

CHAPTER 18

Solved Problems

P.18.12 Calculate (a) the operating leverage, (b) financial leverage and (c) combined leverage from the following data under situations I and II and financial plans, A and B.

Installed capacity, 4,000 units

Actual production and sales, 75 per cent of the capacity

Selling price, Rs 30 per unit

Variable cost, Rs 15 per unit

Fixed cost:

Under situation I, Rs 15,000

Under situation II, 20,000

Capital structure:

<i>Particulars</i>	<i>Financial plan</i>	
	<i>A</i>	<i>B</i>
Equity	Rs 10,000	Rs 15,000
Debt (0.20 interest)	10,000	5,000
	20,000	20,000

Solution

(a) Determination of operating leverage

<i>Particulars</i>	<i>Situations</i>	
	<i>I</i>	<i>II</i>
Sales	Rs 90,000	Rs 90,000
Less: Variable costs	45,000	45,000
Contribution	45,000	45,000
Less: Fixed costs	15,000	20,000
EBIT	30,000	25,000
Operating leverage	1.5	1.8

(b) Determination of financial leverage

<i>Particulars</i>	<i>Situation I</i>		<i>Situation II</i>	
	<i>Financial plans</i>		<i>Financial plans</i>	
	<i>A</i>	<i>B</i>	<i>A</i>	<i>B</i>
EBIT	Rs 30,000	Rs 30,000	Rs 25,000	Rs 25,000
Less: Interest on debt	2,000	1,000	2,000	1,000
EBT	28,000	29,000	23,000	24,000
Financial leverage (EBIT/EBT)	1.07	1.03	1.09	1.04

(c) Determination of combined leverage

<i>Particulars</i>	<i>Financial plans</i>	
	<i>A</i>	<i>B</i>
Situation I	$1.5 \times 1.07 = 1.61$	$1.5 \times 1.03 = 1.54$
Situation II	$1.8 \times 1.09 = 1.96$	$1.8 \times 1.04 = 1.87$

P.18.13 Skyline Software Ltd has appointed you as its finance manager. The company wants to implement a project for which Rs 30 lakh is required to be raised from the market as a means of financing the project. The following financing plans and options are at hand: (Number in thousands)

<i>Particulars</i>	<i>Plan A</i>	<i>Plan B</i>	<i>Plan C</i>
Option 1:			
Equity shares	30	30	30
Option 2:			
Equity shares	15	20	10

12% Preference shares	Nil	10	10
10% Non-convertible debentures	15	Nil	10

Assuming corporate tax to be 35 per cent and the face value of all the shares and debentures to be Rs 100 each, calculate the indifference points and earnings per share (EPS) for each of the financing plans. Which plan should be accepted by the company?

Solution

Determination of indifference point under plans A, B, C

Plan A:

OR $X - 0.35X = 2(0.65X - \text{Rs } 97,500)$;
 $X - 0.35X = 1.3X - \text{Rs } 1,95,000$
OR $0.65X = \text{Rs } 1,95,000$ or $X = \text{Rs } 1,95,000/0.65 = \text{Rs } 3,00,000$

Plan B:

OR
 $2(0.65X) = 3(0.65X - \text{Rs } 1,20,000)$
 $1.3X = 1.95X - \text{Rs } 3,60,000$
OR $X = \text{Rs } 3,60,000/0.65 = \text{Rs } 5,53,846$

Plan C:

OR
OR
 $X = \text{Rs } 5,55,000/1.3 = \text{Rs } 4,26,923$

Determination of EPS under plans A, B and C for options 1 and 2

Particulars	Plan A		Plan B		Plan C	
	1	2	1	2	1	2
EBIT	Rs 3,00,000	Rs 3,00,000	Rs 5,53,846	Rs 5,53,846	Rs 4,26,923	Rs 4,26,923
Less: Interest	—	1,50,000	—	—	—	1,00,000
EBT	3,00,000	1,50,000	5,53,846	5,53,846	4,26,923	3,26,923
Less: Taxes	1,05,000	52,500	1,93,846	1,93,846	1,49,423	1,14,423
EAT	1,95,000	97,500	3,60,000	3,60,000	2,77,500	2,12,500
Less: Dividend on preference shares	—	—	—	1,20,000	—	1,20,000
Earnings available for equity-holders	1,95,000	97,500	3,60,000	2,40,000	2,77,500	92,500
Number of equity shares (N)	÷ 30,000	÷ 15,000	÷ 30,000	÷ 20,000	÷ 30,000	÷ 10,000
EPS	6.5	6.5	12	12	9.25	9.25

P.18.14 The capital structure of the Progressive Corporation Ltd consists of an ordinary share capital of Rs 10,00,000 (shares of Rs 100 par value) and Rs 10,00,000 of 10% debentures. The unit sales increased by 20 per cent from 1,00,000 units to 1,20,000 units, the selling price is Rs 10 per unit, variable costs amount to Rs 6 per unit and fixed expenses amount to Rs 2,00,000. The income tax rate is assumed to be 35 per cent.

- (a) You are required to calculate the following:
- The percentage increase in earnings per share.
 - The degree of financial leverage at 1,00,000 units and 1,20,000 units.
 - The degree of operating leverage at 1,00,000 units and 1,20,000 units.
- (b) Comment on the behaviour of operating and financial leverage in relation to increase of production from 1,00,000 to 1,20,000 units.

Solution

(a) Determination of earnings per share (EPS)

	1,00,000	1,20,000
Sales level (units)	1,00,000	1,20,000
Sales revenue	Rs 10,00,000	Rs 12,00,000
Less: Variable costs	6,00,000	7,20,000
Less: Fixed costs	2,00,000	2,00,000
EBIT	2,00,000	2,80,000
Less: Interest	1,00,000	1,00,000
Earnings after interest	1,00,000	1,80,000
Less: Taxes	35,000	63,000
EAT	65,000	1,17,000
Number of equity shares	10,000	10,000
EPS (EAT ÷ N)	6.5	11.7

(i) Percentage increase per share

(ii) DFL (at 1,00,000 units) (at 1,20,000 units)

(iii) DOL (at 1,00,000 units) (at 1,20,000 units)

(b) As a result of increase in production and sales from 1,00,000 units to 1,20,000 units, EPS has gone up by 80 per cent. Moreover, there has been a decrease in both types of leverages—operating as well as financial—reflecting a decline in the total risk of the company.

P.18.15 X Ltd, a widely held company, is considering a major expansion of its production facilities and the following alternatives are available:

Particulars	Alternatives (Rs lakh)		
	A	B	C
Share capital	50	20	10
14% Debentures	—	20	15
Loan from a financial institution @ 18 per cent	—	10	25

The expected rate of return before interest and tax is 25 per cent. The rate of dividend of the company is not less than 20 per cent. The company at present has no debt. The corporate tax rate is 35 per cent. Which of the alternative would you choose, assuming maximising ROR on equity capital as the objective of the firm?

Solution

Rate of return (ROR) on equity capital under proposed financial alternatives

Particulars	Financing alternatives (Rs lakh)		
	A	B	C
EBIT (Rs 50 lakh × 0.25)	12.5	12.5	12.5
Less: Interest on debentures	—	2.8	2.1
Less: Interest on loan	—	1.8	4.5
EBT	12.5	7.9	5.9
Less: Taxes (0.35)	4.375	2.765	2.065
EAT	8.125	5.135	3.835
ROR on equity capital (%)	16.25	25.675	38.35

Alternative C is the best.

P.18.16 Consider the following information for Strong Ltd: (Rs in lakh)

EBIT	1,120
EBT	320
Fixed cost	700

Calculate the percentage of change in EPS, if sales increase by 5 per cent.

Solution

Degree of combined leverage (DCL) = (Degree of operating leverage × Degree of financial leverage)

=

DCL =

Alternatively, DCL can be determined as

DCL =

*Sales – VC i.e., Contribution = EBIT + Fixed costs = Rs 1,120 lakh + Rs 700 lakh = Rs 1,820 lakh
 DCL = (Contribution/EBT) i.e. (Rs 1,820 lakh/Rs 320 lakh) = 5.6875
 5.6875 = Percentage change in EPS/Percentage increase in sales
 Percentage change in EPS = Percentage increase in sales × 5.6875 = 5% × 5.6875 = 28.4375 per cent
 5 per cent increase in sales will cause 28.4375 per cent increase in EPS

Review Questions

18.13 From the following selected operating data, determine the break-even sales level and the degree of operating leverage. Which company has the greater amount of business risk? Explain.

<i>Particulars</i>	<i>A</i>	<i>B</i>
Sales	Rs 25,00,000	Rs 30,00,000
Fixed costs	7,50,000	15,00,000

Variable expenses as a percentage of sales for firm A are 50 per cent and for firm B are 25 per cent.

18.14 From the following financial data of companies X and Y for the current year ending March, prepare their income statements.

<i>Particulars</i>	<i>X</i>	<i>Y</i>
Variable costs as percentage of sales	50	60
Interest expenses (Rs)	20,000	6,000
Degree of operating leverage	3	5
Degree of financial leverage	2	3
Income-tax rate (0.35)		

18.15 X Company Ltd is considering three different plans to finance its total project cost of Rs 100 lakh. These are:

<i>Particulars</i>	<i>Plan A</i>	<i>Plan B</i>	<i>Plan C</i>
Equity (Rs 100 per share)	50	34	25
Debt - 10% Debentures	50	66	75
	100	100	100

Sales for the first 3 years of operations are estimated at Rs 100 lakh, Rs 125 lakh, and Rs 150 lakh and a 10 per cent profit before interest and taxes is forecast. The corporate taxation is to be taken at 35 per cent. Compute EPS in each of the alternative plans of financing for the three years.

18.16 From the following, prepare income statement of company A, B and C. Briefly comment on each company's performance:

<i>Particulars</i>	<i>A</i>	<i>B</i>	<i>C</i>
Financial leverage	3:1	4:1	2:1
Interest	Rs 200	Rs 300	Rs 1,000
Operating leverage	4:1	5:1	3:1
Variable cost as percentage to sales	66.67	75	50
Tax rate	35	35	35

18.17 (a) The following figures relate to two companies: (Rupees in lakh)

<i>Particulars</i>	<i>P Ltd</i>	<i>Q Ltd</i>
Sales	500	1,000
Variable costs	200	300
Contribution	300	700
Fixed costs	150	400
(Contd.)		
EBIT	150	300
Interest	50	100
Profit before tax	100	200

You are required to: (i) calculate the operating, financial and combined leverage for the two companies; and (ii) comment on the relative risk position of the firms.

(b) (i) Find out operating leverage from the following data:

Sales, Rs 50,000

Variable costs, 60 per cent
Fixed costs, Rs 12,000

(ii) Find the financial leverage from the following data:

Net worth, Rs 25,00,000
Debt/Equity, 3:1
Interest rate, 12 per cent
Operating profit, Rs 20,00,000

18.18 Calculate operating, financial and combined leverage under situations when fixed costs are (a) Rs 5,000 and (b) Rs 10,000 for financial plans 1 and 2 respectively from the following information pertaining to the operation and capital structure of a leather manufacturing company.

Total assets	Rs 30,000	
Total assets turnover	2	
Variable cost as per cent of sales	60	
Capital structure:	<i>Financial plan</i>	
	1	2
Equity	Rs 30,000	Rs 10,000
10% Debentures	10,000	30,000

18.19 A company is considering methods of financing its establishment. Initially Rs 2,00,000 will be needed. The company is considering two proposals for the purpose: (i) issue 15% debentures of Rs 1,00,000 and issue of 1,000 equity shares of Rs 100 each, (ii) issue of 2,000 equity shares of Rs 100 each. The corporate tax rate is 35 per cent.

- (a) Compute the indifference point of the above proposed two financial plans.
(b) Show that indifference point computed in (a) above is correct.
(c) Compute EPS under the two proposed financial plans if EBIT is Rs 30,000 and Rs 40,000. How do you explain the difference in your results?
- Assume that levered financial plan is used. Initially the company is expected to operate at a level of 1,00,000 units (selling price, Rs 2 per unit; variable costs, Re 1 per unit and fixed costs Rs 50,000). Your calculations will show increase in EBIT, compared to assumed level of EBIT in 1 (c) of Rs 40,000. What is the percentage increase in EPS due to increase in EBIT? Use these figures to compute the degree of financial leverage.
- Assuming everything to be the same as given in situation 2 except that sales rise by 20 per cent from 1,00,000 units to 1,20,000 units,
(a) Compute the percentage increase in EPS.
(b) What is the degree of operating leverage (take, 1,00,000 units as the base level)?
(c) Determine the combined leverage.

18.20 Determine the indifference points of the financial plans (1) A and B and (2) A and C formulated by the finance department of the company to finance its capital budget, assuming 35 per cent corporate tax rate:

- Issue 1,00,000 equity shares of Rs 20 per share.
 - Issue 50,000 equity shares of Rs 20 per share and 10% debentures of Rs 10,00,000.
 - Issue 50,000 equity shares of Rs 20 per share and 12% preference shares of Rs.10,00,000.
- Do you subscribe to the view that at indifference level of EBIT, since the EPS is same for all types of plans, the market value per share would also be the same?

18.21 A company has the choice of issuing 10% debentures or Rs 100 equity shares to raise Rs 20 lakhs to meet its long-term investment requirements. Its current capital structure consists of 20,000 ordinary shares of Rs 100 each and 8% debentures of Rs 10,00,000 and 12% preference shares of Rs 10,00,000.

Determine the level of EBIT at which EPS would be the same whether the new funds are acquired by issuing ordinary shares or by issuing 10% debentures. Tax rate is 35 per cent.

18.22 A textile company has EBIT of Rs 1,60,000. Its capital structure consists of the following securities:

10% Debentures	Rs 5,00,000
12% Preference shares	1,00,000
Equity shares of Rs 100 each	4,00,000

The company is in the 35 per cent tax bracket.

- Determine the EPS.
- Determine the percentage change in EPS associated with 30 per cent increase and 30 per cent decrease in EBIT.

(c) Determine the degree of financial leverage.

18.23 Calculate operating leverage and financial leverage under situations A, B and C, and financial plans I, II and III respectively from the following information relating to the operations and capital structure of XYZ Company for producing additional 800 units.

Also, find out the combination of operating and financial leverages which gives the highest value and the least value. How are these calculations useful to the finance manager of the company?

Selling price per unit, Rs 30

Variable cost per unit, 20

Fixed costs:

Situation A Rs 2,000

Situation B 4,000

Situation C 6,000

Capital structure:

Particulars	Financial plan		
	I	II	III
Equity	Rs 10,000	Rs 15,000	Rs 5,000
Debt (0.12)	10,000	5,000	15,000

18.24 A company is considering lowering the selling price of its product. The following information is available on the costs of producing and the income from selling its product.

Units sold	3,00,000	
Unit sales price		Rs 10
Variable cost	6	
Fixed cost	6,00,000	
Net operating income		6,00,000

(a) The management has asked you to prepare a table indicating the percentage increase in volume necessary to maintain a net operating income at the current level on product with decrease in price of 10 per cent and 20 per cent, assuming other costs remain constant.

(b) Assuming everything to remain the same as described in situation (a) with the difference that it is possible somehow to decrease the fixed cost by 20 per cent, prepare the new table.

18.25 The Aditya Mills Ltd has submitted to you the following 4 ways of financing its expansion programme. Assuming the objective of the company is to maximise the EPS, which plan would you recommend? The corporate tax rate is 35 per cent. The key information relating to the 4 plans are as follows:

Source of funds	1	2	3	4
Equity shares	Rs 58,500	Rs 37,500	Rs 83,500	Rs 25,000
Preference shares	Nil	11,250 of Rs 100 each @ 10%	7,500 of Rs 100 each at 9%	Nil
Debentures	Rs 15,00,000 @10%	Rs 10,00,000 @11%	Nil	Rs 25,00,000 @12%

Also find the following:

(a) Financial break-even point for each plan.

(b) Determine the degree of financial leverage associated with each plan assuming EBIT of Rs 10,00,000.

(c) Discuss the circumstances in which each plan would be most acceptable.

ANSWERS

18.13 $BEP_{(A)} = Rs\ 15,00,000$, $BEP_{(B)} = Rs\ 20,00,000$, $DOL_{(A)} = 2.5$, $DOL_{(B)} = 3$.

18.14 Earnings after taxes = X, Rs 13,000 and Y Rs 1,950.

18.15 EPS (Rs 6.5 for plans A, B, C) in year 1; Rs 9.75, Rs 11.28 and Rs 13 in year 2; Rs 13, Rs 16.06 and Rs 19.5 in year 3.

18.16 EAT (Company A and B Rs 65); EAT Rs 650 for Company C.

18.17 (a) OL, 2; FL, 1.5; CL, 3 (Company P)

OL, 2.33; FL, 1.5; CL, 3.5 (Company Q).

(b) (i) 2.5; (ii) 1.82

18.18 DOL 1.26 (fixed costs = Rs 5,000), DOL = 1.71 (Fixed costs = Rs 10,000); DFL 1.05 and 1.08

(Financial Plan 1), DFL 1.19 and 1.27 (Financial Plan 2). DCL 1.33 and 1.84 (Financial Plan 1), DCL 1.5 and 2.18 (Financing Plan 2).

- 18.19** (i) (a) Rs. 30,000, (b) EPS is Rs 9.75 in both the plans, (c) EPS is Rs 9.75 and Rs 16.25 (under 1st plan at the EBIT level of Rs. 30,000 and Rs. 40,000 respectively); EPS is Rs 9.75 and Rs 13 (under 2nd plan at the EBIT level of Rs 30,000 and Rs 40,000 respectively). Leverage starts becoming favourable after the EBIT of Rs 30,000. Therefore, the financial plan, having debt-equity mix yields higher EPS compared to pure equity plan 40% (percentage increase in EPS), DFL = 3. (a) 57.14% (b) 2.0, (c) DFL 1.43, DCL 2.86.
- 18.20** (1) Rs 2,00,000 (2) Rs 3,69,231. No, the market price of a share would be more for a plan which has higher proportion of equity in its capital structure.
- 18.21** Rs 6,64,615.
- 18.22** (a) Rs 14.875, (b) 52.98%, (c) 1.75.
- 18.23** OL, 1.33 (A), 2 (B), 4 (C)
FL: Plan I, 1.25 (A), 1.42 (B), 2.5 (C)
Plan II, 1.11 (A), 1.18 (B), 1.43 (C)
Plan III, 1.43 (A), 1.82 (B), 10.0 (C)
CL: Highest, 40 and lowest, 1.48.
- 18.24** (i) 20% (prices are reduced by 10%), 60% (prices are reduced by 20%);
(ii) Required sales volume would be Rs 3,60,000 units (when prices are reduced by 10%) and Rs 5,40,000 units (when prices are reduced by 20%).
- 18.25** (a) Rs 1,50,000 (Plan 1), Rs 2,83,077 (Plan 2), Rs 1,03,846 (Plan 3), Rs 3,00,000 (Plan 4); (iii) At assumed level of EBIT of Rs 10 lakhs, DFL is 1.18 (Plan 1), 1.39 (Plan 2), 1.11 (Plan 3), 1.43 (Plan 4).