Leverages

Concepts of marginal costing used in Leverages:

1) Variable cost is variable and fixed cost is fixed in total.
2) Variable cost is fixed and fixed cost is variable per unit.
3) Contribution = Sales – Variable cost
4) Contribution per unit = Selling price – Variable cost per unit.

$$PV\ Ratio = \frac{Contribution}{Sales} \times 100 = \frac{Contribution\ per\ unit}{Selling\ price} \times 100$$

$$Break\ Even\ Point\ (units) = \frac{Fixed\ Cost}{Contribution\ per\ unit}$$

$$Break\ Even\ Point\ (amount) = \frac{Fixed\ Cost}{PV\ Ratio}$$

$$Margin\ of\ Safety\ (amount) = Sales - BEP$$

$$Margin\ of\ Safety\ (\%) = \frac{Sales - BEP}{Sales} \times 100$$

Que.1 From the following information calculate per unit contribution, total contribution, p/v ratio, BEP in units and amount and MOS in amount and in percent :
Sales (5000 units x Rs.50) = Rs.2,50,000
Variable Cost (5000 units x Rs.30) = Rs1,50,000
Fixed Cost = Rs.1,00,000

Leverage:
The term leverage represents influence or power. In financial analysis leverage represents the influence of one financial variable over some other related financial variable. Generally if we want to calculate impact of change in variable X on variable Y, it is termed as Leverage of Y with X. and represented as follows:

$$\frac{LY}{LX} = \frac{\text{Change in Y / Y}}{\text{Change in X / X}}$$

In financial analysis leverages are of three types:

1) Operating Leverage
2) Financial Leverage
3) Total or Combined leverage.

These leverages show the relationship among certain Income Statement items as follows:

Total Revenue (Q x S)	
Less: Variable Cost (Q x V)	
Contribution	
Less: Fixed Cost (F) (excluding finance charges)	
Profit before interest and tax (EBIT)	
Less: Interest on Debt	
Profit before Tax (PBT)	

Less: Tax	
Profit after Tax (PAT)	
Less: Preference Dividend	
Earning available to Equity Shareholders	
Divided by: No. Of Equity Shares	
Earning Per Share (EPS)	

Here: -

Q = Quantity Sold

S = Selling Price

V = Variable Cost Per Unit

(1) Operating Leverage:

Kohler defines the Operating Leverage as - "The tendency of net income (EBIT) to vary disproportionately with sales."

We know that net profit ratio is affected by two types of costs 1) Variable Cost & 2) Fixed Cost. As sales or production increases variable cost increases proportionately; however fixed cost remain the same and consequently get distributed over a larger volume. This results in higher net profit ratio and vice versa. Thus Operating Leverage may be defined as proportionate change in EBIT with respect to proportionate change in Sales or Level of Activity. Thus,

$$Degree\ of\ Operating\ Leverage = \frac{Change\ in\ EBIT}{Change\ in\ Sales}$$

Mathematically:

$$DOL = \frac{\Delta EBIT}{EBIT} \Big/ \frac{\Delta Q}{Q}$$

Here EBIT = Q (S-V) – F (and Δ Denotes change)

$$DOL = \frac{\Delta\,[Q\ (S-V)-F]\ /\ [Q\ (S-V)-F]}{\Delta Q\ /\ Q}$$

Now ΔF is nil because change in fixed cost is nil. Therefore

$$DOL = \frac{\Delta\, Q\ (S-V)}{Q\ (S-V)-F} \Big/ \frac{\Delta\, Q}{Q}$$

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

$$DOL = \frac{Q\ (S-V)}{Q\ (S-V)-F} = \frac{Contribution}{Contribution - Fixed\ Cost} = \frac{Contribution}{EBIT}$$

Break Even Point, Margin of Safety & Operating Leverage :

$$Margin\ of\ Safety = \frac{Sales - Sales\ at\ BEP}{Sales}$$

$$Margin\ of\ Safety = \frac{Sales - Sales\ at\ BEP}{Sales} \times \frac{PV\ Ratio}{PV\ Ratio} = \frac{Contribution - Fixed\ Cost}{Contribution}$$

$$Hence\ MOS = \frac{1}{DOL}$$

If DOL increases MOS will decrease & business risk will increase. If DOL decreases MOS will increase & business risk will decrease.

Que.2 Calculate the degree of Operating Leverage for each of the following situations for Fluctuating Ltd.:

	1	**2**	**3**	**4**	**5**
Quantity Sold (Units)	8,000	7,000	6,000	5,000	4,000
Selling Price (Rs.)	9	9	9	9	9
Variable Cost (Rs.)	5	5	5	5	5
Fixed Cost (Rs.)	20,000	20,000	20,000	20,000	20,000

Also interpret the results.

Que.3 From the information given below calculate the DOL and comment upon the business risk of the companies:

	Company A	**Company B**	**Company C**	**Company D**
Fixed cost (Rs.)	2,00,000	2,50,000	3,00,000	3,55,000

In all the above companies sales is Rs.16 lakhs while variable cost is Rs.12.40 lakhs.

Comments on DOL

1) It measures business risk. Higher the DOL higher the business risk and vice versa.

If Margin of safety	Business Risk	DOL (= 1/MOS)
Rises	Falls	Falls
Falls	Rises	Rises

2) It may be used to forecast EBIT. If DOL is 2 it means that 10% change in Sales will bring 20% change in EBIT.
3) If Fixed cost rises DOL rises and EPS falls. Both are bad. Therefore fixed cost if preferable on lower side.
4) If Sales rises DOL reduces and EPS increase. Both are good. Therefore sales is preferable on higher side.
5) DOL is preferable on lower side. Because in that case business risk will be lower and EBIT will be higher.

Que.4 Shoppers Stop Ltd. has a P/V ratio of 40%. During the year 99-00, its total sales amounted to Rs.10,00,000 & B.E.P. is Rs.7,60,000. Compute the DOL of the company for the year 99-00. What should be the amount of sales if it is proposed to reduce DOL by 3 ?

Que.5 Total Sales, Break even point & P/V ratio of a company are Rs.2 crore, Rs.1 crore and 25% respectively. If the company is ready to take business risk up to DOL = 4.5, how much reduction in sales the company is ready to bear?

Que.6 The following data are given for M/s Daulatram & Co. :-

Fixed Cost per unit (At 60% capacity utilization)	Rs.14
Variable Cost / Sales	65%
Sales @ Rs.100 per unit (At 70% capacity utilization)	Rs.70,00,000

Calculate DOL at 70% capacity utilization.

(2) Financial Leverage :

Financial leverage shows relationship between Earning Per Share (EPS) and Earning Before Interest & Tax (EBIT). It has been defined by Kohler as "the tendency of net residual income to vary disproportionately with net income .....".

In other words it could be defined as proportionate change in EPS with respect to proportionate change in EBIT. Thus,

$$Degree\ of\ Financial\ Leverage = \frac{Change\ in\ EPS}{Change\ in\ EBIT}$$

$$DFL = \frac{\Delta EPS}{EPS} \Big/ \frac{\Delta EBIT}{EBIT}$$

now EPS = [(EBIT - I) (1- t)] - D / No. of Shares

Here T = Tax Rate

D = Dividend on Preference Shares (inclusive of dividend tax if any)

on simplifying the above we get,

$$DFL = \frac{EBIT(1-t)}{(EBIT - Int.)(1-t) - D_P}$$

$$DFL = \frac{EBIT}{EBIT - Int. - \frac{D_P}{1-t}}$$

If the company has not issued preference shares then:

$$DFL = \frac{EBIT}{EBIT - Int.} = \frac{EBIT}{PBT}$$

Que.7 Capital Structure of a company is as under:

	Rs.
15% Debentures	26,00,000
16% Term Loan	18,00,000
10% Preference Shares	22,00,000
Equity Shares (Rs.10)	22,50,000

The Income Tax Rate is 30% and dividend distribution tax is 15%. Ignore surcharge and cess. Calculate the degree of Financial Leverage and EPS if EBIT is Rs.17,70,000.

Just keep in mind that dividend to preference shareholders is 10% it means that for each Rs.100 preference share, shareholder will get Rs.10 in his hand and DDT will be paid by company separately hence effective DDT rate will be 17.647%.

How will your answer change if surcharge is surcharge is 12% and cess is 3%.

Que.8 Capital structure of three companies, which are having same business risk, are as under:

	P	**Q**	**R**
Equity share capital (Face value Rs.10)	15,00,000	9,00,000	3,00,000
13% Debentures	Nil	6,00,000	12,00,000
EBIT:			
Situation 1	2,40,000	2,40,000	2,40,000
Situation 2	1,80,000	1,80,000	1,80,000
Income Tax 30%.			

Calculate DFL & EPS for all the three companies in the above two situations & comment on the results.

Que.9 Calculate DFL for R Ltd. if interest payable by it is Rs.1,04,000 annually and its EBIT is Rs.:
1) 2,40,000 2) 2,60,000 3) 2,80,000 4) 3,00,000.

Comments on DFL

1) It measures financial risk. Higher the DFL higher the financial risk and vice versa.
2) It may be used to forecast EPS. If DFL is 3 it means that if EBIT increase by 10%, EPS will increase by 30%.
3) If interest rate increases also DFL increases but EPS reduces. Both are bad. Hence interest rate is preferable on lower side.
4) If EBIT increases DFL reduces and EPS increase. Both are good. Hence EBIT is preferable on higher side.
5) If debt equity ratio increases DFL also increases. But in that case impact on EPS is dependent on ROI.
    a. If ROI>r. EPS will also increase due to advantage of trading on equity. Hence higher debt is preferable.
    b. If ROI<r. EPS will reduce due to disadvantage of trading on equity. Hence lower debt is preferable.
    c. If ROI=r. EPS will remain same.
    d. ROI remains more than interest rate on an average hence debt is preferable on higher side but sometimes ROI may reduce hence level of debt should not be very high.

(3) Total or Combined Leverage :

Combined Leverage shows relationship between Earning Per Share (EPS) and Level of Activity / Volume / Sales. It Could be defined as proportionate change in EPS with respect to proportionate change in Volume or Level of Activity. Thus,

$$DCL = \frac{Percentage\ change\ in\ EPS}{Percentage\ chage\ in\ Sales} = \frac{\frac{\Delta EPS}{EPS}}{\Delta Q/Q}$$

$$Here\ EPS = \frac{\{Q(S-V) - Fixed\ Cost - Int\}(1-t) - D_P}{No.}$$

on simplifying the above we get,

$$DCL\ or\ DTL = \frac{Q(S-V)}{Q(S-V) - Fixed\ Cost - Interest - \frac{D_P}{1-t}}$$

If the company has not issued preference shares then

$$DCL = \frac{Contribution}{Contribution - Fixed\ Cost - Interest}$$

Combined Leverage could also be calculated as follows :

DTL = DOL x DFL

$$DTL = \frac{Contribution}{EBIT} \times \frac{EBIT}{Contribution - Fixed\ Cost - Interest - \frac{D_P}{1-t}}$$

$$DTL = \frac{Contribution}{Contribution - Fixed\ Cost - Interest - \frac{D_P}{1-t}}$$

Que.10 Calculate the Operating , Financial and Combined Leverage from the following data under situation I and II and financial plan A and B :-

Installed Capacity	4000 units	Fixed Cost:	
Actual Production and sales	75% of the capacity	Under Situation 1	Rs.15,000
Selling Price	Rs.30 per unit	Under Situation 2	Rs.20,000
Variable Cost	Rs.15 per unit		

Capital Structure :

	FINANCIAL PLAN (Rs.)	
	A	B
Equity	10,000	15,000
Debt (interest rate 20%)	10,000	5,000
	20,000	20,000

Que.11 Calculate the degree of Operating and Financial Leverage under situations A & B and financial plan 1 & 2 respectively, from the following information relating to the operation and capital structure of XYZ Co. Also find out the combinations of Operating & Financial Leverages which gives the highest and least values. How are these calculations useful to the financial Manager ?

Installed Capacity	1200 units	Fixed Cost:	
Actual Production & Sales	800 units	Situation A	Rs.1,000
Selling Price Per unit	Rs.15/-	Situation B	Rs.3,000
Variable Cost per unit	Rs.10/-		

Financial Plan	**1**	**2**
Equity	Rs.7500	Rs.2500
Debt (Interest Rate 10%)	Rs.2500	Rs.7500

Que.12 The XYZ Co. has the following Balance Sheet and income statement information :

Balance Sheet (As on 31st March, 2003)

Liabilities	Amount	Assets	Amount
Equity Share Capital (Rs.10 each)	8,00,000	Fixed assets	10,00,000
Retained Earnings	3,50,000	Current assets	9,00,000
10% Debt	6,00,000		
Current Liabilities	1,50,000		
	19,00,000		19,00,000

Income Statement for the year ending 31.03.2003

	Rs.
Sales	3,40,000
Operating Expenses	-1,20,000
EBIT	2,20,000
Interest	-60,000
EBT	1,60,000
Tax(50%)	-80,000
PAT	80,000

(i) Determine the degree of Operating, Financial and Combined Leverage at the current Sales level, If all operating expenses other than depreciation amounting to Rs.35000/- are variable in nature.
(ii) If total assets remain at the same level, but sales :

(a) Increases by 20%,

(b) Decreases by 20%, What will be EPS in the new situation ?

Question 13

The following details of RST Limited for the year ended 31March, 2006 are given below:

Operating leverage	1.4
Combined leverage	2.8
Fixed Cost (Excluding interest)	Rs. 2.04 lakhs
Sales	Rs. 30.00 lakhs
12% Debentures of Rs. 100 each	Rs. 21.25 lakhs
Equity Share Capital of Rs. 10 each	Rs. 17.00 lakhs
Income tax rate	30 per cent

Required:

(i) Calculate Financial leverage

(ii) Calculate P/V ratio and Earning per Share (EPS)

(iii) At what level of sales the Earning before Tax (EBT) of the company will be equal to zero?

Question 14

Following information are related to four firms of the same industry:-

Firm	Change in Revenue	Change in Operating Income	Change in earnings per share
P	27%	25%	30%
Q	25%	32%	24%
R	23%	36%	21%
S	21%	40%	23%

Find out:

(i) Degree of Operating Leverage, and

(ii) Degree of Combined Leverage for all the firms.

Comments on DTL

1) DTL measures total risk. Higher the DTL higher the total risk and vice versa.
2) It may be used to forecast to EPS. If DTL is 6 it means that 10% increase in sales will bring 60% increase in EPS.
3) DTL is preferable on moderate side.

DOL	DFL	Comments
Low	Low	Lower total risk. Can not take advantage of trading on equity.
High	High	Higher total risk. Very risky combination.
High	Low	Moderate total risk. Not a good combination. Lower EBIT due to higher DOL and lower advantage of trading on equity due to low DFL.
Low	High	Moderate total risk. Best combination. Higher financial risk is balanced by lower total business risk.

(Miscellaneous questions)

Que. 15 From the following data of companies X & Y, prepare their income statements :

	Company X	**Company Y**
Variable Cost as a % of Sales	50	60
Interest Exp.	Rs.20000	Rs.6000
Degree of Operating Leverage	3/1	5/1
Degree of Financial Leverage	4/2	3/1
Income Tax Rate	55%	55%

Que.16 From the following information prepare income statement of Company A, B & C and briefly comment on each companies performance :-

Company	**A**	**B**	**C**
Financial Leverage	3 : 1	4 : 1	2 : 1
Interest	Rs.200	Rs.300	Rs.100
Operating Leverage	4 : 1	5 : 1	3 : 1
Variable Cost as a % to sales	66.67%	75%	50%
Income Tax Rate	45%	45%	45%

Que.17 The Capital Structure of Progressive Corporation consists of ordinary Share Capital of Rs.10,00,000 (face value of a share is Rs.100/-) and 10% Debenture of Rs.10,00,000 .The Selling Price is Rs.10 per unit, fixed cost is Rs.2,00,000 and variable cost is Rs.6 per unit. The Income Tax Rate is assumed to be 50% . If Sales increases by 20% from 1,00,000 to 1,20,000 units then -

(a) Calculate :
1) The percentage increase in EPS.
2) The Degree of Financial Leverage at 1 lakh & 1.2 lakhs units.
3) The Degree of Operating Leverage at 1 lakh & 1.2 lakhs units.

Que.18 The Sale revenue of Unknown Ltd. @ Rs.20 Per unit of output is Rs.20 lakhs and Contribution is Rs.10 lakhs. At the present level of output the DOL of the company is 2.5. The company does not have any Preference Shares. The number of Equity Shares are 1 lakh. Applicable corporate Income Tax rate is 50% and the rate of interest on Debt Capital is 16% p.a. What is the EPS (At sales revenue of Rs.20 lakhs) and amount of Debt Capital of the company if a 25% decline in Sales will wipe out EPS.

Que.19 The Following information pertains to XYZ Ltd.

Sales Volume	1200 Units
Fixed Exp. (excluding finance charges)	Rs.40000/-
Selling Price per unit	Rs.100
Variable Cost per unit	Rs.60

Compute the Degree of Financial Leverage of the company if a 10% change in Sales will bring about 90% change in EPS ? What percentage increase in variable cost will result in a 750 % increase in Operating Leverage.

Comparision of Leverages:

DOL	DFL	DTL
Shows level of business risk	Shows level of financial risk	Shows level of total or combined risk
It is dependent upon fixed cost	It is dependent upon interest and preference dividend	It is dependent upon fixed cost, interest & preference dividend.
Measures % change in EBIT which results from a 1% change in Sales.	Measures % change in EPS which results from a 1% change in EBIT.	Measures % change in EPS which results from a 1% change in Sales.
For example if DOL is 3 & there is 8% increase in output then EBIT will increase by 24% & if there is a 8% decrease in output EBIT will decrease by 24%.	For example if DFL is 2 and there is 5% increase in EBIT then EPS will increase by 10% and if there is a 5% decrease in EBIT, EPS will decrease by 10%.	For example if DTL is 6 and there is a 8% increase in sales then EPS will increase by 48%. And if there is a 8% decrease in sales then EPS will decrease by 48%.
There is unique DOL for each level of output.	There is a unique DFL for each level of EBIT.	There is a unique DTL for each level of sales.
High DOL means high Business Risk. Even a slight fall in sales may result in loss. Hence Low DOL is preferable.	High DFL means higher DEBT-equity ratio and higher financial risk. At the same time lower DFL means the management is loosing the opportunities. Hence to take advantage of trading on equity DFL is preferable at higher side up to optimum point.	DTL is dependent on DOL & DFL. Optimum high DTL due to low DOL & High DFL is the best.
It is undefined at Operating B.E.P.	It is undefined at Financial* B.E.P.	It is undefined at Total B.E.P.