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Study Material-1

FINANCING DECISION – LEVERAGE ANALYSIS

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CHAPTER OBJECTIVES

- § Meaning of Leverage
- § Operating Leverage
- § Significance of Operating Leverage
- § Financial Leverage
- § Combined Leverage
- § Illustrations in Leverage Analysis
- § Lets Sum Up
- § Questions

Meaning of Leverage

The word 'Leverage' is derived from the word 'lever'. In physical science, we have read that there are three classes of lever-1st class, 2nd class and 3rd class depending upon the position of fulcrum. If the word done is more than the effort applied to do the work, then we can say that the lever works positively and the system gives mechanical advantage. If the work done is just equal to to the effort applied, then the lever does not give any mechanical advantage.

The term leverage, in general, refers to a relationship between two interrelated variables. With reference to a business firm, these variables may be costs, output, sales revenue, EBIT, Earnings Per share (EPS) etc. In financial analysis, the leverage reflects the responsiveness or

influence of one financial variable over some other financial variable. In financial management, the term 'leverage' has the same idea of getting more benefit(in terms of profit) by employment of the fixed asset or part of the capital employed which has a fixed rate of cost. Before discussing the term 'leverage' in details, let us have look on the following statement of profit(taking hypothetical figures):

Operating and Financial Statement of Profits

Sales value(10,00,000 units @Rs 50 per unit)	Rs. 5,00,00,000
Less:Variable costs @Rs.20 per unit	Rs. 2,00,00,000
Contribution	Rs.3,00,00,000
Less: Operating Fixed costs [Depreciation, rent, staff salary etc].	Rs. 60,00,0000
Operating profit or EBIT or PBIT	Rs.2,40,00,000
Less: Interest on Borrowed capital(say,12% on Rs.2,00,00,000	Rs.24,00,000
EBT or PBT	Rs. 2,16,00,000
Less:Tax@40% (say)	Rs.86,40,000
EAT or PAT	Rs. 1,29,60,000
Less: Preference dividend@20% on Rs.3,00,00,000(say)	Rs. 60,00,000,
EAES(Earning available to equity shareholders)	Rs.69,60,000
Less: Equity Dividend	Rs. 30,00,000
Retained Earnings(Transferred to Reserve)	Rs. 39,60,000

The income statement upto operating profit i.e from sales value to EBIT is called operating statement of profits whereas the income statement upto EAES i.e from EBIT to EAES is called financial statement of profits.

We have deducted operating fixed costs(i.e costs related to fixed assets, staff salary etc.) from contribution to find out the EBIT of the company. Operating fixed costs are must and the company is bound to bear it whether the contribution sufficient or not. Operating fixed cost also does not depend on the volume of production or sales; rather it is fixed within a given range of activity. The company has no control or negligible control on the amount of operating fixed cost. If the contribution (i.e sales value less variable costs) is just equal to the amount of operating fixed cost, the company reaches the break-even point i.e the respective sales volume is called the break even volume of sales. In case the fixed costs exceed the amount of contribution earned, the

difference is the operating loss. On the other hand, if the amount of contribution exceeds the amount of operating fixed cost, the difference is the operating profit earned by the company.

There are two types of financial fixed costs viz. interest on borrowed capital and preference dividend. Though the company is not bound to pay preference dividend in case of insufficiency of profits or in case of loss, there is a contractual obligation on the part of the company to pay fixed rate of interest on borrowed capital.

James C.Van Horne rightly said, "Leverage refers to the use of fixed cost in an attempt to increase (or lever up) profitability". If the measurement of leverage (i.e degree of leverage) is greater than one, we say that leverage exists. The leverage may be defined as the % change in one variable divided by the % change in some other variable or variables. Impliedly, the numerator is the dependent variable, say X, and the denominator is the independent variable, say Y. The leverage analysis thus, reflects as to how responsiveness is the dependent variable to a change in the independent variables. There are three types of leverage viz.-

(i) Operating leverage
(ii) Financial leverage
(iii) Combined leverage

The above presentation shows that the level of EBIT depends upon the level of sales revenue and the above presentation shows that the level of profit after tax or EPS depends upon the level of EBIT. The relationship between sales revenue and EBIT is defined as *operating leverage* and the relationship between EBIT and EPS is defined as *financial leverage.* The direct relationship between the sales revenue and the EPS can also be established by the combining the operating leverage and financial leverage and is defined as *combined leverage*.

Operating Leverage

The term 'operating leverage' may 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".

The leverage associated with the operating fixed costs is known as operating leverage. Measurement of operating leverage is known as "***Degree of operating leverage"*** or in short, ***DOL***. Keeping in mind the other factors constant(i.e, selling price, sales quantity and variable cost remaining constant), if the operating fixed cost increases, DOL increases and vice

versa. Operating fixed cost has magnified effect on the EBIT compared to the sales volume. Operating fixed cost may be viewed as the fulcrum of the business activity with respect to which operating profit increases or decreases and thus operating leverage. The operating leverage measures the relationship between the sales revenue and the EBIT. It measures the effect of change in sales revenue on the level of EBIT. Hence, the operating leverage is calculated by dividing the % change in EBIT by the % change in sales revenue.

Degree of operating leverage can be calculated in the following ways:

[A] DOL= Contribution / EBIT = Contribution

Contribution-Operating fixed cost

[B] DOL= % change in EBIT

% change in sales

$$= \frac{\frac{\triangle EBIT}{EBIT} X100}{\frac{\triangle Sales}{Sales} X100} = \frac{\frac{\triangle EBIT}{EBIT}}{\frac{\triangle Sales}{Sales}}$$

The Operating Leverage of 1 denotes that the EBIT level increases or decreases in direct proportion to the increase or decrease in sales level. This is due to fact that there is no fixed costs and total cost is variable in nature.

Whenever, the % change in EBIT resulting from given % change in sales is greater than the % change in sales, the OL exists and the relationship is known as the DOL (Degree of Operating Leverage). This means that as long as the DOL is greater than 1, there is an OL. The OL emerges as result of existence of fixed element in the cost structure of the firm. The OL, therefore, may be defined as firm's position or ability to magnify the effect of change in sales over the level of EBIT. The level of fixed costs, which is instrumental in bringing this magnifying effect, also determines the extent of this effect. Higher the level of fixed costs in relation to variable costs, greater would be the DOL. The DOL may, at any particular sales volume, also be calculated as a ratio of contribution to the EBIT.

Degree of Operating Leverage = Contribution/EBIT

Thus, on the basis of the above analysis, the DOL may be interpreted as follows:

1. The DOL is the % change in EBIT as a result of 1% change in sales. DOL arises as a result of fixed cost in the cost structure. If there is no fixed cost, there will be no DOL and the % change in EBIT will be same as % change in sales.
2. A positive DOL means that the firm is operating at a level higher than the break-even level and both the EBIT and sales will vary in the same direction.
3. A negative DOL means that the firm is operating at a level lower tan the break-even level; and the EBIT will be negative.

Significance of Operating Leverage

Operating Leverage explains the effect of change in sales on EBIT. When there is high operating leverage, a small rise in sales will result in a larger rise in EBIT. But if there is small drop in sales, EBIT will fall dramatically or may even be wiped off. Thus, existence of high operating leverage reflects high-risk situation. As the operating leverage reaches its maximum near break even point, the firm can protect itself from the dangers of operating leverage and the consequent operating risk by operating sufficiently above the break even point.

Financial Leverage

Financial leverage is associated with the financial activities of the firm. It exists due to the existence of fixed financial charges which do not depend on the profits of the firm. There are types of fixed financial charges –(i) Interest on capital (ii) dividend on preference share capital.

Interest on capital is a must. The firm is bound to pay it irrespective of its profit(i.e operating profit) position. The amount of operating profit may be high or low but the interest on debenture and long term loans is fixed. It is a contractual obligation of the firm to pay the fixed rate of interest on the debt capital in its capital structure even when the firm incurs losses. Though there is no contractual obligation to pay preference dividend to the preference shareholders at the time of insufficiency of profits or at the time of incurring losses, the firm is bound to pay to the preference shareholders of their claim before paying any amount to the ordinary shareholders(i.e to the equity shareholders).

The conception of financial leverage originates from the effective use of fixed financial charges. Debt capital is a source of fund which has a fixed charge or cost. The firm utilizes the fund to acquire assets and the assets are used effectively to earn sufficient amount of profits. If the earning is more than the cost of the fund, then the balance is left to the equity shareholders. In reverse case,i.e if the fixed financial charges or costs are more than the earnings, then nothing is left for the ordinary shareholders. If the net earnings are positive, then there will be positive earnings per share (EPS) which is calculated by dividing earnings available to equity shareholders by the number of equity shares. If the net earnings are negative, EPS will be negative. Thus financial leverage is also called the 'trading on equity'.

Financial leverage is the ability of the firm to use fixed financial charges or costs to magnify the effect of changes in EBIT on its EPS (earnings per share). The Financial Leverage (DFL) measures the relationship between the EBIT and the EPS and it reflects the effect of change in EBIT on the level of EPS. The DFL measures the responsiveness of the EPS to a change in EBIT and is defined as the % change in EPS divided by the % change in EBIT. Hence, the DFL may be defined as a % increase in EPS that is associated with a given % increase in the level of EBIT. The increase in EPS of the firm may be more than proportionate for increase in the level of EBIT. In other words, the effect of increase or decrease in EBIT is magnified on the level of EPS. The existence of fixed financing charge is instrumental to bring this magnifying effect and also determines the extent of this effect. Higher the level of fixed financial charge, greater would be the DFL. The measurement of financial leverage is called degree of financial leverage (DFL) and the formula is given as follows:

[A] If there is no preference capital in the capital structure:

$$\text{DFL}=\frac{EBIT}{EBIT-I}=\frac{EBIT}{EBT}$$

Here, I= Interest on borrowed capital

EBT=Earnings before tax

EBIT=Earnings before interest and tax

[B] If preference share capital exists in the capital structure:

$$\text{DFL}=\frac{EBIT}{EBIT-I-\frac{P_D}{(1-t)}}$$

Where P_D =Preference dividend p.a

T=(corporate tax rate/100)

[C] DFL= $\frac{\%changeinEPS}{\%changeinEBIT} = \frac{\frac{\triangle EPS}{EPS} X100}{\frac{\triangle EBIT}{EBIT} X100} = \frac{\frac{\triangle EPS}{EPS}}{\frac{\triangle EBIT}{EBIT}}$

On the basis of above analysis, the Financial Leverage can be interpreted as:

(a) The Financial Leverage is a % change in EPS as result of 1% change in EBIT. The FL emerges as a result of fixed financial cost (in the form of interest and preference dividend). If there is no fixed financial liability, there will be no FL. In such a case the % change in EPS will be same as % change in EBIT.

(b) A positive FL means that the firm is operating at a level of EBIT which is higher than the financial break-even level and both the EBIT and EPS will vary in the same direction as the EBIT changes.

(c) A negative FL means that the firm is operating at a level lower than the financial break-even level and the EPS will be negative.

Combined Leverage

The Combined Leverage (CL) is not a distinct type of leverage analysis, rather it is a product of the OL and the FL. The CL may be defined as the % change in EPS for a given % change in the sales level and may be calculated as follows:

Combined Leverage = Operating Leverage x Financial Leverage

= % Change in EPS / % Change in sales

The Combined Leverage is interpreted as:

(a) The Combined Leverage is the % change in EPS resulting from a 1% change in sales level.

(b) A positive CL means that the leverage is being computed for a sales level higher than the break even level and both the EPS and sales will vary in the same direction.

(c) A negative CL means that the leverage is being calculated for a sales level lower than the financial break even level and EPS will be negative.

Illustration 1: Calculate the Degree of Operating Leverage (DOL), Degree of Financial leverage (DFL) and the Degree of Combined Leverage (DCL) for the following firms and interpret the results.

	Firm A	Firm B	Firm C
Output (units)	60,000	15,000	1,00,000
Fixed Costs (Rs)	7,000	14,000	1,500
Variable cost per unit (Rs.)	0.20	1.50	0.02
Interest on borrowed funds	4,000	8,000	-----
Selling price per unit (Rs)	0.60	5.00	0.10

Solution:

	Firm A	Firm B	Firm C
Output (units)	60,000	15,000	1,00,000
Selling price per unit (Rs)	0.60	5.00	0.10
Variable cost per unit (Rs.)	0.20	1.50	0.02
Contribution per unit	**0.40**	**3.50**	**0.08**
Total Contribution	**Rs.24,000**	**Rs.52,500**	**RS.8,000**
Less fixed costs	7,000	14,000	1,500
EBIT	17,000	38,500	6,500
Less Interest	4,000	8,000	---
Profit before Tax	13,000	30,500	6,500

Degree of Operating Leverage

Contribution/EBIT	24,000/17,000	52,500/38,000	8,000/6,500
	= 1.41	=1.36	= 1.23

Degree of Financial Leverage

EBIT/PBT	17,000/13,000	38,500/30,500	6,500/6,500
	= 1.31	= 1.26	= 1.00

Degree of Combined Leverage

Contribution/ EBIT	24,000/13,000	52,500/30,500	8,000/6,500
	= 1.85	= 1.72	= 1.23

Illustration 2: A firm has sales of Rs. 10,00,000, variable cost of Rs. 7,00,000 and fixed costs of Rs. 2,00,000 and debt of Rs. 5,00,000 at 10% rate of interest. What are the operating, financial and combined leverages. If the firm wants to double its earnings before interest and tax (EBIT), how much of a rise in sales would be needed on a percentage basis?

Solution:

Statement of Existing Profit

Sales		Rs.10,00,000
Less Variable cost		7,00,000
Contribution		3,00,000
Less fixed cost		2,00,000
EBIT		1,00,000
Less Interest @ 10% on 5,00,000		50,000
Profit after Tax		50,000
Operating leverage	Contribution/ EBIT = 3,00,000/1,00,000 = 3	
Financial Leverage	EBIT/PBT = 1,00,000/50,000 = 2	
Combined Leverage	= 3x 2= 6	

Statement of sales needed to double EBIT

Operating Leverage is 3 times i.e. 33 – 1/3% increase in sales volume causes a 100% increase in operating profit or EBIT. Thus, at the sales of Rs. 13,33,333, operating profit or EBIT will become Rs. 2,00,000 i.e. double existing one.

Verification:

Sales	Rs.13,33,333
Variable cost (70%)	9,33,333
Contribution	4,00,000
Fixed Costs	2,00,000
EBIT	2,00,000

Illustration 3: The balance sheet of Well Established Company is as follows:

Liabilities	Amount	Assets	Amount
Equity share capital	60,000	Fixed Assets	1,50,000
Retained Earnings	20,000	Current Assets	50,000

10% long term debt	80,000	
Current Liabilities	40,000	----------
	2,00,000	2,00,000

The company's total assets turnover ratio is 3, its fixed operating costs are Rs.1,00,000 and its variable operating cost ratio is 40%. The income tax rate is 50%. Calculate the different types of leverages given that the face value of share is Rs.10.

Solution: Total Assets Turnover Ratio = Sales / Total Assets

3 = Sales/2,00,000

Sales	6,00,000
Variable Operating Cost (40%)	2,40,000
Contribution	3,60,000
Less Fixed Operating Cost	1,00,000
EBIT	2,60,000
Less interest (10% of 80,000)	8,000
PBT	2,52,000
Tax at 50%	1,26,000
PAT	1,26,000
Number of shares	6,000
EPS	Rs.21

Degree of Operating Leverage = Contribution/EBIT

= 3,60,000/2,60,000 = 1.38

Degree of Financial leverage = EBIT / PBT

= 2,60,000/2,52,000 = 1.03

Degree of Combined Leverage =1.38 x 1.03 = 1.42

Illustration 4: The following information is available for ABC & Co.

EBIT Rs. 11,20,000

Profit before Tax 3,20,000

Fixed Costs 7,00,000

Calculate % change in EPS if the sales are expected to increase by 5%.

Solution: In order to find out the % change in EPS as a result of % change in sales, the combined leverage should be calculated as follows:

Operating Leverage = Contribution/ EBIT

= Rs.11,20,000 + Rs. 7,00,000/11,20,000

= 1.625

Financial Leverage = EBIT / Profit before Tax

= Rs. 11,20,000/3,20,000

= 3.5

Combined Leverage = Contribution/ Profit before Tax = OL x FL

= 1.625 x 3.5 = 5.69

The combined leverage of 5.69 implies that for 1% change in sales level, the % change in EPS would be 5.69% So, if the sales are expected to increase by 5%, then the % increase in EPS would be 5 x 5.69 = 28.45%.

Illustration 5: The data relating to two companies are as given below**:**

	Company A	Company B
Capital	Rs.6,00,000	Rs.3,50,000
Debentures	Rs. 4,00,000	6,50,000
Output (units) per annum	60,000	15,000
Selling price/unit	Rs.30	250
Fixed costs per annum	7,00,000	14,00,000
Variable cost per unit	10	75

You are required to calculate the Operating leverage, Financial leverage and Combined Leverage of two companies.

Solution**: Computation of Operating leverage, Financial Leverage and Combined leverage**

	Company A	***Company B***
Output (units) per annum	60,000	15,000
Selling price/unit	Rs.30	250
Sales Revenue	18,00,000	37,50,000
Less variable costs		
@ Rs.10 and Rs.75	6,00,000	11,25,000
Contribution	12,00,000	26,25,000
Less fixed costs	7,00,000	14,00,000
EBIT	5,00,000	12,25,000
Less Interest @ 12%		

on debentures	48,000	78,000
PBT	4,52,000	11,47,000
DOL = Contribution/EBIT	12,00,000/5,00,000 = 2.4	26,25,000/12,25,000 = 2.14
DFL = EBIT/ PBT	5,00,000/4,52,000 1.11	12,25,000/11,47,000 =1.07
DCL = DOL x DFL	2.14 x 1.11 = 2.66	2.14 x 1.07 = 2.2

Illustration 6: X Corporation has estimated that for a new product its break-even point is 2,000 units if the item is sold for Rs. 14 per unit, the cost accounting department has currently identified variable cost of Rs. 9 per unit. Calculate the degree of operating leverage for sales volume of 2,500 units and 3,000 units. What do you infer from the degree of operating leverage at the sales volume of 2,500 units and 3,000 units and their difference if any?

Solution:

Statement of Operating Leverage

Particulars	**2500 units**	**3000 units**
Sales @ Rs.14 per unit	35,000	42,000
Variable cost	22,500	27,000
Contribution	12,500	15,000
Fixed Cost (2,000 x (Rs.14 – 9)	10,000	10,000
EBIT	2,500	5,000
Operating Leverage		
= Contribution/ EBIT	12,500/2,500 = 5	15,000/5,000 = 3

Illustration 7: The following data is available for XYZ Ltd.

Sales	Rs. 2,00,000
Less: Variable cost	60,000
Contribution	1,40,000
Fixed Cost	1,00,000
EBIT	40,000
Less Interest	5,000
Profit before tax	35,000

Find out:

(a) Using concept of financial leverage, by what percentage will the taxable income increase, if EBIT increases by 6 %.

(b) Using the concept of operating leverage, by what percentage will EBIT increase if there is 10% increase in sales and,

(c) Using the concept of leverage, by what percentage will the taxable income increase if the sales increase by 6%. Also verify the results in view of the above figures.

Solution:

(i) Degree of Financial Leverage:

FL = EBIT/Profit before Tax = 40,000/35,000 = 1.15

If EBIT increases by 6%, the taxable income will increase by 1.15 x 6 = 6.9% and it may be verified as follows:

EBIT (after 6% increase)	Rs. 42,400
Less Interest	5,000
Profit before Tax	37,400

Increase in taxable income is Rs. 2,400 i.e 6.9% of Rs. 35,000

(ii) Degree of Operating Leverage:

OL = Contribution / EBIT = 1,40,000/40,000 = 3.50

If sale increases by 10%, the EBIT will increase by 3.50 x 10 = 35% and it may be verified as follows:

Sales (after 10% increase)	Rs. 2,20,000
Less variable expenses @ 30%	66,000
Contribution	1,54,000
Less Fixed cost	1,00,000
EBIT	54,000

Increase in EBIT is Rs. 14,000 i.e 35% of Rs. 40,000

(iii) Degree of Combined leverage

CL = Contribution/ Profit before tax = 1,40,000/35,000 = 4

If sales increases by 6%, the profit before tax will increase by 4x6= 24% and it may be verified as follows:

Sales (after 6% increase)	Rs. 2,12,000
Less Variable expenses@ 30%	63,600
Contribution	1,48,400
Less Fixed cost	1,00,000

EBIT	48,400
Less Interest	5,000
Profit before tax	43,400

Increase in Profit before tax is Rs. 8,400 i.e 24% of Rs. 35,000

Lets Sum Up

- § In Leverage analysis the relationship between two interrelated variables is established. In financial management Operating leverage, financial leverage and Combined Leverage is calculated.
- § The Operating relationship establishes the relationship between sales and EBIT. It measures the effect of change in sales revenue on the level of EBIT.
- § Operating leverage appears as a result of fixed cost.
- § The financial leverage measures the responsiveness of the EPS for given change in EBIT.
- § The financial leverage appears as a result of fixed financial charge i.e. interest and preference dividend.
- § Combined leverage may also be ascertained to measures the % change in EPS for a % change in the sales.

QUESTIONS

1 Distinguish between operating leverage and financial leverage. How the two leverages can be measured?

2 Explain the concept of financial leverage. Examine the impact of financial leverage on the EPS. Does the financial Leverage always increases the EPS?

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