

## CHAPTER 6

### VARIABLE COSTING AND SEGMENT REPORTING

#### AGENDA

##### Variable costing and absorption costing.

1. Key elements of variable and absorption costing.
2. Classification of costs under variable and absorption costing.
3. Unit product cost comparison.
4. Income statement comparison.
5. Extended example—fluctuating sales.
6. Comparative income effects.
7. Extended example—fluctuating production.
8. Advantages of variable costing.

##### **Segment reporting**

1. Traceable and common fixed costs
2. Dangers in allocating common fixed costs

## ABSORPTION AND VARIABLE COSTING

### I. KEY ELEMENTS

Variable costing and absorption costing are alternative methods of determining unit product costs. They affect inventory valuations and net operating income.

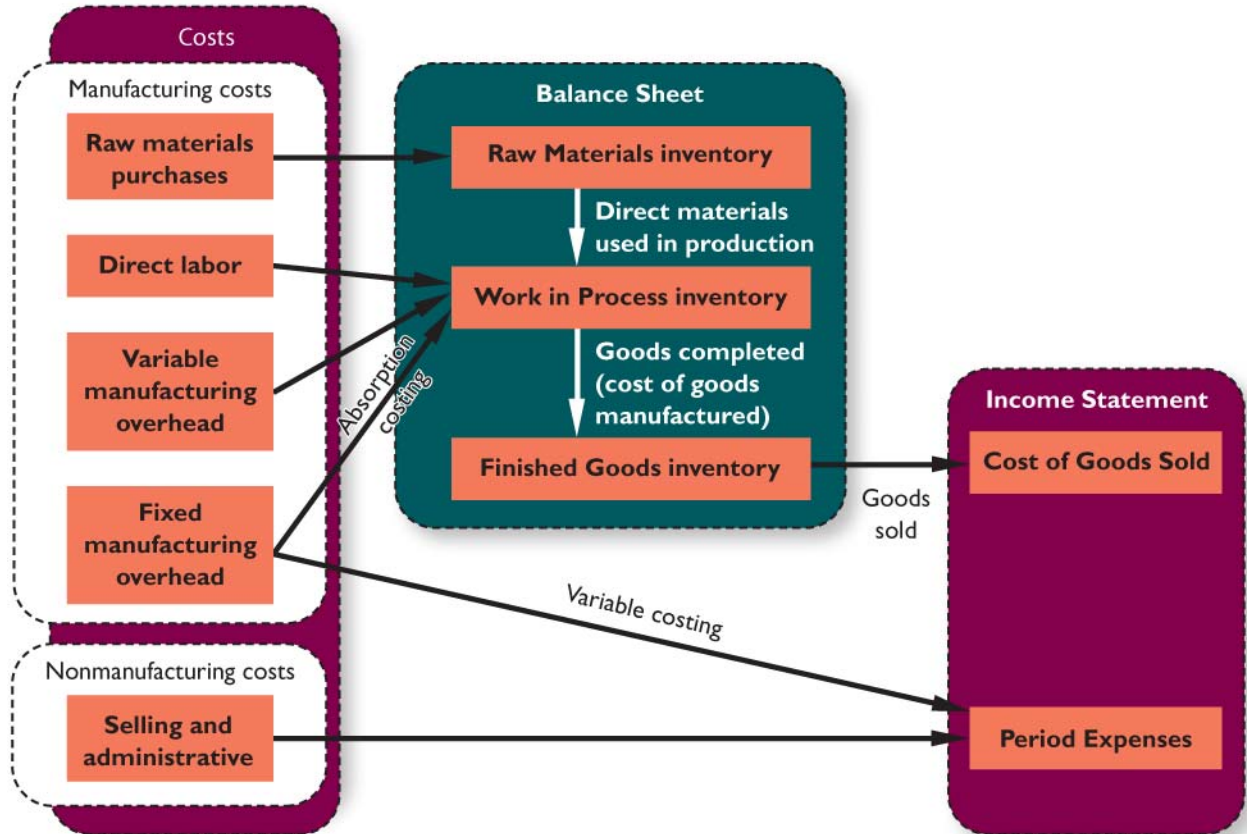
#### ABSORPTION COSTING

- Absorption costing was used in earlier chapters and is generally considered to be required for external financial reports.
- Under absorption costing, product costs include *all* manufacturing costs:
  - Direct materials.
  - Direct labor.
  - Variable manufacturing overhead.
  - Fixed manufacturing overhead.
- Under absorption costing, the following costs are treated as period expenses and are excluded from product costs:
  - Variable selling and administrative costs.
  - Fixed selling and administrative costs.

#### VARIABLE COSTING

- Variable costing is an alternative for internal management reports.
- Under variable costing, product costs include only the *variable* manufacturing costs:
  - Direct materials.
  - Direct labor (unless fixed).
  - Variable manufacturing overhead.
- Under variable costing, the following costs are treated as period expenses and are excluded from product costs:
  - Fixed manufacturing overhead.
  - Variable selling and administrative costs.
  - Fixed selling and administrative costs.

## II. CLASSIFICATION OF COSTS UNDER VARIABLE AND ABSORPTION COSTING



### III. UNIT PRODUCT COST COMPARISON

- Unit product costs differ between variable and absorption costing.

EXAMPLE: Harvey Company produces a single product.

Number of units produced annually.....	25,000
Selling price per unit.....	\$30
Variable costs per unit:	
Direct materials, direct labor, and variable manufacturing overhead.....	\$10
Variable selling and administrative expense .....	\$3
Fixed costs per year:	
Fixed manufacturing overhead.....	\$150,000
Fixed selling and administrative expense.....	\$100,000

Unit product costs are computed as follows:

	<i>Absorption Costing</i>	<i>Variable Costing</i>
Direct materials, direct labor, and variable manufacturing overhead .....		
Fixed manufacturing overhead.....		
Total unit product cost.....		

- Selling and administrative expenses are always treated as period costs and are expensed in the current period; they are not treated as product costs under either costing method.

**IV. INCOME STATEMENT COMPARISON**

Harvey Company had no beginning inventory, produced 25,000 units, and sold 20,000 units last year.

<i>Absorption Costing</i>	
Sales .....	\$600,000
Cost of goods sold .....	<u>320,000</u>
Gross margin.....	280,000
Selling and administrative expense.....	<u>160,000</u>
Net operating income .....	<u>\$120,000</u>

<i>Variable Costing</i>	
Sales .....	<u>\$600,000</u>
Variable expenses:	
Variable cost of goods sold .....	200,000
Variable selling and administrative expense .....	<u>60,000</u>
Total variable expenses	<u>260,000</u>
Contribution margin .....	<u>340,000</u>
Fixed expenses:	
Fixed manufacturing overhead.....	150,000
Fixed selling and administrative expense.....	<u>100,000</u>
Total fixed expenses	<u>250,000</u>
Net operating income .....	<u>\$ 90,000</u>

**How much are the cost of goods sold and the ending inventory under the two costing methods?**

**INCOME STATEMENT COMPARISON (continued)**

	<i>Cost of Goods Sold</i>	<i>Ending Inventory</i>
<i>Absorption costing</i>		
Variable manufacturing costs		
(20,000 units × \$10 per unit) .....	\$200,000	
(5,000 units × \$10 per unit) .....		\$50,000
Fixed manufacturing overhead		
(20,000 units × \$6 per unit) .....	120,000	
(5,000 units × \$6 per unit) .....		<u>30,000</u>
Total .....	<u>\$320,000</u>	<u>\$80,000</u>
 <i>Variable costing</i>		
Variable manufacturing costs		
(20,000 units × \$10 per unit) .....	\$200,000	
(5,000 units × \$10 per unit) .....		<u>\$50,000</u>
Total .....	<u>\$200,000</u>	<u>\$50,000</u>

**RECONCILIATION OF NET OPERATING INCOMES:**

Variable costing net operating income .....	\$ 90,000
Add fixed manufacturing overhead cost deferred in inventory under absorption costing (5,000 units × \$6 per unit) .....	<u>30,000</u>
Absorption costing net operating income .....	<u>\$120,000</u>

**V. EXTENDED EXAMPLE—FLUCTUATING SALES**

EXAMPLE: Holland Company produces a single product.

Number of units produced annually .....	5,000
Selling price per unit .....	\$15
Variable costs per unit:	
Direct materials, direct labor, and variable manufacturing overhead.....	\$5
Variable selling and administrative expense.....	\$1
Fixed costs per year:	
Fixed manufacturing overhead .....	\$15,000
Fixed selling and administrative expense .....	\$21,000

Unit product costs are computed as follows:

	<i>Absorption Costing</i>	<i>Variable Costing</i>
Direct materials, direct labor, and variable manufacturing overhead.....	\$5	\$5
Fixed manufacturing overhead (\$15,000 ÷ 5,000 units).....	<u>3</u>	<u>—</u>
Total unit product cost .....	<u>\$8</u>	<u>\$5</u>

Income statements using both costing methods over a three-year period are provided on the following page. (Note the computation of the variable cost of goods sold on the variable costing income statements. The method used is simpler than the method used in the previous example.)

**FLUCTUATING SALES (continued)**

	Year 1	Year 2	Year 3
Units in beginning inventory .....	0	0	1,000
Units produced .....	5,000	5,000	5,000
Units sold .....	5,000	4,000	6,000
Units in ending inventory .....	0	1,000	0
 <i>Absorption costing</i>			
Sales (@ \$15 per unit) .....	<u>\$75,000</u>	<u>\$60,000</u>	<u>\$90,000</u>
Cost of goods sold (@ \$8 per unit) .....	<u>40,000</u>	<u>32,000</u>	<u>48,000</u>
Gross margin.....	35,000	28,000	42,000
Selling and administrative expense.....	<u>26,000</u>	<u>25,000</u>	<u>27,000</u>
Net operating income .....	<u>\$ 9,000</u>	<u>\$ 3,000</u>	<u>\$15,000</u>
 <i>Variable costing</i>			
Sales (@ \$15 per unit) .....	<u>\$75,000</u>	<u>\$60,000</u>	<u>\$90,000</u>
Variable expenses:			
Variable cost of goods sold			
(@ \$5 per unit).....	25,000	20,000	30,000
Variable selling and administrative expense			
(@ \$1 per unit).....	<u>5,000</u>	<u>4,000</u>	<u>6,000</u>
Total variable expenses .....	<u>30,000</u>	<u>24,000</u>	<u>36,000</u>
Contribution margin .....	<u>45,000</u>	<u>36,000</u>	<u>54,000</u>
Fixed expenses:			
Fixed manufacturing overhead.....	15,000	15,000	15,000
Fixed selling and administrative expense.....	<u>21,000</u>	<u>21,000</u>	<u>21,000</u>
Total fixed expenses .....	<u>36,000</u>	<u>36,000</u>	<u>36,000</u>
Net operating income .....	<u>\$ 9,000</u>	<u>\$ 0</u>	<u>\$18,000</u>

**RECONCILING NET OPERATING INCOME:**

	Year 1	Year 2	Year 3
Variable costing net operating income .....	\$9,000	\$ 0	\$18,000
Add fixed manufacturing overhead cost deferred in inventory under absorption costing (1,000 units × \$3 per unit).....		3,000	
Deduct fixed manufacturing overhead cost released from inventory under absorption costing (1,000 units × \$3 per unit).....			<u>(3,000)</u>
Absorption costing net operating income .....	<u>\$9,000</u>	<u>\$3,000</u>	<u>\$15,000</u>

**VI. COMPARATIVE INCOME EFFECTS —VARIABLE AND ABSORPTION COSTING**

<i>Relation Between Production and Sales</i>	<i>Relation Between Variable and Absorption Costing Net Operating Incomes</i>
Units produced = Unit sales (No change in inventory)	Absorption costing NI = Variable costing NI*
Units produced > Unit sales (Inventory increases)	Absorption costing NI > Variable costing NI **
Units produced < Unit sales (Inventory decreases)	Absorption costing NI < Variable costing NI #

\* Under lean production, inventories are reduced drastically and changes in inventories are small. Therefore, absorption costing net operating income tends to equal variable costing net operating income under lean production.

\*\* Net operating income will be higher under absorption costing than under variable costing because fixed manufacturing overhead cost will be *deferred* in inventory under absorption costing.

# Net operating income will be lower under absorption costing than under variable costing because fixed manufacturing overhead cost will be *released* from inventory under absorption costing.

**VII. EXTENDED EXAMPLE—FLUCTUATING PRODUCTION**

EXAMPLE: Suppose all of the facts are the same as in the previous example of Holland Company except that production and sales are as follows:

	Year 1	Year 2	Year 3
Units in beginning inventory .....	0	0	1,000
Units produced .....	5,000	6,000	4,000
Units sold .....	5,000	5,000	5,000
Units in ending inventory .....	0	1,000	0

Unit product costs are computed as follows:

	Year 1	Year 2	Year 3
<i>Absorption costing</i>			
Direct materials, direct labor, and variable manufacturing overhead .....	\$5.00	\$5.00	\$5.00
Fixed manufacturing overhead:			
(\$15,000 ÷ 5,000 units) .....	3.00		
(\$15,000 ÷ 6,000 units) .....		2.50	
(\$15,000 ÷ 4,000 units) .....			3.75
Unit product cost .....	<u>\$8.00</u>	<u>\$7.50</u>	<u>\$8.75</u>
<i>Variable costing</i>			
Direct materials, direct labor, and variable manufacturing overhead .....	<u>\$5.00</u>	<u>\$5.00</u>	<u>\$5.00</u>
Unit product cost .....	<u>\$5.00</u>	<u>\$5.00</u>	<u>\$5.00</u>

**FLUCTUATING PRODUCTION (continued)**

	Year 1	Year 2	Year 3
<i>Absorption costing</i>			
Sales (@ \$15 per unit) .....	\$75,000	\$75,000	\$75,000
Cost of goods sold (5,000 units × \$8); (5,000 units × \$7.50); (1,000 units × \$7.50) + (4,000 units × \$8.75) .....	<u>40,000</u>	<u>37,500</u>	<u>42,500</u>
Gross margin.....	35,000	37,500	32,500
Selling and administrative expense.....	<u>26,000</u>	<u>26,000</u>	<u>26,000</u>
Net operating income .....	<u>\$ 9,000</u>	<u>\$11,500</u>	<u>\$6,500</u>
 <i>Variable costing</i>			
Sales (@ \$15 per unit) .....	<u>\$75,000</u>	<u>\$75,000</u>	<u>\$75,000</u>
Variable expenses:			
Variable cost of goods sold .....	25,000	25,000	25,000
Variable selling and administrative expense .....	<u>5,000</u>	<u>5,000</u>	<u>5,000</u>
Total variable expenses .....	<u>30,000</u>	<u>30,000</u>	<u>30,000</u>
Contribution margin .....	<u>45,000</u>	<u>45,000</u>	<u>45,000</u>
Fixed expenses:			
Fixed manufacturing overhead.....	15,000	15,000	15,000
Fixed selling and administrative expense.....	<u>21,000</u>	<u>21,000</u>	<u>21,000</u>
Total fixed expenses .....	<u>36,000</u>	<u>36,000</u>	<u>36,000</u>
Net operating income .....	<u>\$ 9,000</u>	<u>\$ 9,000</u>	<u>\$ 9,000</u>

**RECONCILING NET OPERATING INCOME:**

	Year 1	Year 2	Year 3
Variable costing net operating income .....	\$9,000	\$9,000	\$9,000
Add fixed manufacturing overhead cost deferred in inventory under absorption costing (1,000 units × \$2.50 per unit).....		2,500	
Deduct fixed manufacturing overhead cost released from inventory under absorption costing (1,000 units × \$2.50 per unit) .....			(2,500)
Absorption costing net operating income .....	<u>\$9,000</u>	<u>\$11,500</u>	<u>\$6,500</u>

### **VIII. ADVANTAGES OF VARIABLE COSTING**

- + Variable costing is easy to use with CVP analysis.
- + Variable costing net operating income is only affected by changes in unit sales; therefore, it provides clearer explanations than absorption costing of why net operating income changes from one period to the next.
- + Variable costing supports decision making better than absorption costing. Absorption costing treats fixed overhead as though it is a variable cost which may lead to flawed pricing decisions and discontinuation decisions.
- + Variable costing readily adapts to the Theory of Constraints by treating direct labor as a fixed cost rather than a variable cost.

## **SEGMENT REPORTING**

Managers need more than a single, company-wide income statement; they need statements that focus on the various segments of a company.

### **DEFINITION OF A SEGMENT**

A segment is any part or activity of an organization about which a manager seeks cost or revenue data. Examples of segments include: sales territories, products, divisions of a company, individual salespersons, individual customers, etc.

### **TRACEABLE AND COMMON COSTS**

A cost is either traceable or common with respect to a particular segment.

Traceable costs arise because of the existence of the particular segment. Traceable costs would disappear if the segment itself disappeared.

Common costs support more than one business segment but are not traceable, in whole or in part, to any one of those segments.

## SEGMENT REPORTING EXAMPLE

### EXAMPLE:

Mary Fischer, the owner of Mary's Market, would like information concerning the performance of the Market's two main segments—the meat and produce departments.

The following partial list of costs was provided to help identify fixed and variable and traceable and common costs:

	<i>Meat Department</i>	<i>Produce Department</i>
• Variable costs	<ul style="list-style-type: none"> <li>• Wholesale cost of meats</li> <li>• Packaging materials</li> </ul>	<ul style="list-style-type: none"> <li>• Wholesale cost of produce</li> <li>• Plastic bags and ties</li> </ul>
• Traceable fixed costs	<ul style="list-style-type: none"> <li>• Meat department manager's salary</li> <li>• Butchers' wages *</li> <li>• Meat department depreciation *</li> <li>• Rent on meat department spaces**</li> </ul>	<ul style="list-style-type: none"> <li>• Produce department manager's salary</li> <li>• Workers' wages *</li> <li>• Produce department depreciation *</li> <li>• Rent on produce department spaces**</li> </ul>
• Common fixed costs	<ul style="list-style-type: none"> <li>• Rent on space occupied by general offices, checkout counters, etc.</li> <li>• General manager's salary</li> <li>• Accountant's salary</li> <li>• Checkout clerks' wages</li> <li>• Liability insurance premiums</li> </ul>	

\* Depending on circumstances, all or part of the indicated costs could be variable.

\*\* This assumes that the rent costs would be avoided if the department were eliminated.

**SEGMENT REPORTING EXAMPLE**

	<i>Total Company</i>	<i>Departments</i>	
		<i>Meats</i>	<i>Produce</i>
Sales .....	\$1,500,000	\$900,000	\$600,000
Variable expenses.....	<u>810,000</u>	<u>460,000</u>	<u>350,000</u>
Contribution margin .....	690,000	440,000	250,000
Traceable fixed expenses .....	<u>400,000</u>	<u>230,000</u>	<u>170,000</u> *
Divisional segment margin .....	290,000	<u>\$210,000</u>	<u>\$ 80,000</u>
Common fixed expenses not traceable to departments .....	<u>240,000</u>		
Net operating income .....	<u>\$ 50,000</u>		

	<i>Produce</i>	<i>Product Lines</i>	
		<i>Fresh Produce</i>	<i>Packaged Produce</i>
Sales .....	\$600,000	\$400,000	\$ 200,000
Variable expenses.....	<u>350,000</u>	<u>200,000</u>	<u>150,000</u>
Contribution margin .....	250,000	200,000	50,000
Traceable fixed expenses .....	<u>100,000</u>	<u>40,000</u>	<u>60,000</u>
Product line segment margin.....	150,000	<u>\$160,000</u>	<u>\$ (10,000)</u>
Common fixed expenses not traceable to product lines.....	<u>70,000</u>		
Divisional segment margin .....	<u>\$ 80,000</u>		

\* The \$170,000 in traceable fixed expenses for the Produce Department changes to \$100,000 traceable and \$70,000 common expenses when the Produce Department is further segmented by product lines.

**DANGERS IN ALLOCATING COMMON COSTS**

Common costs should not be allocated among segments. If common costs are allocated, the results can be misleading.

EXAMPLE: Suppose the common costs of Mary’s Market were allocated on the basis of sales (a frequently used allocation basis).

	<i>Total</i>	<i>Product Lines</i>	
	<i>Company</i>	<i>Meats</i>	<i>Produce</i>
Sales .....	\$1,500,000	\$900,000	\$600,000
Variable costs .....	<u>810,000</u>	<u>460,000</u>	<u>350,000</u>
Contribution margin.....	690,000	440,000	250,000
Traceable fixed costs .....	<u>400,000</u>	<u>230,000</u>	<u>170,000</u>
Divisional segment margin .....	290,000	210,000	80,000
Allocated common fixed costs.....	<u>240,000</u>	<u>144,000</u>	<u>96,000</u>
Net operating income .....	<u>\$ 50,000</u>	<u>\$ 66,000</u>	<u>\$(16,000)</u>

If the Produce Department were closed down because of its apparent loss, the company would suffer an overall loss as shown below:

	<i>Total</i>	<i>Product Lines</i>	
	<i>Company</i>	<i>Meats</i>	<i>Produce</i>
Sales .....	\$900,000	\$900,000	—
Variable costs .....	<u>460,000</u>	<u>460,000</u>	—
Contribution margin.....	440,000	440,000	—
Traceable fixed costs .....	<u>230,000</u>	<u>230,000</u>	—
Divisional segment margin .....	210,000	210,000	—
Allocated common fixed costs.....	<u>240,000</u>	<u>240,000</u>	—
Net operating income .....	<u>\$(30,000)</u>	<u>\$(30,000)</u>	—