

LEVERAGE

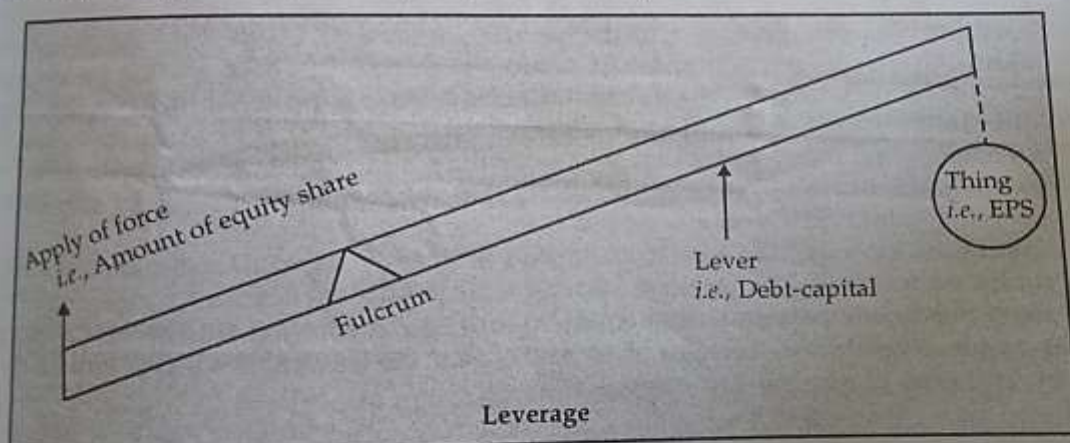
UNIT 3

DR BIDISHA DATTA

FINANCIAL MANAGEMENT

A Introduction

Before giving the definitions of operating Leverage, Financial Leverage and Combined Leverage, let us see, at first, what is meant by Leverage. The term 'Leverage' has been derived from the word 'Lever' which means weight-lifting tool. Lever refers to a stick with a fulcrum by which a weighty thing can easily be lifted up by loading the thing on the one side of the fulcrum and applying force on the other side. It helps to lift a weighty thing by increasing force quite a few times more than the force that is applied. That is, lever helps to increase in the effectiveness of the applied force. The simile can be used gracefully in the case of financial management. As for instance, if debt-capital is used by reducing a part of the equity capital, then the earning per share is increased to a certain extent than the earning per share of a business having only equity share. Here, the debt-capital is lever, the thing is earning per share and the force is equity share. As a weighty thing can be lifted up easily by applying less force with the help of the lever; similarly, if debt-capital is used, then the earning per share can easily be increased by using less amount of equity capital. So, it can be said that the process of increasing the earning per share by using lever i.e., debt-capital, is the leverage.



B Definition of Leverage

Whatever may be the volume of production or sales, every firm has to pay fixed operating cost and fixed financial cost return (such as Interest, dividend etc.). So, it can be said that the fixed operating cost and fixed financial cost affect the earnings to the equity shareholders. For this, if it is possible to bring the fixed operating cost and fixed financial cost at optimum level by changing them properly, the earnings to the equity shareholders must be increased. The process of increasing the amount of earnings to the equity shareholders by changing these two costs

is **Leverage**. Different experts have defined the term 'Leverage' in different ways. A few of such definitions are given below—

According to **Van Horn**—Leverage refers to the use of fixed costs in an attempt to increase (or, *Lever up*) profitability.

According to **Ezra Solomon**—Leverage is the ratio of net returns on shareholders' equity and the net rate of return on total capitalisation.

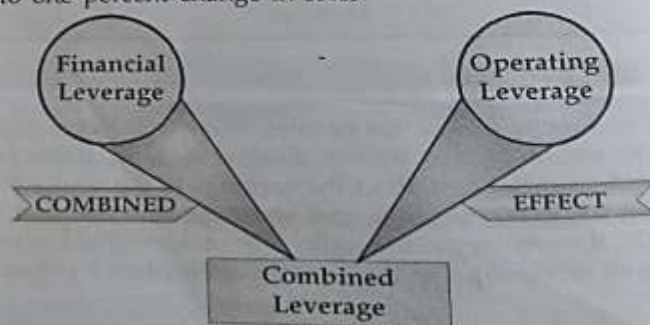
According to **S. C. Kuchhal**—The term leverage is used to describe a firm's ability to use fixed cost assets or funds to magnify the return to its owners.

On the basis of the above definitions, it can be said that the process of increasing the earning per share to the equity shareholders by changing the fixed operating cost and fixed financial cost is called **Leverage**.

C Classification of Leverage

Leverages are of three types; such as—(a) Financial Leverage, (b) Operating Leverage, and (c) Combined Leverage. These are discussed below :

- A. **Financial Leverage** : The process of increasing the earning per share to the equity shareholders by increasing the amount of debt-capital is called **Financial Leverage**. The financial leverage may be of two types, such as, Positive or Favourable Financial Leverage and Negative or Unfavourable Financial Leverage. When there is a greater dependence on debt-capital and as a result, the earning per share to the equity shareholders is increased at a faster rate, it is called **Positive or Favourable Financial Leverage**. On the other hand, when there is a lower dependence on the debt-capital and as a result, it is quite impossible to increase the rate of earning per share to the equity shareholders, it is called **Negative or Unfavourable Financial Leverage**.
- B. **Operating Leverage** : The tendency of disproportionately changes in operating profit with the change in sales is called **Operating Leverage**. Every firm has to bear fixed operating cost whatever may be its productions or sales. The operating leverage takes place only at that time when a firm has to bear fixed operating cost. As every firm has to bear fixed operating cost compulsorily, the percentage change in operating profit accompanying a change in sales is greater than the percentage change in sales. So, in the definition of the operating leverage, disproportionate change of the sales and operating profit has been mentioned.
- C. **Combined Leverage** : The combined effect of operating and financial leverage is called combined leverage. The leverage by which the percentage change in earning per equity share due to one percent change in sales is measured is called **Combined Leverage**. For example, a combined leverage of 10 means that the earning per share will be changed by 10% due to one percent change in sales.



D Interrelation among Fixed Cost, Risk and Leverage

Generally, a firm has to bear two types of fixed costs, as for instance — Fixed operating cost (for example, depreciation, rent etc.) and Fixed financial cost (for example, interest on debt-capital, etc.). Similarly, the total risk of a firm can be divided into two parts such as — Operating risk and Financial risk. The risk of changing the earning before interest and tax (EBIT) due to change in sales is called **operating risk**. On the other hand, The risk which is created for the formation of the capital structure is called **Financial Risk**. For example, the risk of using debt-capital is an example of financial risk. Again, the process of increasing the earning per share to the equity shareholders by changing the fixed operating cost and fixed financial cost is called **Leverage**. Thus, it is seen that the fixed cost, risk and leverage are interrelated. This interrelationship is discussed below :

Firstly, the interest payable on debt-capital is an admissible expense in the case of computation of tax liability. So, debt-capital increases the earnings to the equity shareholders. But if debt-capital is used, the firm has to bear the cost of fixed interest. As a result of it, financial risk is created in the firm. The financial leverage explains such financial risk attached to the capital structure. The more the degree of financial leverage, the greater is the earnings to the equity shareholders as well as increase in the degree of financial risk and vice-versa.

Secondly, the disproportionate changes in operating profit with the change in sales is called **Operating Leverage**. The operating leverage becomes effective only at that time when a firm has to bear fixed operating cost. Here, operating profits refers to the earning before interest and tax (EBIT). Again, the risk of changing the earning before interest and tax due to change in sales is called **operating risk**. So, fixed operating cost, operating risk and operating leverage are interrelated. The more the degree of operating leverage, the more is the amount of operating risk and vice-versa.

Thirdly, the amount of risk relating to the fixed operating cost is measured by the operating leverage and the amount of risk relating to the fixed interest cost is measured by the Financial leverage. Since, both these leverages are closely related with the firm's capacity to meet its fixed cost obligation, if they are multiplied, the result is combined leverage. The risk involved with the combined leverage of a firm is the total risk of that very firm. So, a high degree of operating leverage together with a high degree of financial leverage makes the firm very risky.

E Operating Leverage

E.1. Measurement of Operating Leverage

The percentage change in earning before interest and tax (EBIT) due to one percent change in the amount of sales, is called **Degree of Operating Leverage (DOL)**. That is —

$$DOL = \frac{\% \text{ Change in EBIT}}{\% \text{ Change in Sales}}$$

Now, suppose —

Q = Volume of output or sales ;

V = Variable cost per unit ;

S = Selling price per unit ;

(S - V) = Contribution per unit ;

Q (S - V) = Total Contribution ;

F = Total fixed cost ;

$$\begin{aligned}\Delta Q &= \text{Change in sales;} \\ \text{EBIT} &= (\text{Total contribution} - \text{Total fixed cost}) \\ &= Q(S - V) - F; \text{ and} \\ \text{Changes in EBIT} &= \Delta \text{EBIT} = \Delta Q(S - V) \quad [\because 'F' \text{ is fixed}] \end{aligned}$$

$$\therefore \text{DOL} = \frac{\frac{\text{Change in EBIT}}{\text{Opening EBIT}} \times 100}{\frac{\text{Change in Sales}}{\text{Opening Sales}} \times 100}$$

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

$$\text{or, DOL} = \frac{\Delta \text{EBIT}}{\text{EBIT}} \times \frac{Q}{\Delta Q}$$

$$\text{or, DOL} = \frac{\Delta Q(S - V)}{\text{EBIT}} \times \frac{Q}{\Delta Q}$$

$$\text{or, DOL} = \frac{Q(S - V)}{\text{EBIT}}$$

$$\text{or, DOL} = \frac{\text{Contribution}}{\text{EBIT}}$$

$$\text{Thus, Degree of Operating Leverage} = \frac{\text{Total Contribution}}{\text{EBIT}}$$

E.2. Significance of operating Leverage

- (i) If the volume of sales changes by one per cent, what percentage of earning before interest and tax (EBIT) that will be changed is known from this leverage. For example, let us assume that the operating leverage of a firm is 2.5. This means that if the volume of sales changes by 1%, the EBIT of that firm will be changed by 2.5%.
- (ii) The operating leverage is effective only then, when the firm has to bear fixed operating cost. This means, if fixed cost does not exist, there can not remain the existence of operating leverage. For example, we know that—

$$\text{DOL} = \frac{\text{Contribution}}{\text{EBIT}}$$

$$\text{or, DOL} = \frac{\text{Fixed operating cost} + \text{EBIT}}{\text{EBIT}} \quad [\text{Where EBIT} = \text{Profit}]$$

$$\text{or, DOL} = \frac{0 + \text{EBIT}}{\text{EBIT}} \quad [\text{Where fixed operating cost} = 0]$$

$$\therefore \text{DOL} = \frac{\text{EBIT}}{\text{EBIT}} = 1$$

We know that the disproportionate changes in operating profit due to change in sale is called operating leverage. Here, $\text{DOL} = 1$. This means that if the volume of sales changes by 1%, the operating profit also will be changed by 1% i.e., the operating profit will not be changed disproportionately with the changes in the volume of sales. Thus, it is clear that if operating cost does not exist, disproportionate changes in operating profit can not

be taken place with the changes in the volume of sales i.e., there can not remain the existence of the operating leverage.

- (iii) If $DOL = 1$, the operating leverage is not effective. For example, if $DOL = 1$, it is understood that if the volume of sales changes by 1%, the operating profit also will be changed by 1% i.e., the operating profit will not be changed disproportionately with the changes in the volume of sales. So, the operating leverage will not be effective.
- (iv) The degree operating leverage depends on the amount of fixed operating cost. This means—the more the amount of fixed operating cost, the higher will be the degree of operating leverage and vice-versa. For example—

Particulars	Firm-A	Firm-B
Sales	₹ 40,000	₹ 40,000
Less : Variable Cost	₹ 24,000	₹ 24,000
Contribution	₹ 16,000	₹ 16,000
Less : Fixed Operating Cost	₹ 6,000	₹ 8,000
EBIT	₹ 10,000	₹ 8,000
$DOL = \frac{\text{Contribution}}{\text{EBIT}}$	$\frac{16,000}{10,000} = 1.6$	$\frac{16,000}{8,000} = 2$

It is found from the above statement that the DOL of firm-B is more as compared to the firm-A. This is because, the fixed operating cost of firm-B is more as compared to firm-A. Thus, it is clear that if the fixed operating cost is more, the DOL is high and if the fixed operating cost is less, the DOL also is low.

- (v) As every firm has to bear fixed operating cost compulsorily, the percentage change in operating profit accompanying a change in sales is greater than the percentage change in sales. So, in the definition of operating leverage, disproportionate change of the sales and operating profit has been mentioned. For example—

Particulars	1st year	2nd year [25% increase in sales]	3rd year [60% increase in sales]
Sales	₹ 20,000	₹ 25,000	₹ 32,000
Less : Variable Cost	₹ 10,000	₹ 12,500	₹ 16,000
Contribution	₹ 10,000	₹ 12,500	₹ 16,000
Less : Fixed Operating Cost	₹ 5,000	₹ 5,000	₹ 5,000
EBIT	₹ 5,000	₹ 7,500	₹ 11,000
Rate of Change in Sales	—	$\frac{5,000}{20,000} = 25\%$	$\frac{12,000}{20,000} = 60\%$
Rate of Change in EBIT	—	$\frac{2,500}{5,000} = 50\%$	$\frac{6,000}{5,000} = 120\%$

It is clear from the above statement that the EBIT increases at higher rate than the rate at which the volume of sales increases. This is because of the existence of fixed operating cost; because if fixed operating cost does not exist, the volume of sales and operating profit would have changed at the same proportion. As for instance—

Particulars	1st year	Increase in sales]	2nd year (60% increase in sales)
Sales	₹ 20,000	₹ 25,000	₹ 32,000
Less : Variable Cost	₹ 10,000	₹ 12,500	₹ 16,000
Contribution	₹ 10,000	₹ 12,500	₹ 16,000
Less : Fixed Operating Cost	Nil	Nil	Nil
EBIT	₹ 10,000	₹ 12,500	₹ 16,000
Rate of Change in Sales	—	$\frac{5,000}{20,000} = 25\%$	$\frac{12,000}{20,000} = 60\%$
Rate of Change in EBIT	—	$\frac{2,500}{10,000} = 25\%$	$\frac{6,000}{10,000} = 60\%$

- (vi) If a firm has a high degree of operating leverage, a small change in sales will reflect a large change in operating profits. So, it can be said that the operating profit of a firm having a high degree of operating leverage increases at a faster rate than the increase in sales. For example—

Particulars	Firm-A	Firm-B
Sales	₹ 40,000	₹ 50,000
Less : Variable Cost	₹ 24,000	₹ 30,000
Contribution	₹ 16,000	₹ 20,000
Less : Fixed Operating Cost	₹ 6,000	₹ 10,000
EBIT	₹ 10,000	₹ 10,000
DOL = $\frac{\text{Contribution}}{\text{EBIT}}$	$\frac{16,000}{10,000} = 1.6$	$\frac{20,000}{10,000} = 2$

Now, let us see, if the volume of sales of both the firm increases by 50%, what happens—

Particulars	Firm-A	Firm-B
Sales	₹ 60,000	₹ 75,000
Less : Variable Cost	₹ 36,000	₹ 45,000
Contribution	₹ 24,000	₹ 30,000
Less : Fixed Operating Cost	₹ 6,000	₹ 10,000
EBIT	₹ 18,000	₹ 20,000
Less : Old EBIT	₹ 10,000	₹ 10,000
Increase in EBIT	₹ 8,000	₹ 10,000
Rate of increase in EBIT	$\frac{8,000}{10,000} = 80\%$	$\frac{10,000}{10,000} = 100\%$

It is found from the above two statements that if the volume of sales increases by 50%, the EBIT of firm-B increases more than the EBIT of firm-A, because, the DOL of firm-B is more than that of firm-A. Thus, it is clear that, if the volume of sales increases, the EBIT of that firm will be increased at higher rate whose DOL is higher.

(iii) If the trend of sales is upward, high degree of operating leverage is favourable for the firm. On the other hand, if the trend of sales is downward, low degree of operating leverage is suitable for the firm. For example—

Particulars	Firm-A	Firm-B
Sales	₹ 80,000	₹ 80,000
Less : Variable Cost	₹ 48,000	₹ 48,000
Contribution	₹ 32,000	₹ 32,000
Less : Fixed Operating Cost	₹ 7,000	₹ 12,000
EBIT	₹ 25,000	₹ 20,000
DOL = $\frac{\text{Contribution}}{\text{EBIT}}$	$\frac{32,000}{25,000} = 1.28$	$\frac{32,000}{20,000} = 1.60$

Now, suppose, the volume of sales of both the firms increases by 25%. In this case—

Particulars	Firm-A	Firm-B
Sales $[\text{₹ } 80,000 \times \frac{125}{100}]$	₹ 1,00,000	₹ 1,00,000
Less : Variable Cost $[\text{₹ } 48,000 \times \frac{125}{100}]$	₹ 60,000	₹ 60,000
Contribution	₹ 40,000	₹ 40,000
Less : Fixed Operating Cost	₹ 7,000	₹ 12,000
EBIT	₹ 33,000	₹ 28,000
Less : Old EBIT	₹ 25,000	₹ 20,000
Increase in EBIT	₹ 8,000	₹ 8,000
Rate of increase in EBIT	$\frac{8,000}{25,000} = 32\%$	$\frac{8,000}{20,000} = 40\%$

As the degree of operating leverage of Firm-B is higher than that of Firm-A, the EBIT of Firm-B has been increased at higher rate in spite of increase in sales of both the firms by 25%. Now let us see, if the volume of sales decreases by 25%, then what happens—

Particulars	Firm-A	Firm-B
Sales $[\text{₹ } 80,000 \times \frac{75}{100}]$	₹ 60,000	₹ 60,000
Less : Variable Cost $[\text{₹ } 48,000 \times \frac{75}{100}]$	₹ 36,000	₹ 36,000
Contribution	₹ 24,000	₹ 24,000
Less : Fixed Operating Cost	₹ 7,000	₹ 12,000
EBIT	₹ 17,000	₹ 12,000
Less : Old EBIT	₹ 25,000	₹ 20,000
Decrease in EBIT	₹ 8,000	₹ 8,000
Rate of decrease in EBIT	$\frac{8,000}{25,000} = 32\%$	$\frac{8,000}{20,000} = 40\%$

It is found from the above statement that the EBIT of firm-A has been decreased at lower rate; because, DOL of this firm is lower than that of firm-B. Thus, it is clear that high degree of operating leverage is favourable for the firm under boom condition and low degree of operating leverage is favourable at the time of depression.

- (viii) The risk of changing the earning before interest and tax (EBIT) due to change in sales is called operating risk. The operating leverage indicates the degree of operating risk; because, if the volume of sales changes by one per cent, what percentage of EBIT that will be changed is known from this leverage.

E.3. Necessity of Operating Leverage

Generally the degree of operating leverage (DOL) is determined for two basic purposes—

Firstly, If the volume of sales changes by one per cent, then what percentage of earning before interest and tax (EBIT) that will be changed is determined with the help of the operating leverage. So, the operating leverage is determined for the purpose of determining the effect of changing the volume of sales on EBIT.

Secondly, The risk of changing the earning before interest and tax (EBIT) due to change in sales is called operating risk. The risk is measured with the help of degree of operating leverage; because, if the volume of sales changes by one per cent, what percentage of EBIT that will be changed can be determined with the help of this leverage. So, this leverage is computed also for measuring the degree of operating leverage.

E.4. Advantages of Operating Leverage

The advantages which are obtained from the operating leverage are—

- The risk of changing the earning before interest and tax (EBIT) due to change in sales is called operating risk. This risk can be measured with the help of the operating leverage; because, if the volume of sales changes by one per cent, what percentage of EBIT that will be changed can be determined with the help of this leverage. The higher the degree of this leverage, the higher is the operating risk to the firm and vice-versa.
- If the volume of sales changes, what effect may be imposed on the EBIT of the firm can be known with the help of this leverage. The firms which have high degree of operating leverage, their EBIT increases at greater rate than the rate at which the volume of sales increases. So, the amount of EBIT of the firm having high degree of operating leverage can be increased at larger quantity by a small increasing the volume of sales.

E.5. Limitations of Operating Leverage

The limitations of operating leverage are—

- DOL is undefined at the break-even point. We know that, at break-even point, $EBIT = 0$.
Under this condition, operating leverage = $\frac{\text{Contribution}}{EBIT} = \frac{\text{Contribution}}{0} = \text{undefined}$.
- The existence of this leverage is very risky for the firm; because, under this situation, if the volume of sales decreases at a small rate, the amount of profit decreases significantly.
- It is very difficult for the outsiders to compute the degree of this leverage; because, it is not possible for them to determine the fixed operating cost of the firm and contribution from each product separately. So, it is not possible for them to measure the degree of operating risk of the firm.

E.6. Relation between Margin of Safety and DOL

We know that—

$$\text{Margin of Safety} = \text{Sales} - \text{Break-Even Sales (BES)}$$

$$= \text{Sales} - \frac{\text{Fixed cost}}{\text{P/V ratio}} \quad \left[\because \text{BES} = \frac{\text{Fixed cost}}{\text{P/V ratio}} \right]$$

$$= \frac{\text{Sales} \times \text{P/V ratio} - \text{Fixed cost}}{\text{P/V ratio}}$$

$$= \frac{\text{Sales} \times \frac{\text{Contribution}}{\text{Sales}} - \text{Fixed cost}}{\frac{\text{Contribution}}{\text{Sales}}}$$

$$= \frac{\text{Contribution} - \text{Fixed cost}}{\frac{\text{Contribution}}{\text{Sales}}}$$

$$= \frac{\text{EBIT}}{\frac{\text{Contribution}}{\text{Sales}}} \quad [\because \text{Contribution} - \text{Fixed cost} = \text{EBIT}]$$

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

$$= \frac{\text{Sales}}{\frac{\text{Contribution}}{\text{EBIT}}} = \frac{\text{Sales}}{\text{Degree of Operating Leverage}}$$

$$\therefore \text{Margin of safety} = \frac{\text{Sales}}{\text{Degree of Operating Leverage}}$$

$$\therefore \text{Degree of Operating Leverage} = \text{Sales} \times \frac{1}{\text{Margin of Safety}}$$

Thus, it is clear that the degree of operating leverage is inversely related to the margin of safety. This means, if the margin of safety increases, the degree of operating leverage decreases and vice-versa.