UNIT-III
LEVERAGE ANALYSIS

What is financial leverage

The use of fixed charges sources like debt and preference shares together with owner's equity or ordinary shares capitals know as financial leverage. It is also known as gearing or trading or equity. The financial leverage employed by a company is intended to earn more on the fixed charges funds than their costs.

Since the charges of debt are fixed it could be used to increase shareholders earnings as well as creating the risks of loss to them.

For instance: If a firm borrows Rs. 50 at 8% interest and invests if for a return of 10% the balance of 2% after payment of taxes will belong to shareholders where as if company could earn only 6% there would be loss to shareholders of 2%.

Why financial-leverage is called a double-edge sword?

The fixed charges of debt act as a double edged sword as the lower the interest rate the great will the profit, and the less the chance of loss, the less the amount borrowed the lower will be the profit or loss, the greater the borrowing, the greater the risk of unprofitable leverage and the greater the chance of gain.

What is the effect of financial leverage on shareholder's return?

While analyzing this it is assumed that the fixed charges funds can be obtained at a lower cost than the firms rate of return on net assets EPS (earning pershare), ROE (return of equity) ROI (return on investment) are the important figures for the above analysis.

EPS is calculated dividing profit after tax (PAT) by the number of shares outstanding.

$$\underline{\text{EBIT}}$$

Interest $\underline{\quad - \quad}$

$(-) \quad$ PBT

$\underline{\quad - \quad}$ Tax

$(-) \quad$ PAT

$$\text{Earning per share} = \frac{\text{Profit after tax}}{\text{Number of shares}}$$

$$\text{EPS} = \frac{\text{PAT}}{\text{N}} = \frac{(\text{EBIT} - \text{INT})\,(\text{I} - \text{T})}{\text{N}}$$

T = Corporate tax

N = Number of shares

INT = Interest

ROE is obtained by dividing PAT by equity or net worth (NW)

$$\text{ROE} = \frac{(\text{EBIT} - \text{INT})\,(\text{I} - \text{T})}{\text{NW}}$$

Now we shall analyse alternative financial plan: when EBIT is constant.

XY firm is considering 2 alternative financial plans for an investment of Rs. 50000 with a before tax rate of return 24%.

1. To raise fund by issuing 5000 ordinary shares at Rs. 10 per share.
2. To raise Rs. 25000 by issuing 2500 ordinary shares of Rs. 10 each and borrow Rs. 25000 at 15 percent rate of interest. The tax rate is 50%.

Effect of financial plan on EPS and ROE constant EBIT

EBIT = Rs. 50000 x 0.24 = Rs. 12000

	Financial Plan	
	All equity	Debt- equity
EBIT	12000	12000
Less: Interest	0	0
PBT = EBIT – INT	12000	8250
Less : Tax	6000	4125
PAT	6000	4125
Total earning of investor		
PAT+ INT	6000	7875
No of ordinary shares	5000	2500
EPS	1.20	1.65
ROE	12.0%	16.5%

You will see that EPS is greater for plan II because.

1. Under this plan the firm is able to borrow half of its funds requirement at 15% costs, which lower than rate of return on total investment which is 24%.

2. Under the debt-equity plan the firm has only 2500 shares as against 5000 shares under all-equity plan. Therefore, the after-tax favorable leverage of Rs. 1125 divided by 2500 shares increases EPS by Rs. 0.45 form Rs. 1.20 to Rs. 1.65.

3. The impact of the interest charges on the firm's liability is also analysed. The interest charges are tax deductible, it provides tax shield which increases the earnings of the shareholders.

It is the tax deductibility of the interest charges which makes the use of the debt in the capital structure beneficial to a firm. In general it can be deduced that the effect of leverage.

Favourable   ROI > i

Unfavourable   ROI < i

Rental   ROI = i

Where 'i' is the interest rate on debt.

Now we shall analyse the effect on varying EBIT on different financial plans.

Let us consider financial plans of XY firm for before tax rate of return.

1. 10%   EBIT = Rs. 5000

2. 15%   EBIT = Rs. 7500

3. 20%   EBIT = Rs. 10000

Plan	No Debt	50% Debt	No Debt	50% Debt	No Debt	50% Debt
EBIT	5000	5000	7500	7500	10000	10000
Interest	0	3750	0	3750	0	3750
PBT= EBIT – INT	5000	1250	7500	3750	10000	6250
Less Tax 50%	2500	625	3750	1875	5000	3125
PAT	25000	625	3750	1875	5000	3125
No. of Ordinary Shares	5000	25000	5000	25000	5000	2500
EPS	0.5	0.25	0.75	0.75	1.00	1.25

ROE	5%	2.5%	7.5%	7.5%	10%	12.5%

$$ROE = \frac{(EBIT - INT)(I - Tax)}{S}$$

S = equity or Net worth

- The reason of such a behaviour against lies in the relationship between the return on assets and cost of debt. If the cost of debt is more than the return on assets, EPS (or ROE) would depress with more leverage or debt. When the firm earns 15 percent return on its assets which is equal to the cost of debt, EPS is saved under both financial plans.

- The higher the financial leverage the wider the range over which EPS varies with fluctuating EBIT for e.g., when no debt is used. EPS varies form 0.5 to 1.00 a range of 0.95 when 50% debt is used from 0.25 to 1.25 a range of 1.00 with further increase in leverage it would become all the more wider. Therefore, for any given level of EBIT variability the increased financial leverage increase the degree of variability is EPS. Therefore it becomes important to take account of variability in EBIT before deciding upon the level of leverage because not doing to can lead a firm into financial difficulties.

What is point of indifference?

The point of indifference is that level of EBIT for which EPS of different financial plans is equal, or it can also be said that the firm is indifferent among two plans and can choose any, at that EBIT for e.g., for financial plan no debt and 50% debt what would be the indifference point. The formula is given as below:

$$\boxed{\frac{(I\text{-}Tax)\,(EBIT - INT)}{N_1} = \frac{(I - Tax)\,EBIT}{N_2}}$$

N_1 – number of shares in 50% debt plan

N_2 – number of shares in no debt plan

$$\frac{(1 - 0.5)\,(EBIT - 3750)}{2500} = \frac{(1 - 0.5)\,(EBIT)}{5000}$$

$$\frac{0.5\,(EBIT - 3750)}{2500} = \frac{0.5\,(EBIT)}{5000}$$

$$0.5\,(EBIT) - 3750 = \frac{0.5\,(EBIT)}{2}$$

$$0.5\,EBIT - 1870) = \frac{0.5\,(EBIT)}{2}$$

$$EBIT - 3750 = 0.5\,EBIT$$

$$0.5\,EBIT = 3750$$

$$EBIT = 7500$$

Thus, is the example:

The EBIT for indifference point is Rs. 7500.

What is Operating leverage?

Operating leverage refers to the use of fixed costs in operation of a firm. A firm will not have operating leverage if it does not have fixed cost. A firm will have higher operating if the total cost have higher percentage of fixed cost. Operating leverage increases with fixed cost. Operating profit of a highly operating leveraged firm would increase at a faster rate for any given

increase in sales. If the sales fall, the firm with a higher operating leverage would suffer more than a firm with low operating leverage.

Let us analyse the effect of fixed cost on profit with fluctuations in sales.

Let us consider two firms A and B

Firm	Fixed Cost
A	80000
B	200000

Both firms produce same product selling price is Rs. 8 per unit for both firms. The variable cost for firm A is Rs. 6 and firm B is Rs. 4.

Let us calculate break- even-point first

Firm A $\quad$ BEP $= \dfrac{80000}{8-6} = \dfrac{80000}{2} = 40000$ units

Firm B $\quad$ BEP $= \dfrac{200000}{8-6} = \dfrac{200000}{2} = 50000$ units

This means firm A and B required to produce and sell 40000 and 50000 units respectively to manage a position of no profit no loss.

Profit to be made at different levels of sales volume are:

Firm A

Units (‘000)	Sales Rs. (‘000)	Variable cost Rs. (‘000)	Fixed cost Rs. (‘000)	Total cost Rs. (‘000)	EBIT Rs. (‘000)
20	160	120	80	200	-40
30	240	180	80	260	-20

40	320	240	80	320	0$^{(BEP)}$
50	400	300	80	380	20
60	480	360	80	440	40
70	560	420	80	500	60
80	640	480	80	560	80

Firm B

Units ('000)	Sales Rs. ('000)	Variable cost Rs. ('000)	Fixed cost Rs. ('000)	Total cost Rs. ('000)	EBIT Rs. ('000)
20	160	80	200	280	-120
30	240	120	200	320	-80
40	320	160	200	360	-40
50	400	200	200	400	0
60	480	240	200	440	40
70	560	280	200	480	80
80	640	320	200	520	120

It is noted that the firm with higher fixed cost i.e., high operating leverage is more sensitive to changes in sales. A given change in sales produces a much higher percentage change in B's profit than A's.

Why is operating leverage called a double edged sword?
Operating leverage is called a double edged sword: On one hand when high operating leverage gives higher profit margin. When sales are changing favorably it also gives higher margins of loss when sales change adversely.

What is degree of financial leverage (DFL)?

We have seen that the change in EBIT effect the change in EPS with different alternatives of financial plan. Or it can be said that EPS increase faster with more debt in capital structure when EBIT increases. The degree of financial leverage is defined as the percentage change in EPS due to given percentage change in EBIT.

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

$$\% \text{ change in EPS} = \frac{\text{Change in EPS } (\Delta \text{EPS})}{\text{EPS}} \times 100$$

$$\% \text{ change in EBIT} = \frac{\text{Change in EBIT } (\Delta \text{EBIT})}{\text{EBIT}} \times 100$$

In case of XY company. When EBIT increases form Rs. 5000 to Rs. 7500 when no debt EPS increases from 0.5 to 0.75 and when EBIT invreases from 7500 to Rs. 10000 EPS increases from 0.75 to 1.00 where as when firm uses 50% debt. When EBIT increases from Rs. 5000 is Rs. 7500 EPS increases from 0.25 to 0.75, when EBIT increases from 7500 to Rs. 10000 EPS increases from 0.75 to 1.25.

$$\text{DFL (No debt)} = \frac{(0.75 - 0.50)/\ 0.50}{(7500 - 5000)/\ 5000} = 1$$

$$\text{DFL (50\% debt)} = \frac{(0.75 - 0.50)/\ 0.25}{(10000 - 7500)/\ 7500} = 2$$

DFL in case of 50% debt is higher than DFL in case of no debt in 2, and we also seen that EPS increases with greater margin when debt is employed in financial plan, therefore it is deduced that firm with more debt has higher DFL and is more sensitive to changes in EBIT.

What is degree of operating leverage? (DOL)

The degree of operating leverage can be defined as the percentage change in the earning before interest and tax relative to a given percentage change in sales.

$$DOL = \frac{\% \text{ change in EBIT}}{\% \text{ change in sales}}$$

OR

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

Q = Unit of output

S = Unit selling price

V = Unit variable cost

F = Total fixed cost

OR

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

Contribution = EBIT + fixed Cost

$$DOL = \frac{\text{EBIT} + \text{Fixed cost}}{\text{EBIT}} = 1 + \frac{FC}{\text{EBIT}}$$

For instance XY Company expects its sales to be of 100000 units with selling price of Rs. 8 p. u. Its variable cost is Rs. 4 p. u. fixed cost is 280000.

	Rs.
Sales (100000 units at Rs. 8)	800000
Less: Variable costs (100000 at Rs. 4)	400000
Contribution	400000
Less: Fixed Cost	280000
EBIT	120000

Applying equation (2)

$$DOL = \frac{100000 \ (RS. \ 8 - Rs. \ 4)}{100000 \ (Rs. \ 8 - Rs. \ 4) - Rs. \ 280000}$$

$$= \frac{Rs. \ 400000}{Rs. \ 120000} = 3.33$$

Therefore an expect appointed by management tells them that the plant can becomes more automated to reduce variable cost to Rs. 2 but increases fixed cost to Rs. 480000, with the advice the income statement will look like.

	Rs.
Sales: (100000 at Rs. 8)	800000
Less: Variable cost at Rs. 2 for 100000 units	200000
Contribution	600000
Less: fixed costs	480000

EBIT   120000

New DOL will be

$$DOL = \frac{Rs.\ 600000}{Rs.\ 120000} = 5.0$$

Now this means if XY company's actual sales happens to be more than expected, its EBIT will increases greatly, an increases of 100 percent in sales will lead to a 500 percent increases in EBIT.

What will be the effect of combining operating and financial leverage?

Operating leverage affects a firm's operating profit (EBIT), while financial leverage affects profits after tax or the earnings per share. Operating and financial leverage together cause wide fluctuation in EPS for a given change in sales. If a company employs a high level of operating and financial leverage, even a small change in the level of sales will have great effect of EPS.

The degree of operating and financial leverage can be combined to see the effect of total leverage on EPS with given change in sales.

The degree of combined leverage (DCL) is given by:

$$= \frac{\%\ change\ in\ EBIT}{\%\ change\ in\ sales} \quad X \quad \frac{\%\ change\ in\ EPS}{\%\ change\ in\ EBIT}$$

$$= \frac{\%\ change\ in\ EBIT}{\%\ change\ in\ sales}$$

$$\text{DLC} = \frac{Q\,(S-V)}{Q\,(S-V)\,F} \times \frac{Q\,(S-V)-F}{Q\,(S-V)-F\ \text{INT}} = \frac{Q\,(S-V)}{Q\,(S-V)-F-\text{INT}}$$

OR

$$\text{DCL} = \frac{\text{Contribution}}{\text{Profit before taxes}}$$