



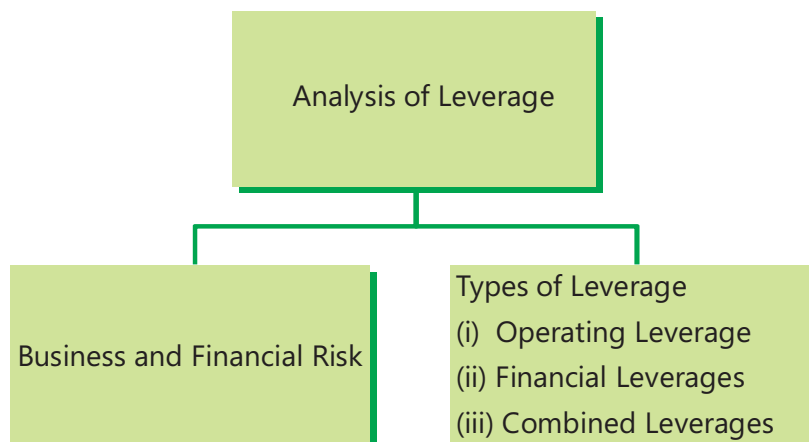
FINANCING DECISIONS- LEVERAGES



LEARNING OUTCOMES

- ❑ Understand the concept of business risk and financial risk.
- ❑ Discuss and Interpret the types of leverages.
- ❑ Discuss the relationship between operating leverage and Break -even analysis.
- ❑ Discuss positive and negative Leverage.
- ❑ Discuss Financial leverage as 'Trading on equity
- ❑ Discuss Financial leverage as 'Double edged sword'.

CHAPTER OVERVIEW



6.1 INTRODUCTION

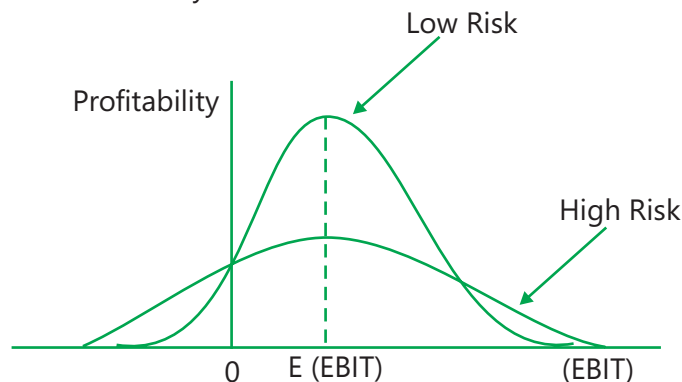
A firm can finance its operations through common and preference shares, with retained earnings, or with debt. Usually a firm uses a combination of these financing instruments. Capital structure refers to a firm's debt-to-equity ratio, which provides insight into how risky a company is. Capital structure decisions by firms will have an effect on the expected profitability of the firm, the risks faced by debt holders and shareholders, the probability of failure, the cost of capital and the market value of the firm.

6.1.1 Business Risk and Financial Risk

Risk facing the common shareholders is of two types, namely business risk and financial risk. Therefore, the risk faced by common shareholders is a function of these two risks, i.e. {Business Risk, Financial Risk}

Business Risk:- It refers to the risk associated with the firm's operations. It is the uncertainty about the future operating income (EBIT), i.e. how well can the operating incomes be predicted?

Business risk can be measured by the standard deviation of the Basic Earning Power ratio.



Financial Risk:- It refers to the additional risk placed on the firm's shareholders as a result of debt use i.e. the additional risk a shareholder bears when a company uses debt in addition to equity financing. Companies that issue more debt instruments would have higher financial risk than companies financed mostly or entirely by equity.

6.2 DEBT VERSUS EQUITY FINANCING

Financing a business through borrowing is cheaper than using equity. This is because:

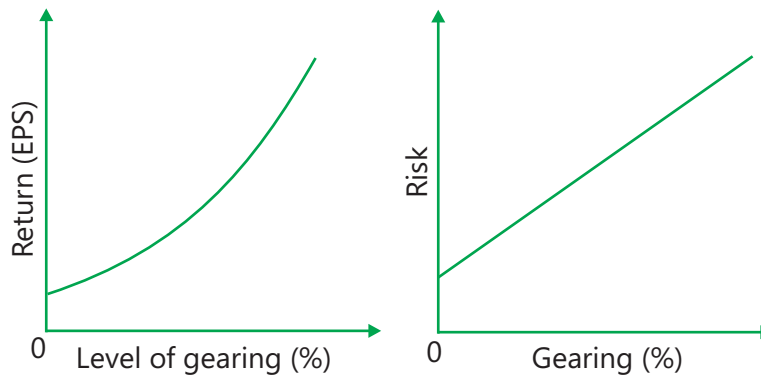
- Lenders require a lower rate of return than ordinary shareholders. Debt financial securities present a lower risk than shares for the finance providers because they have prior claims on annual income and liquidation.

- A profitable business effectively pays less for debt capital than equity for another reason: the debt interest can be offset against pre-tax profits before the calculation of the corporate tax, thus reducing the tax paid.
- Issuing and transaction costs associated with raising and servicing debt are generally less than for ordinary shares.

These are some benefits from financing a firm with debt. Still firms tend to avoid very high gearing levels.

One reason is financial distress risk. This could be induced by the requirement to pay interest regardless of the cash flow of the business. If the firm goes through a rough period in its business activities it may have trouble paying its bondholders, bankers and other creditors their entitlement.

The relationship between Expected return (Earnings per share) and the level of gearing can be represented as:



Relationship between leverage and risk

Leverage can occur in either the *operating* or *financing* portions of the income statement.

The effect of leverage is to *magnify* the effects of changes in sales volume on earnings. Let's now discuss in detail Operating, Financing and Combined Leverages.



6.3 MEANING AND TYPES OF LEVERAGE

6.3.1 Meaning of Leverage

Leverage refers to the ability of a firm in employing long term funds having a fixed cost, to enhance returns to the owners. In other words, leverage is the amount of debt that a firm uses to finance its assets. A firm with a lot of debt in its capital structure is said to be highly levered. A firm with no debt is said to be unlevered.

The term Leverage in general refers to a relationship between two interrelated variables. In financial analysis it represents the influence of one financial variable over some other related financial variable. These financial variables may be costs, output, sales revenue, Earnings Before Interest and Tax (EBIT), Earning per share (EPS) etc.

6.3.2 Types of Leverage

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

- (i) Operating Leverage
- (ii) Financial Leverage
- (iii) Combined Leverage

6.3.3 Chart Showing Operating Leverage, Financial Leverage and Combined leverage

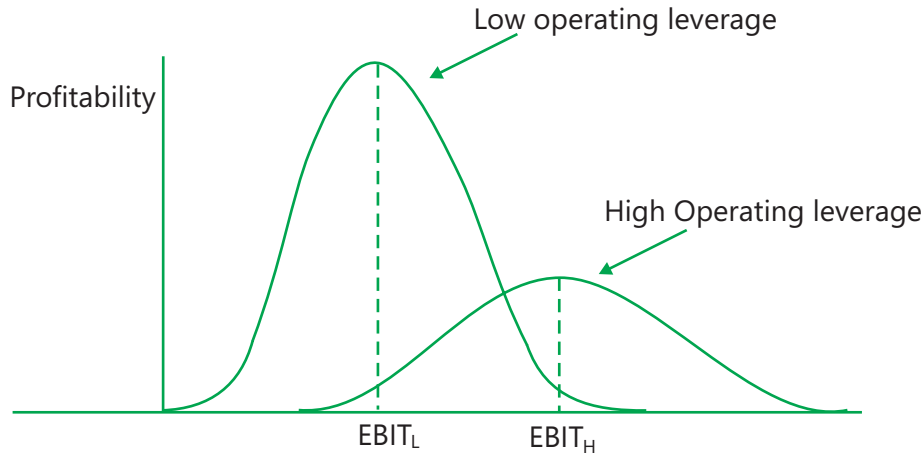
Profitability Statement			
Sales	xxx		
Less: Variable Cost	(xxx)		
Contribution	xxx	} Operating } Leverage	} Combined } Leverage
Less: Fixed Cost	(xxx)		
Operating Profit/ EBIT	xxx		
Less: Interest	(xxx)	} Financial } Leverage	
Earnings Before Tax (EBT)	xxx		
Less: Tax	(xxx)		
Profit After Tax (PAT)	xxx		
Less: Pref. Dividend (if any)	(xxx)		
Net Earnings available to equity shareholders/ PAT	xxx		
No. Equity shares (N)			
Earnings per Share (EPS) = (PAT ÷ N)			

6.3.4 Operating Leverage

Operating leverage (OL) may be defined as the employment of an asset with a fixed cost in the hope that sufficient revenue will be generated to cover all the fixed and variable costs.

The use of assets for which a company pays a fixed cost is called operating leverage.

With fixed costs the percentage change in profits accompanying a change in volume is greater than the percentage change in volume. The higher the turnover of operating assets, the greater will be the revenue in relation to the fixed charge on those assets.



Operating leverage is a function of three factors:

- (i) Amount of fixed cost
- (ii) Variable contribution margin and
- (iii) Volume of sales.

$$\text{Operating Leverage (OL)} = \frac{\text{Contribution (C)}}{\text{Earnings before interest and tax (EBIT)}}$$

Where, Contribution (C) = Sales – Variable cost

EBIT = Sales – Variable cost – Fixed cost

6.3.5 Break-Even Analysis and Leverage

Break-even analysis is a generally used method to study the Cost Volume Profit analysis. This technique can be explained in two ways:

- (i) It is concerned with computing the break-even point. At this point of production level and sales there will be no profit and loss i.e. total cost is equal to total sales revenue.
- (ii) This technique is used to determine the possible profit/loss at any given level of production or sales

$$\text{Break - even point in units} = \frac{\text{Fixed Cost}}{\text{Contribution per unit}}$$

Particulars	Product X	Product Y
	(₹)	(₹)
Selling Price	40	20
Variable Cost	20	12
Contribution	20	8

Total Contribution of 1,000 units	20,000	8,000
Fixed Cost	15,000	5,000
Profit (EBIT)	5,000	3,000
Break- even point (Fixed Cost / Contribution)	$\frac{15,000}{20} = 750$ units	$\frac{5,000}{8} = 625$ units
Operating Leverage $\left(\frac{\text{Contribution}}{\text{EBIT}} \right)$	$\frac{20,000}{5,000} = 4$	$\frac{8,000}{3,000} = 2.67$

There is a relationship between leverage and Break-even point. Both are used for profit planning. In brief the relationship between leverage, break-even point and fixed cost as under:

Leverage	Break-even point
1. Firm with leverage	1. Higher Break-even point
2. Firm with no leverage	2. Lower Break-even point

Fixed cost	Operating leverage
1. High fixed cost	1. High degree of operating leverage
2. Lower fixed cost	2. Lower degree of operating leverage

6.3.6 Degree of Operating Leverage (DOL)

The operating leverage may also be 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."

$$\text{Degree of Operating Leverage (DOL)} = \frac{\text{Percentage change in EBIT}}{\text{Percentage change in Sales}}$$

or

$$= \frac{\frac{\Delta \text{EBIT}}{\text{EBIT}}}{\frac{\Delta \text{Sales}}{\text{Sales}}}$$

Δ EBIT means changes in EBIT

Δ Sales means changes in sales

When DOL is more than one (1), operating leverage exists. More is the DOL higher is operating leverage.

A positive DOL/OL means that the firm is operating at higher level than the break-even level and both sales and EBIT moves in the same direction. In case of negative DOL/OL firm operates at lower than the break-even and EBIT is negative.

Situation 1: No. Fixed Cost

Particulars	20,000 units (₹)	30,000 units (₹)
Sales @ ₹10	2,00,000	3,00,000
Variable cost @ ₹ 5	1,00,000	1,50,000
EBIT	1,00,000	1,50,000

$$\text{Degree of Ooperative leverage (DOL)} = \frac{\text{Percentage change in EBIT}}{\text{Percentage change in sales}} = \frac{50\%}{50\%} = 1$$

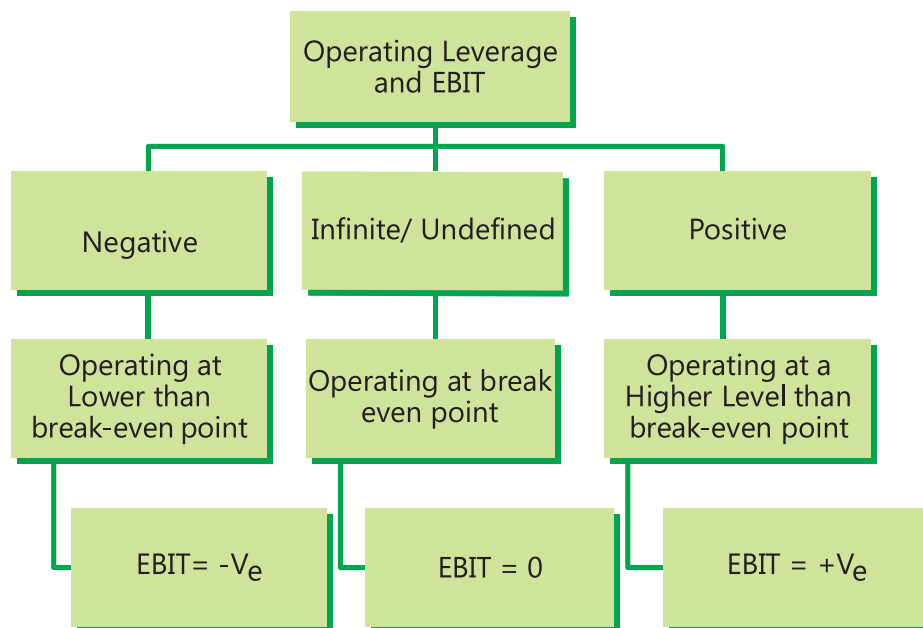
Situation 2: Positive Leverage

Particulars	(₹)	(₹)
Sales @ ₹10	2,00,000	3,00,000
Variable Cost @ ₹5	1,00,000	1,50,000
Contribution	1,00,000	1,50,000
Fixed Cost	50,000	50,000
EBIT	50,000	1,00,000

$$\text{Degree of Operative leverage (DOL)} = \frac{\text{Percentage change in EBIT}}{\text{Percentage change in sales}} = \frac{100\%}{50\%} = 2$$

Situation 3: When EBIT is Nil (contribution = fixed cost)

$$\text{Degree of Operating Leverage (DOL)} = \frac{\text{Contribution}}{0} = \text{Undefined.}$$



Positive and Negative Operating Leverage

Analysis and Interpretation of operating leverage

S. No.	Situation	Result
1	No Fixed Cost	No operating leverage
2.	Higher Fixed cost	Higher Break-even point
3.	Higher than Break-even level	Positive operating leverage
4.	Lower than Break-even level	Negative operating leverage

ILLUSTRATION 1

A Company produces and sells 10,000 shirts. The selling price per shirt is ₹ 500. Variable cost is ₹ 200 per shirt and fixed operating cost is ₹ 25,00,000.

- Calculate operating leverage.
- If sales are up by 10%, then what is the impact on EBIT?

SOLUTION**(a)** Statement of Profitability

Particulars	(₹)
Sales Revenue (10,000 × 500)	50,00,000
Less: Variable Cost (10,000 × 200)	20,00,000
Contribution	30,00,000
Less: Fixed Cost	25,00,000
EBIT	5,00,000

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{\text{₹30 lakhs}}{\text{₹5 lakhs}} = 6 \text{ times}$$

$$\text{(b) Operating Leverage (OL)} = \frac{\% \text{ Change in EBIT}}{\% \text{ Change in Sales}}$$

$$6 = \frac{X / 5,00,000}{5,00,000 / 50,00,000}$$

$$X = ₹ 3,00,000$$

$$\therefore \Delta \text{ EBIT} = ₹ 3,00,000 / 5,00,000$$

$$= 60\%$$

ILLUSTRATION 2

Calculate the operating leverage for each of the four firms A, B, C and D from the following price and cost data:

	Firms			
	A (₹)	B (₹)	C (₹)	D (₹)
Sale price per unit	20	32	50	70
Variable cost per unit	6	16	20	50
Fixed operating cost	60,000	40,000	1,00,000	Nil

What calculations can you draw with respect to levels of fixed cost and the degree of operating leverage result? Explain. Assume number of units sold is 5,000.

SOLUTION

Particulars	Firms			
	A	B	C	D
Sales (units)	5,000	5,000	5,000	5,000
Sales revenue (Units × price) (₹)	1,00,000	1,60,000	2,50,000	3,50,000
Less: Variable cost (Units × variable cost per unit) (₹)	(30,000)	(80,000)	(1,00,000)	(2,50,000)
Less: Fixed operating costs (₹)	(60,000)	(40,000)	(1,00,000)	Nil
EBIT	10,000	40,000	50,000	1,00,000

$$DOL = \frac{\text{Current sales (S) - Variable costs (VC)}}{\text{Current EBIT}}$$

$$DOL_{(A)} = \frac{₹ 1,00,000 - ₹ 30,000}{₹ 10,000} = 7$$

$$DOL_{(B)} = \frac{₹ 1,60,000 - ₹ 80,000}{₹ 40,000} = 2$$

$$DOL_{(C)} = \frac{₹ 2,50,000 - ₹ 1,00,000}{₹ 50,000} = 3$$

$$DOL_{(D)} = \frac{₹ 3,50,000 - ₹ 2,50,000}{₹ 1,00,000} = 1$$

The operating leverage exists only when there are fixed costs. In the case of firm D, there is no magnified effect on the EBIT due to change in sales. A 20 per cent increase in sales has resulted in a 20 per cent increase in EBIT. In the case of other firms, operating leverage exists. It is maximum in firm A, followed by firm C and minimum in firm B. The interception of DOL of 7 is that 1 per cent change in sales results in 7 per cent change in EBIT level in the direction of the change of sales level of firm A.

6.3.7 Financial Leverage

Financial leverage (FL) maybe defined as 'the use of funds with a fixed cost in order to increase earnings per share.' In other words, it is the use of company funds on which it pays a limited return. Financial leverage involves the use of funds obtained at a fixed cost in the hope of increasing the return to common stockholders.

$$\text{Financial Leverage (FL)} = \frac{\text{Earnings before interest and tax (EBIT)}}{\text{Earnings before tax (EBT)}}$$

Where, EBIT = Sales - (Variable cost + Fixed cost)

EBT = EBIT - Interest

6.3.8 Degree of Financial Leverage (DFL)

Degree of financial leverage is the ratio of the percentage increase in earnings per share (EPS) to the percentage increase in earnings before interest and taxes (EBIT). Financial Leverage (FL) is also defined as "the ability of a firm to use fixed financial charges to magnify the effect of changes in EBIT on EPS"

$$\begin{aligned} \text{Degree of Financial Leverage (DFL)} &= \frac{\text{Percentage change in earnings per share (EPS)}}{\text{Percentage change in earnings before interest and tax (EBIT)}} \\ \text{or} &= \frac{\frac{\Delta \text{EPS}}{\text{EPS}}}{\frac{\Delta \text{EBIT}}{\text{EBIT}}} \end{aligned}$$

Δ EPS means change in EPS and Δ EBIT means change in EBIT

When DFL is more than one (1), financial leverage exists. More is DFL higher is financial leverage.

A positive DFL/ FL means firm is operating at a level higher than break-even point and EBIT and EPS moves in the same direction. Negative DFL/ FL indicates the firm is operating at lower than break-even point and EPS is negative.

Situation 1: No Fixed Interest Charges

Particulars	X	Y
	₹	₹
EBIT	1,00,000	1,50,000
Tax @ 50%	50,000	75,000
PAT	50,000	75,000
No. of share	10,000	10,000
EPS	5	7.5

$$\text{Degree of Finance Leverage (DFL)} = \frac{\text{Change in EPS}}{\text{Change in EBIT}} = \frac{50\%}{50\%} = 1$$

Situation 2 : Positive Financial Leverage

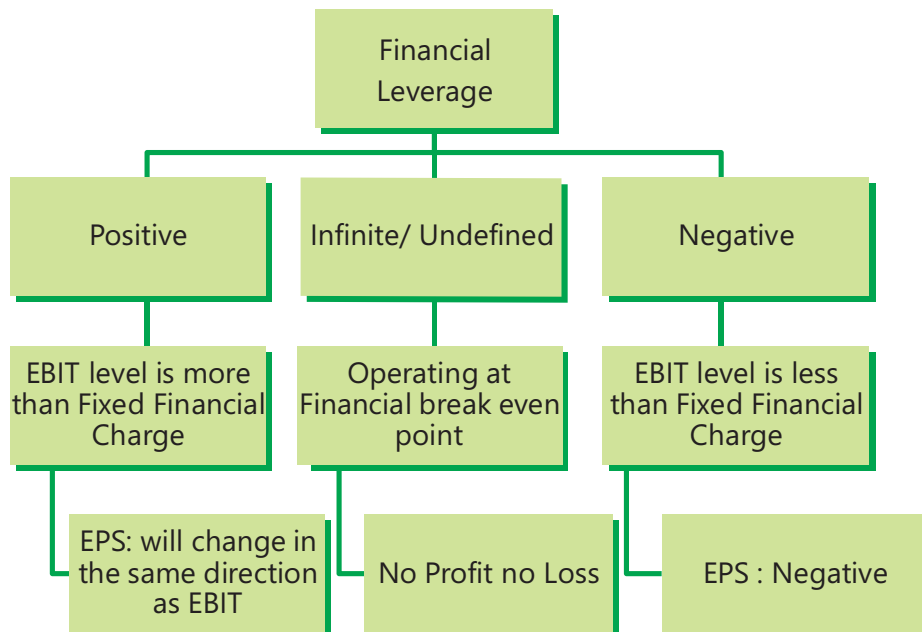
Particular	M	N
EBIT	1,00,000	1,50,000
Interest	20,000	20,000
EBT	80,000	1,30,000
Tax @ 50%	40,000	65,000
PAT	40,000	65,000
No of Share	10,000	10,000
	4	6.5

$$\text{Degree of Finance Leverage (DFL)} = \frac{\text{Change in EPS}}{\text{Change in EBIT}} = \frac{62.5\% *}{50\%} = 1.25$$

$$* \left(\frac{\frac{2.5}{4} \times 100}{50\%} \right) = 62.5\%$$

Situation 3 : When EBT is nil (EBIT = Fixed Interest)

$$\text{Degree of Finance Leverage} = \frac{\text{EBIT}}{\text{Nil}} = \text{undefined.}$$

**Positive and Negative Financial Leverage**

Analysis and Interpretation of Financial leverage

Sl. No.	Situation	Result
1	No Fixed Financial Cost	No Financial leverage
2.	Higher Fixed Financial cost	Higher Financial Leverage
3.	When EBIT is higher than Financial Break-even point	Positive Financial leverage
4.	When EBIT is less than Finance Break-even point	Negative Financial leverage

6.3.9 Financial Leverage as 'Trading on Equity'

Financial leverage indicates the use of funds with fixed cost like long term debts and preference share capital along with equity share capital which is known as trading on equity. The basic aim of financial leverage is to increase the earnings available to equity shareholders using fixed cost fund. A firm is known to have a positive leverage when its earnings are more than the cost of debt. If earnings is equal to or less than cost of debt, it will be an unfavourable leverage. When the quantity of fixed cost fund is relatively high in comparison to equity capital it is said that the firm is "trading on equity".

6.3.10 Financial Leverage as a 'Double edged Sword'

On one hand when cost of 'fixed cost fund' is less than the return on investment financial leverage will help to increase return on equity and EPS. The firm will also benefit from the saving of tax on interest on debts etc. However, when cost of debt will be more than the return it will affect return of equity and EPS unfavourably and as a result firm can be under financial distress. This is why financial leverage is known as "double edged sword".

Effect on EPS and ROE:

When, $ROI > \text{Interest}$ – Favourable – Advantage

When, $ROI < \text{Interest}$ – Unfavourable – Disadvantage

When, $ROI = \text{Interest}$ – Neutral – Neither advantage nor disadvantage.

6.3.11 Combined Leverage

Combined leverage maybe defined as the potential use of fixed costs, both operating and financial, which magnifies the effect of sales volume change on the earning per share of the firm.

$$\begin{aligned}
 \text{Combined Leverage (Cl)} &= \text{Operating Leverage (OL)} \times \text{Financial Leverage (FL)} \\
 &= \frac{C}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBT}} \\
 &= \frac{C}{\text{EBT}}
 \end{aligned}$$

6.3.12 Degree of Combined Leverage (DCL)

Degree of combined leverage (DCL) is the ratio of percentage change in earning per share to the percentage change in sales. It indicates the effect the sales changes will have on EPS.

$$\begin{aligned}
 \text{DCL} &= \text{DOL} \times \text{DFL} \\
 &= \frac{\% \text{Change in EBIT}}{\% \text{Change in Sales}} \times \frac{\% \text{Change in EPS}}{\% \text{Change in EBIT}} \\
 &= \frac{\% \text{Change in EPS}}{\% \text{Change in Sales}}
 \end{aligned}$$

Like operating leverage and financial leverage, combined leverage can also be positive and negative combined leverage.

Analysis and Interpretation of Combined leverage

Sl. No.	Situation	Result
1	No Fixed Cost and Fixed Financial Fixed Cost	No Combined leverage
2.	Higher Fixed cost	Higher Combined Leverage
3.	Sales level higher than break-even level	Positive combined leverage
4.	Sales leverage lower than break-even level	Negative Combined leverage

ILLUSTRATION 3

A firm's details are as under:

Sales (@ 100 per unit)	₹ 24,00,000
Variable Cost	50%
Fixed Cost	₹ 10,00,000

It has borrowed ₹ 10,00,000 @ 10% p.a. and its equity share capital is ₹ 10,00,000 (₹ 100 each)

Calculate:

- Operating Leverage
- Financial Leverage
- Combined Leverage

(d) Return on Investment

(e) If the sales increases by ₹ 6,00,000; what will the new EBIT?

SOLUTION

Particulars	(₹)
Sales	24,00,000
Less: Variable cost	12,00,000
Contribution	12,00,000
Less: Fixed cost	10,00,000
EBIT	2,00,000
Less: Interest	1,00,000
EBT	1,00,000
Less: Tax (50%)	50,000
EAT	50,000
No. of equity shares	10,000
EPS	5

$$(a) \text{ Operating Leverage} = \frac{12,00,000}{2,00,000} = 6 \text{ times}$$

$$(b) \text{ Financial Leverage} = \frac{2,00,000}{1,00,000} = 2 \text{ times}$$

$$(c) \text{ Combined Leverage} = \text{OL} \times \text{FL} = 6 \times 2 = 12 \text{ times.}$$

$$(d) \text{ R.O.I} = \frac{50,000}{10,00,000} \times 100 = 5\%$$

Here ROI is calculated as ROE i.e. $\frac{\text{EAT} - \text{Pref. Dividend}}{\text{Equity shareholders' fund}}$

$$(e) \text{ Operating Leverage} = 6$$

$$6 = \frac{\Delta \text{EBIT}}{0.25}$$

$$\Delta \text{EBIT} = \frac{6 \times 1}{4} = 1.5$$

$$\text{Increase in EBIT} = ₹ 2,00,000 \times 1.5 = ₹ 3,00,000$$

$$\text{New EBIT} = 5,00,000$$



SUMMARY

- ♦ **Operating leverage** exists when a firm has a fixed cost that must be defrayed regardless of volume of business. It can be defined as the firm's ability to use fixed operating costs to magnify the effects of changes in sales on its earnings before interest and taxes.
- ♦ **Financial leverage** involves the use fixed cost of financing and refers to mix of debt and equity in the capitalisation of a firm. Financial leverage is a superstructure built on the operating leverage. It results from the presence of fixed financial charges in the firm's income stream.
- ♦ **Combined Leverage:** - Combined leverage maybe defined as the potential use of fixed costs, both operating and financial, which magnifies the effect of sales volume change on the earning per share of the firm. Degree of combined leverage (DCL) is the ratio of percentage change in earning per share to the percentage change in sales. It indicates the effect the sales changes will have on EPS.



TEST YOUR KNOWLEDGE

MCQs based Questions

1. Given

Operating fixed costs	₹ 20,000
Sales	₹ 1,00,000
P/V ratio	40%

The operating leverage is:

- (a) 2.00
 - (b) 2.50
 - (c) 2.67
 - (d) 2.47
2. If EBIT is ₹ 15,00,000, interest is ₹ 2,50,000, corporate tax is 40%, degree of financial leverage is
- (a) 1:11
 - (b) 1.20
 - (c) 1.31
 - (d) 1.41
3. If DOL is 1.24 and DFL is 1.99, DCL would be:
- (a) 2.14
 - (b) 2.18
 - (c) 2.31
 - (d) 2.47

4. Operating Leverage is calculated as:
 - (a) Contribution \div EBIT
 - (b) EBIT \div PBT
 - (c) EBIT \div Interest
 - (d) EBIT \div Tax
5. Financial Leverage is calculated as:
 - (a) EBIT \div Contribution
 - (b) EBIT \div EBT
 - (c) EBIT \div Sales
 - (d) EBIT \div Variables Cost
6. Which of the following is correct?
 - (a) $CL = OL + FL$
 - (b) $CL = OL - FL$
 - (c) $OL = OL \times FL$
 - (d) $OL = OL \div FL$

Theoretical based Questions

1. Differentiate between Business risk and Financial risk.
2. "Operating risk is associated with cost structure, whereas financial risk is associated with capital structure of a business concern." Critically examine this statement.

Practical Problems

1. Suppose there are two firms with the same operating leverage, business risk, and probability distribution of EBIT and only differ with respect to their use of debt (capital structure).

Firm U	Firm L
No debt	₹ 10,000 of 12% debt
₹ 20,000 in assets	₹ 20,000 in assets
40% tax rate	40% tax rate

2. Betatronics Ltd. has the following balance sheet and income statement information:

Balance Sheet as on March 31st

Liabilities	(₹)	Assets	(₹)
Equity capital (₹ 10 per share)	8,00,000	Net fixed assets	10,00,000
10% Debt	6,00,000	Current assets	9,00,000
Retained earnings	3,50,000		
Current liabilities	1,50,000		
	19,00,000		19,00,000

Income Statement for the year ending March 31

	(₹)
Sales	3,40,000
Operating expenses (including ₹ 60,000 depreciation)	1,20,000
EBIT	2,20,000
Less: Interest	60,000
Earnings before tax	1,60,000
Less: Taxes	56,000
Net Earnings (EAT)	1,04,000

- (a) Determine the degree of operating, financial and combined leverages at the current sales level, if all operating expenses, other than depreciation, are variable costs.
- (b) If total assets remain at the same level, but sales (i) increase by 20 percent and (ii) decrease by 20 percent, what will be the earnings per share at the new sales level?
3. A company had the following Balance Sheet as on 31st March, 2014:

Liabilities	(₹ in crores)	Assets	(₹ in crores)
Equity Share Capital (50 lakhs shares of ₹ 10 each)	5		
Reserves and Surplus	1	Fixed Assets (Net)	12.5
15% Debentures	10	Current Assets	7.5
Current Liabilities	4		
	20		20

The additional information given is as under:

Fixed cost per annum (excluding interest)	₹ 4 crores
Variable operating cost ratio	65%
Total assets turnover ratio	2.5
Income Tax rate	30%

Required:

Calculate the following and comment:

- (i) Earnings Per Share
- (ii) Operating Leverage
- (iii) Financial Leverage
- (iv) Combined Leverage

4. Calculate the operating leverage, financial leverage and combined leverage from the following data under Situation I and II and Financial Plan A and B:

Installed Capacity	4,000 units
Actual Production and Sales	75% of the Capacity
Selling Price	₹ 30 Per Unit
Variable Cost	₹ 15 Per Unit

Fixed Cost:

Under Situation I	₹ 15,000
Under Situation-II	₹20,000

Capital Structure:

	Financial Plan	
	A (₹)	B (₹)
Equity	10,000	15,000
Debt (Rate of Interest at 20%)	10,000	5,000
	20,000	20,000

ANSWERS/SOLUTIONS

Answers to the MCQs based Questions

1. (a) 2. (b) 3. (d) 4. (a) 5. (b) 6. (c)

Answers to Theoretical based Questions

- Please refer paragraph 6.1.1
- Please refer paragraph 6.1.1

Answers to Practical problems

- Firm U: Unleveraged

	Economy		
	Bad	Avg.	Good
Probability	0.25	0.50	0.25
EBIT	₹ 2,000	₹ 3,000	₹ 4,000
Interest	0	0	0
EBIT	₹ 2000	₹ 3,000	₹ 4,000
Taxes (40%)	800	1,200	1,600
NI	₹ 1,200	₹ 1,800	₹ 2,400

Firm L: Leveraged

	Economy		
	Bad	Avg.	Good
Probability	0.25	0.50	0.25
EBIT	₹ 2,000	₹ 3,000	₹ 4,000
Interest	1,200	1,200	1,200
EBIT	₹ 800	₹ 1,800	₹ 2,800
Taxes (40%)	320	720	1,120
NI	₹ 480	₹1080	₹ 1,680

*Same as for Firm U.

Ratio comparison between leveraged and unleveraged firms

Firm U	Bad	Avg.	Good
BEP = (EBIT /TOTAL ASSETS)	10.0%	15.0%	20.0%
ROE = (PAT/ NETWORTH)	6.0%	9.0%	12.0%
TIE = (INTEREST COVERAGE RATIO = (EBIT/ INTEREST)	∞	∞	∞
Firm L	Bad	Avg.	Good
BEP	10.0%	15.0%	20.0%
ROE	4.8%	10.8%	16.8%
TIE	1.67%	2.50%	3.30%

Risk and return for leveraged and unleveraged firms*Expected Values:*

	Firm U	Firm L
E(BEP)	15.0%	15.0%
E(ROE)	9.0%	10.8%
E(TIE)	∞	2.5x

Risk Measures:

	Firm U	Firm L
σ_{ROE}	2.12%	4.24%
CV_{ROE}	0.24	0.39

Thus, the effect of leverage on profitability and debt coverage can be seen from the above example. For leverage to raise expected ROE, BEP must be greater than K_d i.e. $BEP > K_d$ because if $K_d > BEP$, then the interest expense will be higher than the operating income produced by debt-financed assets, so leverage will depress

income. As debt increases, TIE decreases because EBIT is unaffected by debt, and interest expense increases ($\text{Int Exp} = K_d$).

Thus, it can be concluded that the basic earning power (BEP) is unaffected by financial leverage. Firm L has higher expected ROE because $\text{BEP} > K_d$ and it has much wider ROE (and EPS) swings because of fixed interest charges. Its higher expected return is accompanied by higher risk.

2. (a) Calculation of Degree of Operating (DOL), Financial (DFL) and Combined leverages (DCL).

$$\text{DOL} = \frac{\text{₹ } 3,40,000 - \text{₹ } 60,000}{\text{₹ } 2,20,000} = 1.27$$

$$\text{DFL} = \frac{\text{₹ } 2,20,000}{\text{₹ } 1,60,000} = 1.38$$

$$\text{DCL} = \text{DOL} \times \text{DFL} = 1.27 \times 1.38 = 1.75$$

(b) Earnings per share at the new sales level

	Increase by 20%	Decrease by 20%
	(₹)	(₹)
Sales level	4,08,000	2,72,000
Less: Variable expenses	72,000	48,000
Less: Fixed cost	60,000	60,000
Earnings before interest and taxes	2,76,000	1,64,000
Less: Interest	60,000	60,000
Earnings before taxes	2,16,000	1,04,000
Less: Taxes	75,600	36,400
Earnings after taxes (EAT)	1,40,400	67,600
Number of equity shares	80,000	80,000
EPS	1.76	0.85

Working Notes:

(i) Variable Costs = ₹ 60,000 (total cost – depreciation)

(ii) Variable Costs at:

(a) Sales level, ₹ 4,08,000 = ₹ 72,000 (increase by 20%)

(b) Sales level, ₹ 2,72,000 = ₹ 48,000 (decrease by 20%)

3.

Total Assets	= ₹ 20 crores
Total Asset Turnover Ratio	= 2.5
Hence, Total Sales	= $20 \times 2.5 = ₹ 50$ crores

Computation of Profit after Tax (PAT)

	(₹ in crores)
Sales	50.00
Less: Variable Operating Cost @ 65%	32.50
Contribution	17.50
Less: Fixed Cost (other than Interest)	4.00
EBIT	13.50
Less: Interest on Debentures (15% × 10)	1.50
PBT	12.00
Less: Tax @ 30%	3.60
PAT	8.40

(i) Earnings per Share

$$\text{EPS} = \frac{5.40 \text{ crores}}{\text{Number of Equity Shares}} = \frac{8.40 \text{ crores}}{50,00,000} = ₹ 16.80$$

It indicates the amount the company earns per share. Investors use this as a guide while valuing the share and making investment decisions. It is also an indicator used in comparing firms within an industry or industry segment.

(ii) Operating Leverage

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{17.50}{12.00} = 1.296$$

It indicates the choice of technology and fixed cost in cost structure. It is level specific. When firm operates beyond operating break-even level, then operating leverage is low. It indicates sensitivity of earnings before interest and tax (EBIT) to change in sales at a particular level.

(iii) Financial Leverage

$$\text{Financial Leverage} = \frac{\text{EBIT}}{\text{PBT}} = \frac{13.50}{12.00} = 1.125$$

The financial leverage is very comfortable since the debt service obligation is small vis-à-vis EBIT.

(iv) Combined Leverage

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{PBT}}$$

$$\begin{aligned} \text{Or,} &= \text{Operating Leverage} \times \text{Financial Leverage} \\ &= 1.296 \times 1.125 = 1.458 \end{aligned}$$

The combined leverage studies the choice of fixed cost in cost structure and choice of debt in capital structure. It studies how sensitive the change in EPS is vis-à-vis change in sales. The leverages – operating, financial and combined are measures of risk.

4.

Particulars	Situation-I	Situation-II
	(₹)	(₹)
Sales (S)	90,000	90,000
3000 units @ ₹ 30/- per unit		
Less: Variable Cost (VC) @ ₹ 15 per unit	45,000	45,000
Contribution (C)	45,000	45,000
Less: Fixed Cost (FC)	15,000	20,000
Operating Profit (OP)	30,000	25,000
(EBIT)		

(i) Operating Leverage

$$\begin{aligned} \frac{C}{OP} &= \frac{\text{₹ } 45,000}{30,000} && \frac{\text{₹ } 45,000}{25,000} \\ &= 1.5 && 1.8 \end{aligned}$$

(ii) Financial Leverages

	A (₹)	B (₹)
Situation I		
Operating Profit (EBIT)	30,000	30,000
Less: Interest on debt	2,000	1,000
PBT	28,000	29,000

$$\text{Financial Leverage} = \frac{OP}{PBT} = \frac{\text{₹ } 30,000}{28,000} = 1.07 \quad \text{₹ } \frac{30,000}{24,000} = 1.04$$

	A (₹)	B (₹)
Situation-II		
Operating Profit (OP) (EBIT)	25,000	25,000
Less: Interest on debt	2,000	1,000
PBT	23,000	24,000

