{N_1}=\frac{X(1-t)-D_p}{N_3} \quad (7)$$

(ii)(b) Equity shares versus Preference shares with tax on Preference dividend :

$$\frac{X(1-t)}{N_1}=\frac{X(1-t)-D_p(1+Dt)}{N_3} \quad (7A)$$

(iii)Equity shares versus Preference shares and Debentures : $$\frac{X(1-t)}{N_1}=\frac{(X-I)(1-t)-D_p}{N_4} \quad (8)$$

For an Existing Company

If the debentures are already outstanding, let us assume I_1 = interest paid on existing debt, and I_2 = interest payable on additional debt, then the indifference point would be determined by Equation 9.

$$\frac{(X-I_1)(1-t)}{N_1}=\frac{(X-I_1-I_2)(1-t)}{N_2} \quad (9)$$

Example 7

The financial manager of a company has formulated various financial plans to finance Rs 30,00,000 required to implement various capital budgeting projects:

1) Either equity capital of Rs 30,00,000 or Rs 15,00,000 10% debentures and Rs 15,00,000 equity;
2) Either equity capital of Rs 30,00,000 or 13% preference shares of Rs 10,00,000 and Rs 20,00,000 equity;
3) Either equity capital of Rs 30,00,000 or 13% preference capital of Rs 10,00,000, (subject to dividend tax of 10 per cent), Rs 10,00,000 10% debentures and Rs 10,00,000 equity; and
4) Either equity share capital of Rs 20,00,000 and 10% debentures of Rs 10,00,000 or 13% preference capital of Rs 10,00,000, 10% debentures of Rs 8,00,000 and Rs 12,00,000 equity.

You are required to determine the indifference point for each financial plan, assuming 35 per cent corporate tax rate and the face value of equity shares as Rs 100.

Solution

$$(i)\ \frac{X(1-t)}{N_1} = \frac{(X-I)(1-t)}{N_2}$$

$$Or\ \frac{X(1-0.35)}{30,000} = \frac{(X-Rs\,1,50,000)(1-0.35)}{15,000}$$

$$Or\ \frac{0.65X}{30,000} = \frac{0.65X - Rs\,97,500}{15,000}$$

$$Or\ 0.65X = 1.3X - Rs\,1,95,000$$

$$Or\ -0.65X = -Rs\,1,95,000$$

$$X = Rs\,1,95,000 / 0.65 = Rs\,3,00,000$$

Confirmation Table

Particulars	Equity financing	Equity + debt financing
EBIT	Rs 3,00,000	Rs 3,00,000
Less: Interest	—	1,50,000
Earning before taxes	3,00,000	1,50,000
Less: Taxes	1,05,000	52,500
Earnings for equity-holders	1,95,000	97,500
Number of equity shares	30,000	15,000
EPS	6.5	6.5

(ii) $\frac{X(1-t)}{N_1} = \frac{(X-I)-D_p}{N_3}$

Or $\frac{X(1-0.35)}{30,000} = \frac{(1-0.35)-Rs\,1,30,000}{20,000}$

Or $\frac{0.65X}{30,000} = \frac{0.65X-Rs1,30,000}{20,000}$

$X = Rs\,6,00,000$

Confirmation Table

Particulars	Equity financing	Equity + Preference financing
EBIT	Rs 6,00,000	Rs 6,00,000
Less: Taxes	2,10,000	2,10,000
Earning after taxes	3,90,000	3,90,000
Less: Dividends on preference shares	—	1,30,000
Earnings for equity-holders	3,90,000	2,60,000
Number of equity shares	30,000	20,000
EPS	13	13

$$(iii)\ \frac{X(1-t)}{N_1} = \frac{(X-I)-D_p(1+Dt)}{N_2}$$

$$Or\ \frac{X(1-0.35)}{30{,}000} = \frac{(X-Rs\,1{,}00{,}000)(1-0.35)-Rs\,1{,}30{,}000(1+0.1)}{10{,}000}$$

$$Or\ \frac{0.65X}{30{,}000} = \frac{0.65X-Rs\,65{,}000-Rs\,1{,}43{,}000}{10{,}000}$$

$$X = Rs\,4{,}80{,}000$$

Confirmation Table

Particulars	Equity financing	Equity + Preference + Debentures financing
EBIT	Rs 4,80,000	Rs 4,80,000
Less: Interest	—	1,00,000
Earnings after interest	4,80,000	3,80,000
Less: Taxes	1,68,000	1,33,000
Earning after taxes	3,12,000	2,47,000
Less: Dividends including dividend tax on preference shares	—	1,43,000
Earnings available for equity holders	3,12,000	1,04,000
Number of equity shares	30,000	10,000
EPS	18.4	18.4

$$(iv)\ \frac{(X-1)(1-t)}{N_2}=\frac{(X-I)(1-t)-D_p}{N_4}$$

$$Or\ \frac{(X-Rs\,1,00,000)(1-0.35)}{20,000}=\frac{(X-80,000)(1-0.35)-1,30,000}{12,000}$$

$$X=Rs\,5,50,000$$

Confirmation Table

Particulars	Equity financing	Equity + Debt + Preference financing
EBIT	Rs 5,50,000	Rs 5,50,000
Less: Interest	1,00,000	80,000
Earnings before taxes	4,50,000	4,70,000
Less: Taxes	1,57,500	1,64,500
Earning after taxes	2,92,500	3,05,500
Less: Dividends on preference shares	—	1,30,000
Earnings for equity-holders	2,92,500	1,75,500
Number of equity shares	20,000	12,000
EPS	14.625	14.625

PROBLEM 14.2 A company needs ₹500,000 for construction of a new plant. The following three financial plans are feasible: (*i*) The company may issue 50,000 ordinary shares at ₹10 per share. (*ii*) The company may issue 25,000 ordinary shares at ₹10 per share and 2,500 debentures of ₹100 denominations bearing a 8 per cent rate of interest. (*iii*) The company may issue 25,000 ordinary shares at ₹10 per share and 2,500 preference shares at ₹100 per share bearing a 8 per cent rate of dividend.

If the company's earnings before interest and taxes are ₹10,000, ₹20,000 ₹40,000, ₹60,000 and ₹100,000, what are the earnings per share under each of the three financial plans? Which alternative would you recommend and why? Determine the indifference points by formulae and graphically. Assume a corporate tax rate of 50 per cent.

The earnings per share under the three financial plans are calculated as follows:

First Alternative:

	₹	₹	₹	₹	₹
EBIT	10,000	20,000	40,000	60,000	1,00,000
Interest	0	0	0	0	0
PBT	10,000	20,000	40,000	60,000	1,00,000
Taxes @ 50%	5,000	10,000	20,000	30,000	50,000
PAT	5,000	10,000	20,000	30,000	50,000
No. of shares	50,000	50,000	50,000	50,000	50,000
EPS	0.10	0.20	0.40	0.60	1.00

Second Alternative:

	₹	₹	₹	₹	₹
EBIT	10,000*	20,000	40,000	60,000	100,000
Interest	20,000*	20,000	20,000	20,000	20,000

	₹	₹	₹	₹	₹
PBT	(10,000)*	0	20,000	40,000	80,000
Taxes @ 50%	(5,000)*	0	10,000	20,000	40,000
PAT	(5,000)*	0	10,000	20,000	40,000
No. of shares	25,000*	25,000	25,000	25,000	25,000
EPS	(0.20)*	0.00	0.40	0.80	1.60

*It is assumed that the company will be able to set-off losses against other profits. If the company has no profits from other operations, losses will be carried forward.

Third Alternative:

	₹	₹	₹	₹	₹
EBIT	10,000	20,000	40,000	60,000	100,000
Interest	0	0	0	0	0
PBT	10,000	20,000	40,000	60,000	100,000
Taxes @ 50%	5,000	10,000	20,000	30,000	50,000
PAT	5,000	10,000	20,000	30,000	50,000
Pref. Dividend	20,000	20,000	20,000	20,000	20,000
PAT for ordinary shareholders	(15,000)	(10,000)	0	10,000	30,000
No. of shares	25,000	25,000	25,000	25,000	25,000
EPS	(0.60)	(0.40)	0.00	0.40	1.20

The choice of the financial plan will depend on the state of economic conditions. If the company's sales are increasing, the earnings per share will be maximum under the second financial alternative. Under favourable conditions, debt financing gives more benefit than equity or preference financing. Debt capital is cheaper than preference capital because interest on debt is tax deductible while preference dividend is not.

The indifference points are determined by formula and graphically as follows:

(*i*) Indifference point between first and second alternatives:

$$\frac{(1-T)\text{EBIT}}{N_1} = \frac{(\text{EBIT}-\text{INT})(1-T)}{N_2}$$

$$\text{EBIT} = \frac{N_1}{N_1 - N_2} \times \text{INT}$$

$$= \frac{50,000}{50,000 - 25,000} \times 20,000$$

$$\text{EBIT} = 2 \times 20,000 = ₹40,000$$

(*ii*) Indifference point between first and thir alternatives:

$$\frac{(1-T)\text{EBIT}}{N_1} = \frac{(1-T)\text{EBIT} - \text{PDIV}}{N_2}$$

$$\text{EBIT} = \frac{N_1}{N_1 - N_2} \times \frac{\text{PDIV}}{1-T}$$

$$= \frac{50,000}{50,000 - 25,000} \times \frac{20,000}{1-0.5}$$

$$\text{EBIT} = 2 \times 40,000 = ₹80,000$$

PROBLEM 14.3 Two firms *A* and *B* have the following information:

(₹ lakh)

	Sales	*Variable Costs*	*Fixed Costs*
Firm *A*	1,800	450	900
Firm *B*	1,500	750	375

You are required to calculate (*a*) profit to sales ratio, (*b*) break-even point, and (*c*) the degree of operating leverage for both firms.

SOLUTION:

(*a*) (*i*) Contribution ratio: Contribution/Sales

$$Firm\ A: \frac{1{,}800-450}{1{,}800} = \frac{1{,}350}{1{,}800} = 0.75 \text{ or } 75\%$$

$$Firm\ B: \frac{1{,}500-750}{1{,}500} = \frac{750}{1{,}500} = 0.50 \text{ or } 50\%$$

(*ii*) Profit margin: Profit/Sales

$$Firm\ A: \frac{1{,}350-900}{1{,}800} = \frac{450}{1{,}800} = 0.25 \text{ or } 25\%$$

$$Firm\ B: \frac{750-375}{1{,}500} = \frac{370}{1{,}500} = 0.25 \text{ or } 25\%$$

(*b*) Break-even point

$$Firm\ A: \frac{900}{0.75} = ₹1{,}200$$

$$Firm\ B: \frac{375}{0.50} = ₹750$$

(c) Degree of operating leverage: Contribution/EBIT

$$\textit{Firm A: } \frac{1{,}350}{450} = 3.0$$

$$\textit{Firm B: } \frac{750}{375} = 2.0$$

PROBLEM 14.4 Consider the following information for Kaunark Enterprise:

	₹ *in lakh*
EBIT	1,120
PBT	320
Fixed cost	700

Calculate percentage change in earnings per share if sales increased by 5 per cent.

SOLUTION:

(*a*) Degree of operating leverage

$$\text{DOL} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{\text{EBIT + Fixed Cost}}{\text{EBIT}}$$

$$= \frac{1{,}120 + 700}{1{,}120} = 1.625$$

(*b*) Degree of financial leverage

$$\text{DFL} = \frac{\text{EBIT}}{\text{PBT}} = \frac{1{,}120}{320} = 3.5$$

(*c*) Degree of combined leverage

$$\text{DCL} = \text{DOL} \times \text{DFL} = 1.625 \times 3.5 = 5.6875$$

Change in EPS can be calculated as:

$$\text{DCL} = \frac{\%\text{ Change in EPS}}{\%\text{ Change in Sales}}$$

$$5.6875 = \frac{\%\text{ Change in EPS}}{5}$$

$$\%\text{ change in EPS} = 5 \times 5.6875 = 28.4375\%$$