

SOLUTION – EXERCISES SECTION 2

1. Phoenix Corporation manufactures smartphones, generally selling from 200,000 to 300,000 units per year. The following cost data apply to the activity levels shown:

Number of Units	200,000	250,000	300,000
Total costs			
Fixed	\$ 15,000,000		
Variable	24,000,000		
Total costs	\$ 39,000,000		
Cost per Unit			
Fixed	\$ 75		
Variable	120		
Total cost per unit	\$ 195		

Required: 1.) Complete the preceding table by filling the missing amounts for 250,000 and 300,000 units.

2.) Assume that Phoenix actually makes 280,000 units. What would be the total costs and the cost per unit at this level of activity?

3.) If Phoenix sells each unit for \$220, what is Phoenix's magnitude of operating leverage at sales of 280,000 units?

Feedback:

1.)

Number of Units	200,000	250,000	300,000
Total costs			
Fixed	\$ 15,000,000	\$ 15,000,000	\$ 15,000,000
Variable	24,000,000	30,000,000	36,000,000
Total costs	\$ 39,000,000	\$ 45,000,000	\$ 51,000,000
Cost per Unit			
Fixed	\$ 75	\$ 60	\$ 50
Variable	120	120	120
Total cost per unit	\$ 195	\$ 180	\$ 170

2.) Total cost = \$15,000,000 + (280,000 × \$120) = \$48,600,000

Cost per unit = \$48,600,000 / 280,000 units = \$173.57

3.) Sales = \$220 × 280,000 = \$61,600,000

Contribution margin = \$61,600,000 - (\$120 × 280,000) = \$28,000,000

Net income = \$28,000,000 - \$15,000,000 = \$13,000,000

Operating leverage = \$28,000,000 / \$13,000,000 = 2.15

2. Grant Company and Lee Company compete in the same market. The following budgeted income statements illustrate their cost structures.

	Grant Company	Lee Company
Number of customers	200	200
Sales revenue (200 x \$150)	\$ 30,000	\$ 30,000
Less variable costs	<u>6,000</u>	<u>18,000</u>
Contribution margin	\$ 24,000	\$ 12,000
Less fixed costs	<u>19,000</u>	<u>7,000</u>
Net income	\$ 5,000	\$ 5,000

Required: (a) If Grant Company lowers its price to \$135, it will lure 80 customers away from Lee Company. Prepare Grant's income statement based on 280 customers.

(b) If Lee Company lowers its price to \$135 (assuming that Grant Company is still charging \$150 per customer), Lee would lure 80 customers away from Grant. Prepare Lee's income statement based on 280 customers.

(c) Which of the companies would benefit more from lowering its sales price to attract more customers, and why?

Feedback:

(a) Grant Company income statement

Number of customers	280
Sales revenue (280 x \$135)	\$ 37,800
Less variable costs (\$30 x 280)	<u>8,400</u>
Contribution margin	29,400
Less fixed costs	<u>19,000</u>
Net income	\$ 10,400

(b) Lee Company income statement

Number of customers	280
Sales revenue (280 x \$135)	\$ 37,800
Less variable costs (\$90 x 280)	<u>25,200</u>
Contribution margin	12,600
Less fixed costs	<u>7,000</u>
Net income	\$ 5,600

(c) Grant Company would benefit more from lowering its sales price to attract new customers; its income would increase by \$5,400, while in the same circumstances, Lee's income would increase by just \$600. The difference is caused by the companies' cost structures: Grant has a cost structure with more fixed costs, and Lee has higher variable costs. Therefore, the increase in sales (at a lower selling price) causes more of an increase in Grant's contribution margin and net income.

3. Income statements for three companies are provided below:

	Company A	Company B	Company C
Sales (20 units)	\$ 1,000	\$ 1,000	\$ 1,000
Less variable costs	600	300	-
Less fixed costs	200	500	800
Net income	\$ 200	\$ 200	\$ 200

Required: (a) Prepare new income statements for the firms assuming each sells one additional unit (i.e. each firm sells 21 units)

(b) Briefly describe the effect of cost structure on profitability.

Feedback:

(a) Income statements

	Company A	Company B	Company C
Sales (21 units)	\$ 1,050	\$ 1,050	\$ 1,050
Less variable costs	630	315	-
Less fixed costs	200	500	800
Net income	\$ 220	\$ 235	\$ 250

(b) Companies with high operating leverage experience higher profitability when sales increase. The more fixed costs, the higher the fluctuation in net income. Company C has the highest operating leverage, and it experienced the greatest increase in net income with the increase in sales volume.

4. Former NFL coach Joe Gibbs is highly sought after as a guest speaker. His fee can run as high as \$150,000 for a single two-hour appearance. Recently, he was asked to speak at a seminar offered by the National Sports in Education Foundation (NSEF). Due to the charitable nature of the organization, Mr. Gibbs offered to speak for \$100,000. NSEF planned to invite 350 guests who would each make a \$500 contribution to the organization. The Foundation's executive director was concerned about committing so much of the organization's cash to this one event. So instead of the \$100,000 fee she countered with an offer to pay Mr. Gibbs 50% of the revenue received from the seminar and no other payments.

Required:

(a) Classify the two offers in terms of cost behavior (fixed vs. variable).

Scenario A, NSEF pays Gibbs a \$100,000 fee:

Scenario B, NSEF pays Gibbs 50% of revenue:

(b) Compute the budgeted income (assuming there are no other expenses) under each of the following scenarios:

1) NSEF agrees to pay the \$100,000 fee, and 350 guests actually attend the seminar; and

2) NSEF pays Mr. Gibbs 50% of revenue, and 350 guests attend the seminar.

(c) For each scenario (\$100,000 fee vs. 50% of revenue), compute the percentage increase in profit that would result if the Foundation is able to increase attendance by 20 percent over the original plan (to a total of 420).

(d) For each scenario, compute NSEF's cost per contributor if 350 attend and if 420 contributors attend.

(e) Summarize the impact on risk and profits of shifting the cost structure from fixed to variable costs.

Feedback:

(a) Cost behavior of the two offers:

\$100,000 fee: Fixed

50% of revenue: Variable

(b) Profit computations:

	Scenario A	Scenario B
Number of guests	350	350
Revenue (350 x \$500)	\$ 175,000	\$ 175,000
Costs	100,000	87,500
Profit	\$ 75,000	\$ 87,500

(c) Percentage increase in profit:

	Scenario A	Scenario B
Number of guests	420	420
Revenue (420 x \$500)	\$ 210,000	\$ 210,000
Costs	100,000	105,000
Profit	\$ 110,000	\$ 105,000
% increase in profit	47%	20%

$(\$110,000 - \$75,000)/\$75,000 = 47\%$

$(\$105,000 - \$87,500)/\$87,500 = 20\%$

(d) Cost per Guest:

350 attendees

Scenario A, $\$100,000/350 = \285.71

Scenario B, $\$87,500/350 = \250

420 attendees

Scenario A, $\$100,000/420 = \238.10

Scenario B, $\$105,000/420 = \250

(d-1) Profit per Guest

350 attendees

Scenario A, $\$75,000/350 = \214.29

Scenario B, $\$87,500/350 = \250

420 attendees

Scenario A, $\$110,000/420 = \261.90

Scenario B, $\$105,000/420 = \250

(e) Shifting the cost structure from fixed to variable reduces the level of risk. For example, if no one attends, Mr. Gibbs is paid nothing. However, shifting to variable costs also reduces the potential for profits. For example, a 20 percent increase in attendance results in a 47% increase in profit under the fixed fee scenario but only a 20% increase in profits under the variable cost scenario.

5. Assume that Microsoft and Sony both plan to introduce a new hand-held video game. Microsoft plans to use a heavily automated production process to produce its product while Sony plans to use a labor-intensive production process. The following revenue and cost relationships are provided:

	Microsoft Game	Sony Game
Selling price per unit	150	150
Variable costs per unit		
Direct materials	\$ 27.00	\$ 27.00
Direct labor	7.50	30.00
Overhead	7.50	30.00
Selling and administrative	3.00	3.00
Annual fixed costs		
Overhead	\$ 600,000	\$ 240,000
Selling and administrative	135,000	135,000

- Required: (a) Compute the contribution margin per unit for each company.
(b) Prepare a contribution income statement for each company assuming each company sells 8,000 units.
(c) Compute each firm's net income if the number of units sold increases by 10%.
(d) Which firm will have more stable profits when sales change? Why?

Feedback:

- (a) Contribution margin per unit:

	Microsoft Game	Sony Game
Revenue	150.00	150.00
Less variable costs:		
Direct materials	\$ 27.00	\$ 27.00
Direct labor	7.50	30.00
Overhead	7.50	30.00
Selling and administrative expenses	3.00	3.00
Contribution margin	\$ 105.00	\$ 60.00

- (b) Contribution income statements:

	Microsoft Game	Sony Game
Revenue (8,000 x \$150)	\$ 1,200,000	\$ 1,200,000
Less variable costs:		
Direct materials	216,000	216,000
Direct labor	66,000	240,000
Overhead	66,000	240,000
Selling and administrative expenses	24,000	24,000
Contribution margin	\$ 828,000	\$ 480,000
Less fixed costs		
Overhead	600,000	240,000
Selling and administrative expenses	135,000	135,000
Net income	\$ 93,000	\$ 105,000

(c) Increase in NI with a 10% increase in sales volume:

	Microsoft Game	Sony Game
Revenue (8,800 x \$150)	\$ 1,320,000	\$ 1,320,000
Less variable costs:		
Direct materials	237,600	237,600
Direct labor	66,000	264,000
Overhead	66,000	264,000
Selling and administrative expenses	26,400	26,400
Contribution margin	\$ 924,000	\$ 528,000
Less fixed costs		
Overhead	600,000	240,000
Selling and administrative expenses	135,000	135,000
Net income	\$ 189,000	\$ 153,000

(d) The lower the fixed costs, the more stable will be net income. Because Sony has approximately half the fixed costs of Microsoft, its earnings should be more stable. Note also that Sony's unit contribution margin is considerably less than Microsoft's. As sales rise, Microsoft will gain contribution margin (and thus profit) faster than Sony and, of course, when sales fall will lose contribution margin faster than Sony.

6. Cannon Company operates a clothing store that reported the following operating results for 2013:

Income Statement	
Sales revenue	\$2,000,000
Cost of goods sold	(1,200,000)
Gross margin	\$ 800,000
Employee commissions and bonuses (5% of sales)	(100,000)
Depreciation expense	(150,000)
Salaries expense	(260,000)
Shipping and delivery expense (2% of sales)	(40,000)
Advertising expense	(80,000)
Net income	\$ 170,000

Feedback:

Required: Prepare an income statement for Cannon Company using the contribution margin format.

Income Statement	
Sales revenue	\$2,000,000
Less variable expenses:	
Cost of goods sold	(1,200,000)
Employee commissions and bonuses (5% of sales)	(100,000)
Shipping and delivery expense (2% of sales)	(40,000)
Contribution margin	\$ 660,000
Less fixed expenses	
Depreciation expense	(150,000)
Salaries expense	(260,000)
Advertising expense	(80,000)
Net income	\$ 170,000

7. Contribution margin income statements for two competing companies are provided below:

	Yin Company	Yang Company
Revenue	\$ 750,000	\$ 750,000
Less variable cosrts	<u>300,000</u>	<u>525,000</u>
Contribution margin	\$ 450,000	\$ 225,000
Less fixed costs	<u>405,000</u>	<u>180,000</u>
Net income	\$ 45,000	\$ 45,000

Required: 1) Show each company's cost structure by inserting the percentage of the company's revenue represented by each item on the contribution income statement.

2) Compute each company's magnitude of operating leverage.

3) Using the operating leverage measures computed in requirement 2, determine the increase in each company's net income (percentage and amount) if each company experiences a 10 percent increase in sales.

4) Assume that sales are expected to continue to increase for the foreseeable future, which company probably has more desirable cost structure? Why?

Feedback:

1)

	Yin Company		Yang Company	
Revenue	\$ 750,000	100%	\$ 750,000	100%
Less variable costs	<u>300,000</u>	<u>40%</u>	<u>525,000</u>	<u>70%</u>
Contribution Margin	\$ 450,000	60%	\$ 225,000	30%
Less fixed costs	<u>405,000</u>	<u>54%</u>	<u>180,000</u>	<u>24%</u>
Net income	\$ 45,000	6%	\$ 45,000	6%

2) Magnitude of operating leverage:

Yin Company = \$450,000 contribution margin/\$45,000 net income = 10

Yang Company = \$225,000 contribution margin/\$45,000 net income = 5

3) Expected profits when sales increase by 10%:

Yin Company: $10\% \times 10$ magnitude of operating leverage = 100%

If sales increase by 10%, net income should increase to \$90,000

Yang Company: $10\% \times 5$ magnitude of operating leverage = 50%

If sales increase by 10%, net income should increase to \$67,500

4) Cost structures: Assuming sales continue to increase, Yin Company will fare better than Yang Company because its contribution margin ratio is higher (60% vs. 30%) and its operating leverage is higher. This means that as sales increase, Yin Company's net income will increase more rapidly than Yang Company's.