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## **UNIT 10 EBIT-EPS ANALYSIS AND LEVERAGE**

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## **10.1 INTRODUCTION**

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In the previous unit you learnt about various theories of capital structure that provides basis for relevance and irrelevance of optimum capital structure. We also learnt that existence of optimum capital structure is not well taken by all and there exist extreme views towards identifying optimum debt-equity mix for a company. However, undoubtedly, the capital structure decision is very essential for a company as it affects owner's risk and return.

In this unit, you will learn about how much debt should be employed in company to have a rational capital structure. Finance manager should craft capital structure in a way that balances the incremental returns with regard to the employment of debt in the capital structure as well as risk to the equity shareholders. In this unit we will discuss as to how leverages affect EBIT and EPS and that further impact shareholders returns and risk in the company.

However, somewhere final decision also rest on the various implicit and explicit factors and hence these decisions also attract some extent of subjectivity on the part of owners and managers of the company.

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## 10.2 OBJECTIVES

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After reading this unit you will be able to:

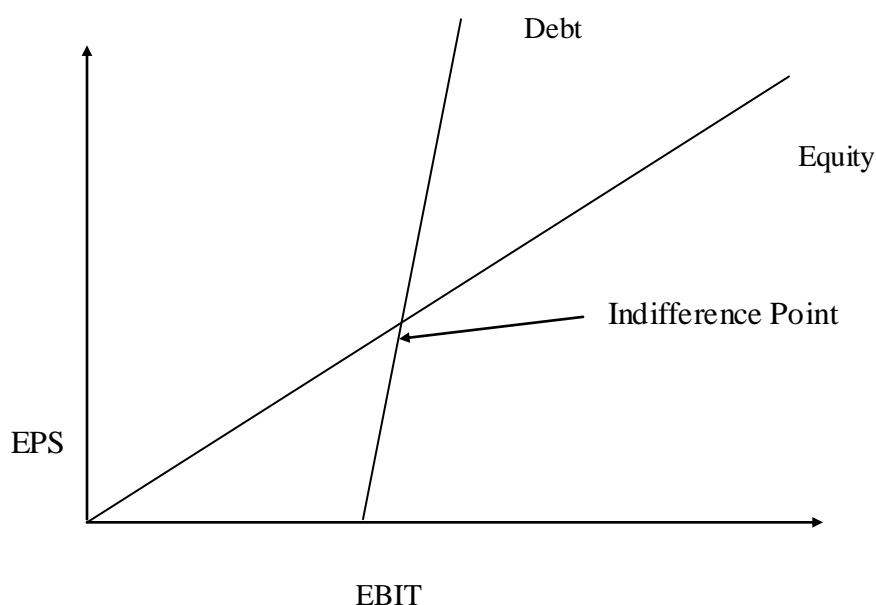
- Understand the EBIT-EPS Analysis
- Know about the concept and importance of leverages.
- Differentiate between operating and financial leverages.
- Compute different types of leverages.

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## 10.3 EBIT-EPS ANALYSIS

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EBIT-EPS Analysis is the method for determining optimum capital structure for a company at a given point of time where Earning per Share is the highest for a given amount of Profit before Interest and Taxes. The main idea behind computation of EBIT-EPS Analysis is to determine the impact of different sources of financing patterns on EPS. EBIT-EPS Analysis provide foundation for deciding appropriate capital structure that yields highest returns over the company's expected level of EBIT. EPS is the standard or benchmark for the evaluating the overall financial performance of a company or a firm. It helps in making comparison among different financial plans. It is financial planning tool that intends to decide the right proportion of debt and equity in the capital structure of a firm. Thus, EBIT-EPS Analysis tries to assess various alternatives to the financing of a capital. The graph shows EPS as varying levels of debt and equity; say 20 percent debt and 80 percent equity else 30 percent debt and 70 percent equity. The graph so plotted on the basis of EPS as a data point for each level of EBIT at various debt-equity combinations is analyzed to find the optimal capital structure framework for the company.



**Fig 10.1 Indifference point**

The Indifference Point or EBIT-EPS Break Even Point indicates the point at which EPS is same irrespective of any level of financial leverage. This means that at the indifference point rate of return on the capital employed is same as the rate of interest on the debt. In other words, it is the EBIT level at which Earnings per Share for the alternatives are same. This is sometimes also called as Break-Even of EBIT for alternative financial plans. In other words, when two or more than two alternative financial plans results into the level of EBIT where EPS is the same, this point is termed as Indifference Point. When level of EBIT crosses this Indifference point, then debt financing is fruitful for the company as in such a case Earning per Share shall be maximized due to debt usage in the capital structure. Thus, it may be inferred that at this point even the management of the company shall be indifferent in opting for an alternative debt equity combinations as all the debt equity plans are equally attractive.

The Indifference Point can be calculated using the following formula;

$$\frac{(EBIT - INT_1)(1-T) - PD}{N_1} = \frac{(EBIT - INT_2)(1-T) - PD}{N_2}$$

$$EPS (\text{Financing Plan 1}) = EPS (\text{Financing Plan 2})$$

EBIT= Earnings before Interest and Taxes

$I_1$ =Interest under alternative 1

$I_2$ =Interest under alternative 2

$T$  = Tax Rate

PD = Preference Dividend

$N_1$ =Number of Equity Shares ( or amount of equity share capital) under first alternative.

$N_2$ =Number of Equity Shares ( or amount of equity share capital) under second alternative.

The above formula can also be written as;

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

To find out the break- even level of EBIT at which EPS would same for all equity plan and for debt equity plan would be as follows (assuming non existence of preference shares);

$$EPS (\text{All equity Plan 1}) = EPS (\text{Debt – Equity Plan 2})$$

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

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

Let us learn the computation of Indifference point from the following illustrations;

### Illustration -1

Sun Chemicals Limited plans for an expansion project. To meet the requirements of expansion Programme Company requires Rs. 20, 00,000. The corporate tax rate prevailing in the economy is 30%. For raising additional funds, company have the following alternative sources to raise the funds;

- Equity Share Capital of Rs 20, 00,000 (Face Value of Rs100) or 15% debentures of Rs 10, 00,000 and Equity Share Capital of Rs 10, 00,000 (Face Value of Rs100).
- Equity Shares of Rs 20, 00,000 (Face Value of Rs100) or 12% Preference Share Capital of Rs 10, 00,000 and Equity Shares Capital of Rs 10, 00,000 (Face Value of Rs100).
- Equity Shares of Rs 20, 00,000 (Face Value of Rs100) or 12% Preference Share Capital of Rs 6, 00,000, 15% debentures of Rs 4, 00,000 and Equity Shares Capital of Rs 10, 00,000 (Face Value of Rs100).
- Equity Shares of Rs 9, 00,000 (Face Value of Rs100) and 12% Preference Share Capital of Rs11, 00,000 or Equity Shares Capital of Rs 8, 00,000 (Face Value of Rs100), and 12% Preference Share Capital of Rs 2,00,000 and 15% debentures of Rs10, 00,000.

Calculate the indifference point for the various alternatives provided.

### Solution

The indifference point for the various alternatives is calculated as under;

- a) Equity Share Capital versus Equity Share Capital and Debentures

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

$$\begin{aligned} EBIT &= \frac{N_1}{N_1 - N_2} \times INT \\ &= \frac{20,000}{20,000 - 10,000} \times 150000 \\ &= \frac{20,000}{10,000} \times 150000 = 2 \times 150000 = \text{Rs. } 3,00,000 \end{aligned}$$

$$\begin{aligned} \text{b) } \frac{(EBIT)(1-T)}{N_1} &= \frac{EBIT(1-T)}{N_2} - PDIV \\ EBIT &= \frac{N_1}{N_1 - N_2} \times \left[ \frac{PDIV}{(1-T)} \right] \\ &= \frac{20,000}{20,000 - 10,000} \times \frac{12000}{1-0.30} = \frac{20000}{10000} \times \frac{120000}{0.70} = \text{Rs. } 8,00,000 \end{aligned}$$

$$\text{c) } EBIT = \frac{N_1}{N_1 - N_2} \times \left[ INT + \frac{PDIV}{(1-T)} \right]$$

$$= \frac{9,000}{9,000 - 8,000} \times \left[ 150,000 + \frac{120,000}{1 - .30} \right]$$

$$= \frac{200,000}{100,000} \times \frac{120,000}{1 - .30} = \text{Rs. } 8,00,000$$

$$\text{d) } EBIT = \frac{N_1}{N_1 - N_2} \times \left[ INT + \frac{PDIV_2}{(1-T)} \right] - \left[ \frac{N_2}{N_1 - N_2} \times \frac{PDIV_1}{(1-T)} \right]$$

$$= \frac{9,000}{9,000 - 8,000} \times \left[ 150,000 + \frac{240,000}{.70} \right] - \left[ \frac{8,000}{9,000 - 8,000} \times \frac{132,000}{.70} \right]$$

$$= 9,000 \times [150,000 + 342,857] - [8,000 + 188,571]$$

$$= 9,000 \times 492,857 - 196,571$$

$$= 4,435,713 - 196,571 = 4,239,142$$

### Illustration -2

Firm ABC may face six unforeseen circumstances regarding sales of the product because of economic conditions. The EBIT is likely to be as under;

	Very Poor	Poor	Normal	Good	Very Good
EBIT	10000	30000	60000	80000	100000

The company has an option to decide its financing mix by either employing no debt, 20% debt, 30% debt or 40% debt. The company's capital structure consists of Rs 1, 00,000 equity shares of Rs 10 each. Tax rate is 30%. If the company issues debentures, then the interest rate is likely to be 10%. What are the earnings per share under each of the three financial plans? Determine the indifference point using formula and depict it graphically.

### Solution

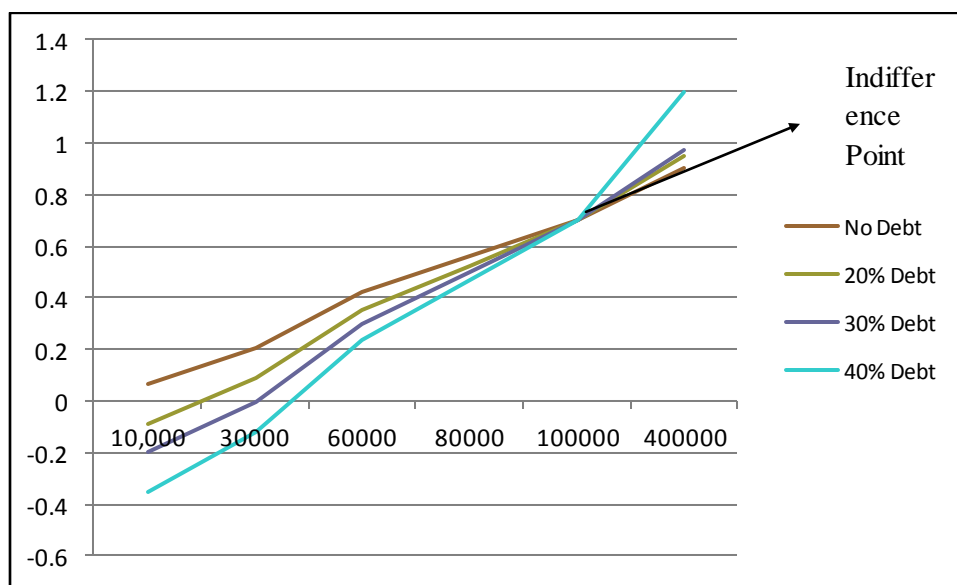
Let us calculate Earnings per share for the various alternatives. As we know that EBIT minus Interest is Earning Before Tax (EBT) and when taxes are deducted from EBT then Earning After Taxes arrives. This EAT is divided from number of shares to find Earning per Share. The above steps are followed to find under No Debt, 20% debt, 30% debt or 40% debt alternatives under different circumstances.

First Option					
	Very Poor	Poor	Normal	Good	Very Good
No Debt					
EBIT	10,000	30000	60000	80000	100000
Interest	0	0	0	0	0

<b>EBT</b>	10,000	30,000	60,000	80,000	100,000
<b>Tax</b>	3000	9000	18000	24000	30000
<b>EAT</b>	7,000	21,000	42,000	56,000	70,000
<b>Number of Shares</b>	100000	100000	100000	100000	100000
<b>EPS</b>	0.07	0.21	0.42	0.56	0.7
<b>Second Option</b>					
<b>20% Debt</b>					
<b>EBIT</b>	10,000	30000	60000	80000	100000
<b>Interest</b>	20000	20000	20000	20000	20000
<b>EBT</b>	-10,000	10,000	40,000	60,000	80,000
<b>Tax</b>	-3000	3000	12000	18000	24000
<b>EAT</b>	-7,000	7,000	28,000	42,000	56,000
<b>Number of Shares</b>	80000	80000	80000	80000	80000
<b>EPS</b>	-0.0875	0.0875	0.35	0.525	0.7
<b>Third Option</b>					
<b>30% Debt</b>					
<b>EBIT</b>	10,000	30000	60000	80000	100000
<b>Interest</b>	30000	30000	30000	30000	30000
<b>EBT</b>	-20,000	0	30,000	50,000	70,000
<b>Tax</b>	-6000	0	9000	15000	21000
<b>EAT</b>	-14,000	0	21,000	35,000	49,000
<b>Number of Shares</b>	70000	70000	70000	70000	70000
<b>EPS</b>	-0.2	0	0.3	0.5	0.7
<b>Fourth Option</b>					
<b>40% Debt</b>					
<b>EBIT</b>	10,000	30000	60000	80000	100000
<b>Interest</b>	40000	40000	40000	40000	40000

<b>EBT</b>	-30,000	-10,000	20,000	40,000	60,000
<b>Tax</b>	-9000	-3000	6000	12000	18000
<b>EAT</b>	-21,000	-7,000	14,000	28,000	42,000
<b>Number of Shares</b>	60000	60000	60000	60000	60000
<b>EPS</b>	-0.35	-0.11667	0.233333	0.466667	0.7

EPS



EBIT

Now indifference point for the above hypothetical example is;

**Indifference Point between First and Second Alternative is;**

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

$$= \frac{1,00,000}{100,000 - 80,000} \times 20,000$$

$$= 1,00,000$$

**Indifference Point between First and Third Alternative is;**

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

$$\frac{1,00,000}{100000 - 70000} \times 30000$$

$$=1,00,000$$

**Indifference Point between First and Fourth Alternative is;**

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

$$\frac{1,00,000}{100000 - 60000} \times 40000$$

$$=1,00,000$$

So , indifference point is at the EBIT level of 1,00,000 under different combinations. We can also infer from the table that when the economic conditions are very good then the use of debt in the capital structure increase EPS whereas when company is using 40% debt in the very poor economic conditions then Earning per share is -0.35. This means that use of debt is reducing shareholder's wealth when there is depression in the market. However in such circumstances, non employment of debt in the capital structure results into positive Earnings per share i.e., 0.07, hence in these situations amount invested by the shareholders is protected.



### ***Check Your Progress-A***

**Q1. What do you mean by Indifference Point?**

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**Q2. Why a company is interested to conduct EBIT-EPS Analysis?**

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**Q3. Write the formula for calculating indifference point.**

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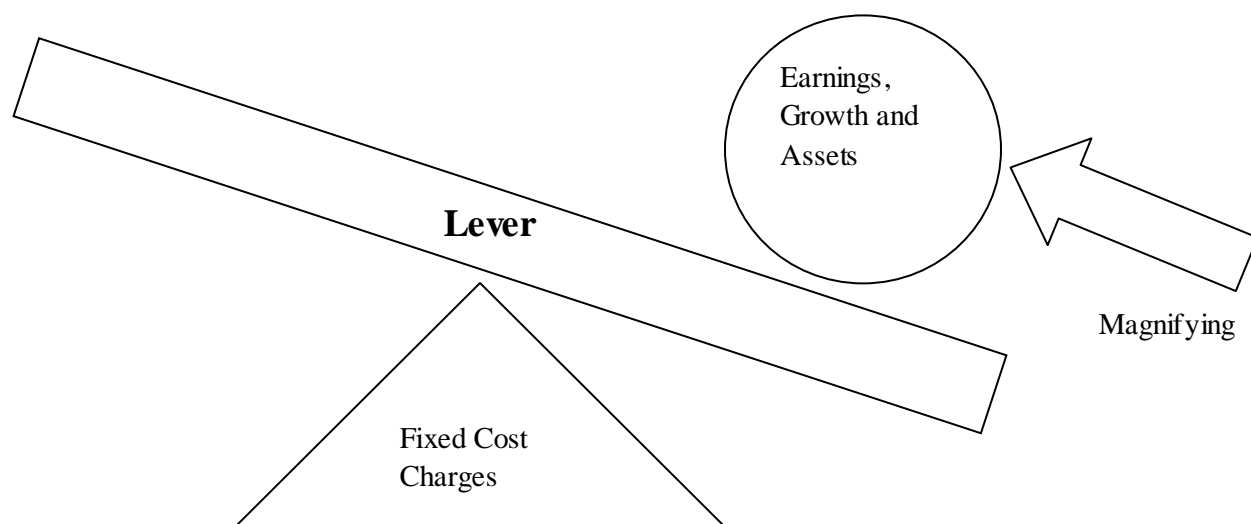
## **10.4 INTRODUCTION TO LEVERAGE**

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*“Give me a lever and a place to stand and I will move the earth. Give me a fulcrum, and I shall move the world. Give me a firm spot on which to stand, and I shall move the earth”.*  
Archimedes

The basic concept of leverage is conceptually to examine the risk resulting due to inclusion of debt in the capital structure. Therefore, leverage helps in estimating the risks of debt financing. A lever is a simple machine which is made up of a beam or stiff rod rotating at a set hinge or fulcrum. A lever is a rigid body that can rotate on itself at a stage. Lever is one of the significant components of the machine tool that is an essential component of the power transmission system. It helps in lifting heavy objects with little utilization of force or power. Accordingly, leverage generally means influence of force in elevating or attaining something. In Financial Management, leverage means influence of independent financial variable over the dependent financial variable. Therefore, it measure influence of independent variable on the dependent variable. Therefore it is how changes in the percentage of independent financial variable will impact the percentage change in dependent variable. Let us read the following description given by Horne and Wachowicz

“When a lever is used properly, a force applied at one point is transformed, or magnified into another, larger force or motion at some other point. This comes most readily to mind when considering mechanical leverages, such as that which occurs when using a crowbar. In a business context, however, leverage refers to the use of fixed costs in an attempt to increase or lever up) profitability”. Horne and Wachowicz



**Fig 10.2 Leverage**

So, we inferred that the term 'leverage' refers to "means of accomplishing power for gaining advantage". Therefore, it tries to explore the effect of one financial variable on the other financial variable.

The leverage are generally classified into three main categories, these are;

- a) Financial Leverage
- b) Operating Leverage
- c) Combined Leverage

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## 10.5 SIGNIFICANCE OF LEVERAGES

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Leverages are basically quantitative tools for assessing the returns to the owners. The same shall be inferred using earning per share and the market price per share. The most often used leverage by the financial analysts is financial leverage as it focuses primarily on market price of the shares and hence net worth of the firm. Therefore, the managers as well as policy makers assess the position of trading on equity as when there is increment in EBIT then there shall also be corresponding increase in price of equity shares. Leverage impacts the company's level and variability in after tax income and thus impact general risk and return of the company.

Leverages are an important instrument that the management of a company can use to create the best choices about funding and investment. It offers a range of funding sources through which the company can attain its target earnings. Leverages specially financial and operating leverage have enormous acceleration and deceleration effect on Earnings before Interest and Taxes as well as on EPS therefore, it is important for the company to manage leverage appropriately. When the company becomes more financially leveraged by employing debt funds that the company become more prone to risk as increased use of debt financing will lead to high financial risk that will bring about increased fluctuations in the returns on equity and increase in the interest rate on debts.

Leverages are double-edged sword and therefore an appropriate combination of operating and financial leverage may act as boon for the growth and the success for the company and on the contrary, in some circumstances it can serve as a curse in the rapid growth and survival of a company. It is generally noticed that company having high operating leverage should not have high financial leverage and accordingly, company having low operating leverage will magnify its profits and returns by adopting strategy of high financial leverage provided that if it has sufficient lucrative possibilities to use borrowed funds. Firm having high degree of financial and operating leverage has to face the problems of illiquidity and insolvency. A high degree of operating leverage with high financial leverage will lead to riskier financial position as it may be inferred that company is employing excessive assets on which it is paying high fixed cost together with large amount of debt funds. Thus, these fixed cost charges and fixed interest payments will attract greater risk to the firm. In case there is a fluctuation in the earnings or returns then the company will face tremendous problems in meeting its fixed cost. Reasons for such fluctuations in earnings may also accrue due to existence of high operating leverage. The presence of such a high degree of operating leverage will lead to more than proportionate change in the EPS even with a small change in the level of EBIT.

Therefore, generally low operating leverage and high financial leverage is considered to be an ideal situation for maximising profits with minimum of risk. Further, having low level of leverages shows conservative approach of the management and therefore it will result into loss of profit earning opportunities. Hence, Operating Leverage and Financial Leverage can be mixed to achieve a desirable level of corporate growth such as increases in sales, increases in profits and increases in assets in a number of distinct ways.

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## 10.6 OPERATING LEVERAGE

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Operating Leverage directly impact operating profit of company that is it impact EBIT whereas Financial Leverage affects Profit after tax or Earning per Share. Therefore,

Operating Leverage is related with the operations of a firm. Operating Leverage arises due to inclusion of fixed nature of costs in the cost structure. Therefore, operating leverage relates to the changes in sales and profit. Therefore, slight changes in sales results into drastic impact on profitability.

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} \text{ or } \frac{\text{Contribution}}{\text{Operating Profit}}$$

“Operating Leverage is the responsiveness of firm’s EBIT to the changes in sales value. It refers to the sensitivity of operating profit before interest and tax to the changes in quantity produced and sold”. (Kishore Ravi)

Operating leverage of a firm is high when its fixed costs is high and the variable costs is less and it will have lower operating leverage when it uses greater amount of variable costs and less amount of fixed costs. Therefore, in case of existence of operating leverage in a firm, 1% change in sales results into more than 1% change in EBIT then it may be inferred that there is presence of operating leverage and this change is measured by Degree of Operating Leverage. Degree of Operating Leverage shall be defined as percentage change in the profits resulting from percentage change in sales.

$$\text{Degree of Operating Leverage} = \frac{\Delta \text{EBIT}}{\Delta Q} \text{ or } \frac{\text{Percentage Change in EBIT}}{\text{Percentage Change in Sales}} \text{ or } \frac{\text{Contribution}}{\text{Operating Profit}} \text{ or } \frac{\text{Contribution}}{\text{EBIT}}$$

The Degree of Operating Leverage can also be computed using the following formula ;

$$\text{Degree of Operating Leverage} = \frac{Q(SP-VC)}{Q(SP-VC)-FC}$$

Q= Quantity Produced

SP=Selling price per unit

VC=Variable cost per Unit

FC=Fixed Costs

The degree of operating leverage calculates the responsiveness of EBIT with respect to the change in the level of quantity produced or sold. The presence of fixed operating expenses gives a firm operating leverage that magnifies the operating profit of a firm. However, operating leverage may lead to increase or decrease the operating profit. Accordingly, operating leverage may be favourable or unfavourable. If the contribution is greater than the fixed cost, then the operating leverage is favourable. On the contrary, if sales minus variable cost i.e. contribution is less than the fixed cost then the operating leverage is generally assessed as unfavourable. Generally speaking, companies do not like to function under high operating leverage circumstances. Operating leverage reflects the effect on operating income

of changes in sales. If a company has a high degree of operating leverage, then slight variations in sales will have a major impact on operating income. Accordingly, the operating profits (EBIT) of such a firm increase at a greater rate as compared to the increase in sales. Further, a small drop in sales can excessively damage the firm's operating profit.

### Illustration -3

The PVC pipe manufacturer company is assumed to have a sales volume of 2000 units at a selling price of Rs 100, its variable cost per unit is Rs 20 and fixed cost is Rs 1, 00,000. You are required to calculate its operating leverage.

### Solution

The operating leverage of the above company shall be;

$$= \frac{2000(100 - 20)}{2000(100 - 20) - 1,00,000}$$

$$= \frac{160000}{160000 - 100000} = 2.67$$

If the sales volume increases to 4,000 then the operating leverage shall be;

$$\frac{4000(100 - 20)}{4000(100 - 20) - 1,00,000} = \frac{320000}{320000 - 100000} = 1.45$$

Therefore, the operating leverage would change with the changes in the sales volume, variable cost and fixed cost. Therefore, for attaining favourable operating leverage, fixed and variable cost should to be monitored along with value and volume of sales.

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## 10.7 FINANCIAL LEVERAGE

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The use of fixed-charges sources of funds in form of as debt and preference capital along with the equity share capital give rise to financial leverage. Financial leverage indicates the impact on earnings or returns due to the usage of fixed cost funds in the capital structure. It represents the relationship between the company's earnings before interest and taxes (EBIT) and the earnings available to equity shareholders in form of Earnings per Share. Operating leverage indicates changes in EBIT of a firm due to changes in output. On the other hand, financial leverage measures the changes that may happen in the taxable income as a result of changes in operating income. The notion behind calculating financial leverage is to compute the changes in the return to the shareholders due to the use of debt funds. It involves the use of funds obtained at a fixed cost in the expectations of increasing the return to the shareholders.

When debt funds have greater weightage in capital structure as compared to owner's equity then leverage is said to be larger and *vice-versa*.

Financial leverage is defined as “the ability of a firm to use fixed financial charges to magnify the effects of changes in EBIT on the Earnings per Share”. (Khan and Jain)

“The use of fixed charges sources of funds, such as debt and preference share capital along with owner's equity in the capital structure is described as financial leverage or gearing or trading on equity.” (I.M. Pandey)

“Financial leverage indicates the effect on earnings under conditions where the capitalization is not altered, created by the use of fixed charge securities in the capitalization of a company. It can be measured by the ratio of;

- a) The rate of growth in earnings available to the ordinary shareholders to
- b) the rate of growth of EBIT”. (S.C. Kuchhal)

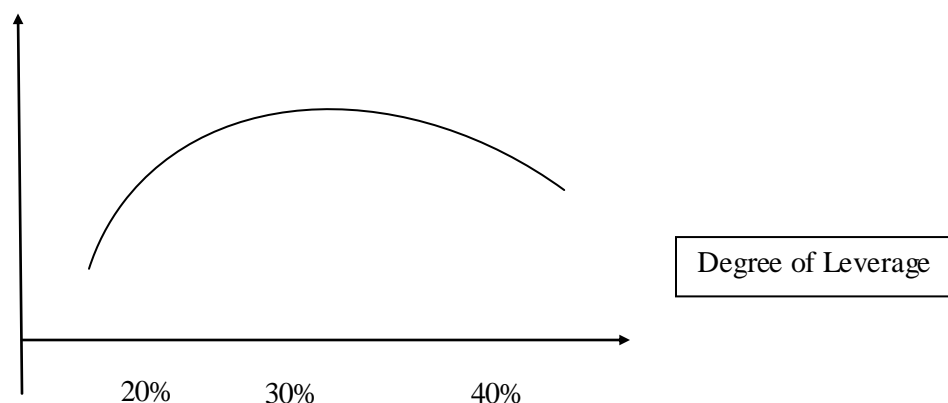
According to Gitmar, “Financial leverage is the ability of a firm to use fixed financial changes to magnify the effects of change in EBIT and EPS”.

Financial leverage is calculated using the following formula;

$$= \frac{\text{Operating Profit}}{\text{Profit Before Taxes}} \text{ or } \frac{\text{EBIT}}{\text{EBT}}$$

The higher ratio indicates that the company may face strain in paying interest on borrowings whereas if the ratio is lower, it indicates less interest payments on the account of lower borrowings but in such a case company might have forgone the opportunities of utilizing interest tax shield for magnifying the returns to the shareholders. Financial leverage is one of the key instruments used to find the ratio between the percentage of fixed costs with respect to the total capital of a firm or a company. Further, if a firm raise debt funds at higher price than the income that will accrue from such investments including earning per share tend to decline.

Accordingly, financial leverage may be favorable or positive when company utilizes funds raised at a fixed cost to earn more than the fixed financing cost whereas it is unfavorable or negative when company does not earn greater than the amount to be paid towards fixed interest payments on debt funds i.e. firm is not able to earn sufficient profits to cover financing costs. The leverage will be regarded favorable as long as the company earns more than the fixed costs of its use on the assets so purchased with the funds. Higher financial leverage shall contribute in increasing EBIT that will ultimately contribute in magnifying earnings per share, if other variables remain the same. Financial leverage impacts variability and expected level of EPS. With the increase in debt in the capital structure, the EBIT of the firm will increase (due to interest tax shield) resulting into higher EPS. However, higher financial leverage will also attract riskiness to the firm, therefore after a certain level, additional use of debt would drastically curtail the returns available to the equity shareholders and accordingly, their earning per share will also fall. The same has been represented as under;



**Fig 10.3 Degree of leverage**

### 10.7.1 TRADING ON EQUITY OR CAPITAL GEARING

The use of fixed interest paying securities such as debt or preference share capital in the capital structure is termed as Financial Leverage or Gearing or Trading on Equity. Trading on Equity means the equity is traded upon to raise debt. That means the financial leverage is employed to earn more returns on the fixed interest bearing funds than the cost of raising it. However, the debt funds providers will expect continuous stream of earnings and protection in values as they have limited participation in the company's profit.

A company raises debt at low cost for earnings of the equity shareholders. The cost of debt is lower due to tax advantage. The rate of return on the Owners Equity is levered above or below the rate of return on total assets.

Financial leverage does magnify the earnings available for equity shareholders but it also creates risk of losing returns. Therefore, at times, financial leverage is termed as double edged sword with two cutting edges that means financial leverage implies that debt has its potential advantages as well as disadvantages. Financial leverage can increase profits as well as can decrease it.

In general, the financial leverage and the weighted average cost of capital shares inverse relationships that when there is an increase in financial leverage then the weighted average cost of capital will decline and on the contrary, when there is decrease in financial leverage, weighted average cost of capital would increase. Moreover, financial leverage shares direct relationship with the value of firm. The value of firm increases with the increase in financial leverage and *vice versa*.

Financial Leverage	Weighted Average cost of capital	Market price of equity shares and value of the firm
Increase	Decline	Increase
Decrease	Increase	Decline

Degree of Financial Leverage is defined as the percentage change in EPS as result of percentage change in operating profit. It therefore depicts the relationship between taxable income (percentage changes) and operating income (percentage changes). Financial Leverage is said to be existent when resultant digit/s from the above is greater than one.

According to Horne and Wachowicz “Degree of Financial leverage is the quantitative measure of the sensitivity of a firm’s earning per share to a change in the firm’s operating profit”.

According to Ravi M. Kishore “Degree of Financial Leverage measures the responsiveness of EPS to the changes in EBIT”.

$$\text{Degree of Financial Leverage} = \frac{\Delta EPS}{\Delta EBIT} \quad \text{or} \quad \frac{\text{Percentage Change in EPS}}{\text{Percentage Change in EBIT}} \quad \text{or} \quad \frac{\text{Percentage Change in EPS}}{\text{Percentage Change in Operating Profit}} \quad \text{or} \quad \frac{\Delta EPS / EPS}{\Delta EBIT / EBIT}$$

The Degree of Financial Leverage can also be computed using the following formula ;

$$\text{Degree of Financial Leverage} = \frac{EBIT}{EBIT - I - \frac{D_p}{(1-t)}}$$

EBIT= Earnings before Interest and Taxes

$D_p$ = Preference Dividend

I= Interest on long term debt funds

t=Income Tax rate



**Illustration -4**

Management of Sunshine Ltd. is thinking about three financial alternatives. As a finance manager, you are required to calculate and interpret the financial leverage for the each alternative.

	I	II	III
Equity Capital	400000	100000	300000
Debt	200000	500000	700000
Operating Profit	100000	100000	100000

**Solution**

The financial leverage for the three alternatives is provided as under;

	I	II	III
Operating Profit	100000	100000	100000
Interest (10% on Debt)	20000	50000	70000
Profit before Tax(PBT)	80000	50000	30000
Financial Leverage = Operating Profit/PBT	1.25	2	3.33

From the above example it can be inferred that as we increase Debt from 200000 to 500000, financial leverage too increases from 1.25 to 2. In the above case, if we further increase debt keeping the same operating profit, financial leverage also increases to 3.33. However, if operating profit decreases to Rs 70,000 in the third plan then its impact on taxable income will be as follows;

Operating Profit	70000
Interest (10% on Debt)	70000
Profit before Tax(PBT)	0
Financial Leverage = Operating Profit/PBT	NIL

Thus, it means that every 1% percent change in operating profit will result in 3.33% change in the taxable profit. However, if the operating profit is decreased to 70,000 then as a result the taxable profit also decreased from 30,000 to 0 and therefore making financial leverage as 0.

### Illustration -5

The following information is available for ABC Corporation Ltd. for the year ended 31<sup>st</sup> March, 2018;

Interest on Debentures Rs 5, 00,000

Preference Dividend Rs 1, 00,000

Corporate Tax Rate 30%

EBIT 8, 00,000

Calculate the degree of financial leverage.

$$\text{Degree of Financial Leverage} = \frac{EBIT}{EBIT - I - \frac{Pref\ Dividend}{(1-t)}}$$

$$= \frac{8,00,000}{8,00,000 - 5,00,000 - \frac{1,00,000}{(1-.30)}}$$

$$= \frac{8,00,000}{157143} = 5.09$$

Now after learning the importance of leverages, let us calculate the impact of increase in debt on the value of the firm.

Excel Ltd. wants to raise additional funds for the company. Mr. Bharat, a finance manager estimates sales of the company to be Rs 20,000. He wants to know the resultant impact of increase in Debt Percentage on Net Income, Earnings per Share and Value of the Firm. The firm is in the 30% tax bracket. Each share has a face value of Rs 10. The following details are provided below. Let us also assess whether alternative debt level effect the earning per share and value of the firm

<b><u>Particulars</u></b>	<b><u>Amount</u></b>	<b><u>Amount</u></b>
<b>Debt %</b>	<b>0.2</b>	<b>0.4</b>
<b>Interest Rate on Debt</b>	<b>0.1</b>	<b>0.1</b>
<b>Sales</b>	<b>20000</b>	<b>20000</b>
<b>Variable Cost Ratio</b>	<b>0.25</b>	<b>0.25</b>
<b>Income Tax Rate</b>	<b>0.3</b>	<b>0.3</b>
<b>Sales Growth Rate</b>	<b>0</b>	<b>0</b>
<b><u>Particulars</u></b>	<b><u>Amount</u></b>	<b><u>Amount</u></b>
<b>Fixed Costs</b>	<b>8000</b>	<b>8000</b>
<b>Cash</b>	<b>400</b>	<b>400</b>
<b>Receivables</b>	<b>1500</b>	<b>1500</b>
<b>Inventories</b>	<b>1500</b>	<b>1500</b>
<b>Plant (Net)</b>	<b>4000</b>	<b>4000</b>
<b>Equipment (Net)</b>	<b><u>5000</u></b>	<b><u>5000</u></b>
<b>Total Assets</b>	<b>12400</b>	<b>12400</b>
<b>Total Liabilities</b>	<b>2480</b>	<b>4960</b>
<b>Stock (Rs 10)</b>	<b>9920</b>	<b>7440</b>
<b>Tot. Liabilities/Equity</b>	<b>12400</b>	<b>12400</b>
<b>Now, let us calculate EPS and Value of the Firm step- by –step procedure;</b>		
<b>Sales</b>	<b>20000</b>	<b>20000</b>

<b>Fixed Costs</b>	<b>8000</b>	<b>8000</b>
<b>Variable Costs % Sales</b>	<b>5000</b>	<b>5000</b>
<b>Total Costs</b>	<b>13000</b>	<b>13000</b>
<b>Earnings Before Interest and Taxes</b>	<b>7000</b>	<b>7000</b>
<b>Less: Interest</b>	<b><u>248</u></b>	<b><u>496</u></b>
<b>Earnings Before Taxes</b>	<b>6752</b>	<b>6504</b>
<b>Less: Income Taxes</b>	<b>2025.6</b>	<b>1951.2</b>
<b>Net Income</b>	<b>4726.4</b>	<b>4552.8</b>
<b>EPS</b>	<b>4.76451613</b>	<b>6.11935484</b>
<b>ROE</b>	<b>0.47645161</b>	<b>0.61193548</b>
<b>ROA</b>	<b>0.38116129</b>	<b>0.36716129</b>
<b>WACC</b>	<b>0.11</b>	<b>0.1</b>
<b>V<sub>F</sub></b>	<b>63636.3636</b>	<b>70000</b>

Financial Leverage is the extent to which fixed income securities and preferred stock used in the capital structure of business. As a general rule, there should be an appropriate mix of owner's funds (equity) and outsider's funds (creditors) in financing the firm's assets. In the above example, we can see that as the debt proportion increases in the capital structure of the company, Value of the firm also increases due to the advantage of tax shield.

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## 10.8 COMBINED LEVERAGE

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Combined Leverage is the combination of Financial and Operating leverage. When operating and financial leverage is combined then the numerator and denominator so obtained depicts the effect of change in sales over change in taxable profit or Earning per share.

Vanhorne defines combined leverage or total leverage as "The use of both fixed operating and financing cost by the firm and the degree of the total leverage is " the percentage change in a firm's earning per share(EPS) resulting from a 1% change in output (sales). This is also equal to a firm's degree of operating leverage (DOL) times its degree of financial leverage (DFL) at a particular level of output (sales)".

Combined Leverage is the impact on the Earning per share of the firm due to the usage of operating fixed cost as well as financial fixed costs (in terms of interest payments). In Combined Leverage, a percentage change in EBIT results more than a proportionate change in earning per share. The Combined leverage is also termed as Total leverage. Hence, combined leverage discloses the relationship between Contribution and Profit before Taxes but after interest. Overall, it tries to find out resulting percentage change in taxable income due to percentage change in sales.

Degree of Combined Leverage = *Operating Leverage* × *Combined Leverage*

$$= \frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBT}}$$

$$\frac{\Delta \text{EPS}/\text{EPS}}{\Delta Q/Q} \text{ or } \frac{\text{Contribution}}{\text{EBT or PBT}}$$

The Degree of Combined leverage can also be computed using the following formula;

$$\text{Degree of Combined Leverage (in quantity)} = \frac{Q(SP-VC)}{Q(SP-VC) - FC - INT - \frac{\text{Pref Div}}{1-t}}$$

FC=Fixed Costs

INT=Interest Cost on Debt

t=Income Tax rate

Pref. Div=Preference Dividend

Q= Quantity Produced

SP=Selling price per unit

VC=Variable cost per Unit

### Illustration -6

A company has sales of Rs 2, 00, 000. The variable costs are expected as 30% of the sales whereas fixed operating costs amount to Rs 30,000. The amount of interest on long term debt is Rs 50,000. You are required to calculate combined leverage. Also find the impact on combined leverage when the sales increases to Rs. 2, 50,000.

### Solution

Particulars	Amount
Sales	2,00,000
Less Variable Cost	60000

Contribution	140000
Less Fixed Operating cost	30000
EBIT	110000
Less Interest	50000
PBT	60000

$$\text{Therefore, Composite Leverage} = \frac{\text{Contribution}}{\text{PBT}} = \frac{140000}{60000} = 2.33$$

This means that with every increase of Re1 in sales, taxable income will increase by 2.33 with the given figures. Further, if sales are increased to Rs 2,50,000 then the combined leverage shall be ;

Particulars	Amount
Sales	250000
Less Variable Cost	75000
Contribution	175000
Less Fixed Operating cost	30000
EBIT	145000
Less Interest	50000
PBT	95000

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{PBT}} = \frac{175000}{95000} = 1.84$$

So, with increase in sales, profit before tax increased to Rs 95,000. However, combined leverage was reduced to 1.84 in the above example.

### Illustration -7

Taking another example, suppose a toy manufacturing unit has Rs. 4, 00,000 in debentures at 5% interest. Selling price is Rs 100 per unit, variable operating costs are Rs 20 per unit and annual fixed operating costs are 1,50,000. Assume tax rate as 30%. You are required to calculate, Degree of Total leverage at 10,000 units of production and sales.

### Solution

$$\text{Degree of Combined Leverage (in quantity)} = \frac{Q(SP-VC)}{Q(SP-VC) - FC - INT - \frac{Pref Div}{1-t}}$$

$$DCL_{10,000} = \frac{10000(100-20)}{10000(100-20) - 150000 - 20000}$$

$$= \frac{800000}{630000} = 1.27$$

Therefore, when the output is 10,000 units, a one percent change in Q will result in 1.27% change in EPS. Further degree of total leverage for the above example can also be calculated as under;

$$= DOL_{10,000} \times DFL_{EBIT \text{ Rs } 650000}$$

$$= \frac{10000(100-20)}{10000(100-20) - 150000} \times \frac{650000}{650000 - 20000}$$

$$= 1.23 \times 1.03$$

$$= 1.27$$

The combined leverage shall help in assessing the overall impact of various types of fixed costs on the firm. High operating leverage shall be balanced against lower financial leverage. Similarly dividend payments may be reduced in case of unfavourable circumstances especially when a company utilizes equity financing while designing capital structure. A slight change in EBIT results into larger proportionate change in Earning per Share.

<i>Operating Leverage</i>	<i>Financial Leverage</i>	<i>Effect/Conclusion</i>
<i>High</i>	<i>High</i>	<i>Very risky. High interest outflow, not commensurate with earnings</i>
<i>High</i>	<i>Low</i>	<i>Sales still unsatisfactory in relation to the fixed costs to be absorbed. Long term borrowing not a strain on earnings</i>
<i>Low</i>	<i>High</i>	<i>Ideal Situation for profit maximisation</i>
<i>Low</i>	<i>Low</i>	<i>Management over cautious</i>

(Reference: Kishore Ravi, Financial Management, 7th Edition, Taxmann Publications (P) Ltd.)

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## 10.9 BROAD INFERENCES FROM THE LEVERAGES

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### Financial Risk

Financial risk basically includes the risk of possible insolvency and the added fluctuations in the earnings per share that is caused by the use of financial leverage. This happens because when a firm increases debt in the capital structure cash flows also increases in form of interest payments and this may lead to cash crunch for a company. As a result, the probability of cash insolvency increases. The second element of financial risk relates to the relative dispersion in the earnings available to equity shareholders. Financial risk, therefore, can be avoided by the firm if it does not raise funds through fixed bearing securities. The variability in EPS and Return on Equity occurs due to employing additional funds using debt.

### Operating risk

Operating risk is caused due to the variability of EBIT or you can say returns on assets. The risk arises due to environmental changes, changes in the policies of the government or changes in the inflation, changes in the cost of raw material and the likes. Therefore operating risk is unavoidable risk. The variability in EBIT has two parts;

- a) Variability of Sales
- b) Variability of expenses

The variability in sales may occur due to technological changes, changes in the cost of raw material, shift in consumer preferences, changes in the economic conditions, changes in inflation prevailing in the economy, policies of competitors, so on and so forth. However, variability in EBIT is also caused by variability in fixed and variable expenses. If the ratio of fixed expenses in comparison to variable expenses is higher then the firm will have high degree of operating leverage. High operating leverage leads to major increase in EBIT when there is increase in the sales. However, when company faces decline in sales then EBIT too declines with a very rapid rate. Operating leverages extremely impact the EBIT with varying sales. The riskiness of EBIT and EPS can be measured by standard deviation and coefficient of variation.

The financial leverage will be favorable for EPS and ROE only when the firm's return on investments exceeds the interest cost and it will be unfavorable if the returns on investments are less than the interest cost.



**Check Your Progress- B**

**Q1. What do you mean by the term 'Leverage'?**

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**Q2. What do you mean by Operating Leverage? How it is Calculated?**

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**Q3. What do you mean by Degree of Financial Leverage?**

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**Q4. Fill in the Blanks**

- a) \_\_\_\_\_ arises due to environmental changes, changes in the policies of the government or changes in the inflation, changes in the cost of raw material and the likes.
- b) \_\_\_\_\_ basically includes the risk of possible insolvency and the added fluctuations in the earnings per share that is caused by the use of financial leverage.
- c) The Combine leverage is also termed as \_\_\_\_\_.
- d) The financial leverage and the \_\_\_\_\_ shares inverse relationships.

**Q5. Complete the table given below and find out the effect of financial leverage on the Company.**

<u>Particulars</u>	<u>Amount</u>	<u>Amount</u>	<u>Amount</u>
<b>Debt %</b>	<b>₹ 0.10</b>	<b>₹ 0.20</b>	<b>₹ 0.30</b>
<b>Interest Rate on Debt</b>	<b>₹ 0.06</b>	<b>₹ 0.06</b>	<b>₹ 0.06</b>
<b>Sales</b>	<b>₹ 30,000.00</b>		
<b>Variable Cost Ratio</b>	<b>₹ 0.30</b>	<b>₹ 0.30</b>	<b>₹ 0.30</b>
<b>Income Tax Rate</b>	<b>₹ 0.40</b>	<b>₹ 0.40</b>	<b>₹ 0.40</b>
<b>Sales Growth Rate</b>	<b>₹ 0.01</b>		
<b>Fixed Costs</b>	<b>₹ 10,000.00</b>		
<b>Cash</b>	<b>₹ 500.00</b>	<b>₹ 500.00</b>	<b>₹ 500.00</b>
<b>Receivables</b>	<b>₹ 800.00</b>	<b>₹ 800.00</b>	<b>₹ 800.00</b>
<b>Inventories</b>	<b>₹ 1,400.00</b>	<b>₹ 1,400.00</b>	<b>₹ 1,400.00</b>
<b>Plant (Net)</b>	<b>₹ 5,000.00</b>	<b>₹ 5,000.00</b>	<b>₹ 5,000.00</b>
<b>Equipment (Net)</b>	<b><u>₹ 2,000.00</u></b>	<b><u>₹ 2,000.00</u></b>	<b><u>₹ 2,000.00</u></b>
<b>Total Assets</b>			
<b>Total Liabilities</b>	<b>₹ 1,000.00</b>	<b>₹ 1,000.00</b>	<b>₹ 1,000.00</b>
<b>Stock (Rs. 10)</b>			
<b>Tot. Liab./Equity</b>			
<b>Sales</b>		<b>₹ 0.00</b>	<b>₹ 0.00</b>
<b>Fixed Costs</b>		<b>₹ 0.00</b>	<b>₹ 0.00</b>
<b>Variable Costs % Sales</b>		<b>₹ 0.00</b>	<b>₹ 0.00</b>
<b>Total Costs</b>		<b>₹ 0.00</b>	<b>₹ 0.00</b>

Earnings Before Interest and Taxes		₹ 0.00	₹ 0.00
Less: Interest		₹ 0.00	₹ 0.00
Earnings Before Taxes		₹ 0.00	₹ 0.00
Less: Income Taxes		₹ 0.00	₹ 0.00
Net Income		₹ 0.00	₹ 0.00

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## 10.10 SUMMARY

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In this unit, you learnt that how sensitive is earning per share (EPS) to changes in earnings before interest and tax (EBIT) under different capital structures. Capital structure refers to the relationship between the various long –term forms of financing such as debentures (long term), preference share capital and equity share capital including reserves and surplus. In this unit you also studied about the different leverages i.e. Financial leverage, Operating leverage and Combined leverage and how these leverages have enormous acceleration and deceleration effect on Earnings before Interest and Taxes as well as on EPS therefore, it is important for the company to manage these leverages appropriately.




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## 10.11 GLOSSARY

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**Indifference Point** or EBIT-EPS Break Even Point indicates the point at which EPS is same irrespective of any level of financial leverage.

**Financial Leverage** indicates the impact on earnings or returns due to the usage of fixed cost funds in the capital structure.

**Operating Leverage** Operating leverage directly impact operating profit of company that is it impact EBIT whereas Financial Leverage affects Profit after tax or Earning per Share.

**Combined Leverage** is the impact on the Earning per share of the firm due to the usage of operating fixed cost as well as financial fixed costs (in terms of interest payments).

**Financial Risk** basically includes the risk of possible insolvency and the added fluctuations in the earnings per share that is caused by the use of financial leverage.



## 10.12 ANSWERS TO CHECK YOUR PROGRESS

### Check Your Progress –B

4. Answers

- a) Operating risk
- b) Financial risk
- c) Total leverage/Composite leverage
- d) weighted average cost of capital

5. Answer

<u>Particulars</u>	<u>Amount</u>	<u>Amount</u>	<u>Amount</u>
Debt %	₹ 0.10	₹ 0.20	₹ 0.30
Interest Rate on Debt	₹ 0.06	₹ 0.06	₹ 0.06
Sales	₹ 30,000.00	₹ 30,300.00	₹ 30,603.00
Variable Cost Ratio	₹ 0.30	₹ 0.30	₹ 0.30
Income Tax Rate	₹ 0.40	₹ 0.40	₹ 0.40
Sales Growth Rate	₹ 0.01		
Fixed Costs	₹ 10,000.00		
Cash	₹ 500.00	₹ 500.00	₹ 500.00
Receivables	₹ 800.00	₹ 800.00	₹ 800.00
Inventories	₹ 1,400.00	₹ 1,400.00	₹ 1,400.00
Plant (Net)	₹ 5,000.00	₹ 5,000.00	₹ 5,000.00
Equipment (Net)	<u>₹ 2,000.00</u>	<u>₹ 2,000.00</u>	<u>₹ 2,000.00</u>
Total Assets	₹ 9,700.00	₹ 9,700.00	₹ 9,700.00

<b>Total Liabilities</b>	<b>₹ 1,000.00</b>	<b>₹ 1,000.00</b>	<b>₹ 1,000.00</b>
<b>Stock ( Rs. 10)</b>	<b>₹ 8,700.00</b>	<b>₹ 8,700.00</b>	<b>₹ 8,700.00</b>
<b>Tot. Liab./Equity</b>	<b>₹ 9,700.00</b>	<b>₹ 9,700.00</b>	<b>₹ 9,700.00</b>
<b>Sales</b>	<b>₹ 30,000.00</b>	<b>₹ 30,300.00</b>	<b>₹ 30,603.00</b>
<b>Fixed Costs</b>	<b>₹ 10,000.00</b>	<b>₹ 10,000.00</b>	<b>₹ 10,000.00</b>
<b>Variable Costs %</b>	<b>₹ 9,000.00</b>	<b>₹ 9,090.00</b>	<b>₹ 9,180.90</b>
<b>Sales</b>			
<b>Total Costs</b>	<b>₹ 19,000.00</b>	<b>₹ 19,090.00</b>	<b>₹ 19,180.90</b>
<b>Earnings Before Interest and Taxes</b>	<b>₹ 11,000.00</b>	<b>₹ 11,210.00</b>	<b>₹ 11,422.10</b>
<b>Less: Interest</b>	<b><u>₹ 60.00</u></b>	<b><u>₹ 60.00</u></b>	<b><u>₹ 60.00</u></b>
<b>Earnings Before Taxes</b>	<b>₹ 10,940.00</b>	<b>₹ 11,150.00</b>	<b>₹ 11,362.10</b>
<b>Less: Income Taxes</b>	<b>₹ 4,376.00</b>	<b>₹ 4,460.00</b>	<b>₹ 4,544.84</b>
<b>Net Income</b>	<b>₹ 6,564.00</b>	<b>₹ 6,690.00</b>	<b>₹ 6,817.26</b>
<b>EPS</b>	<b>₹ 7.54</b>	<b>₹ 7.69</b>	<b>₹ 7.84</b>



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## 10.15 TERMINAL QUESTIONS

- Q1. Explain the importance of EBIT-EPS analysis in choosing the best financing mix ?
- Q2. What do you mean by Indifference point in the EBIT-EPS Analysis?
- Q3. What do you mean by Operating Leverage and Degree of Operating Leverage? How the two are related to each other?
- Q4. “When debt funds have greater weightage in capital structure as compared to owner’s equity then leverage is said to be larger and *vice-versa*”. Comment. Do there are exceptions to this.
- Q5. What is combined leverage? What causes it? How is the degree of combined leverage calculated?
- Q6. Discuss the applicability of operating and financial leverage in the present scenario.
- Q7. Discuss the significance of financial leverage? Discuss its effect on financial risk.
- Q8. When does operating leverage become favorable? State its impact on the risk.
- Q9. Discuss when operating and financial leverages have risky and ideal situation.
- Q10. The following details are available for ABC Ltd and XYZ Ltd. :

	ABC Ltd	XYZ Ltd
Sales	7,00,000	6,00,000
Variable cost	30 per unit	40 per unit
Fixed cost	250000	200000
Interest	20000	20000
Units produced and sold	500	500

Calculate the following;

- a) Degree of operating leverage and financial leverage of ABC Ltd. and XYZ Ltd..

b) Comment on their risk position.

Q11. The following details are available for a company;

Sales 8,00,000

Variable Cost 2,00,000

Fixed Cost 100,000

Debentures 4,00,000

Interest on Debentures is 5%

Equity Capital 6,00,000

You are required to calculate ROI and all the leverages. Also find the level at which EBIT shall be zero.

Q12. Calculate the EBIT at which EPS indifference Point between the financing alternatives as listed below;

Equity Share Capital of Rs 10,00,000 (par value of Rs 10) and 12% Debentures of Rs 5,00,000

Or

Equity Share Capital of Rs 8,00,000 (par value of Rs 10), 12% Preference Share Capital 300,000 and 12% Debentures of Rs 4,00,000. Corporate tax rate is 30%

Q13. Rainbow Limited is setting up a project that requires capital outlay of Rs 50,00,000. It has the following two alternatives in financing the project. The first alternative is financing all from equity and the other alternative is having debt: equity ratio of 2:1. The rate of interest payable on the debt is 15% pa. The corporate tax is 30%. Calculate the indifference point between two alternative methods of financing.

Q14. Calculate the Degree of Operating Leverage, Degree of Financial Leverage and the Degree of Combined Leverage for the following companies. Also give interpretations for all the three leverages.

	X	Y	Z
Output (Units)	2,00,000	3,00,000	5,00,000
Fixed Cost	200,000	3,00,000	3,00,000
Variable Cost per unit	2	2	2
Interest	50,000	50,000	50,000



Selling price in Units	5	5	5
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