

# Chapter 9: Absorption/Variable Costing

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## **ABSORPTION COSTING**

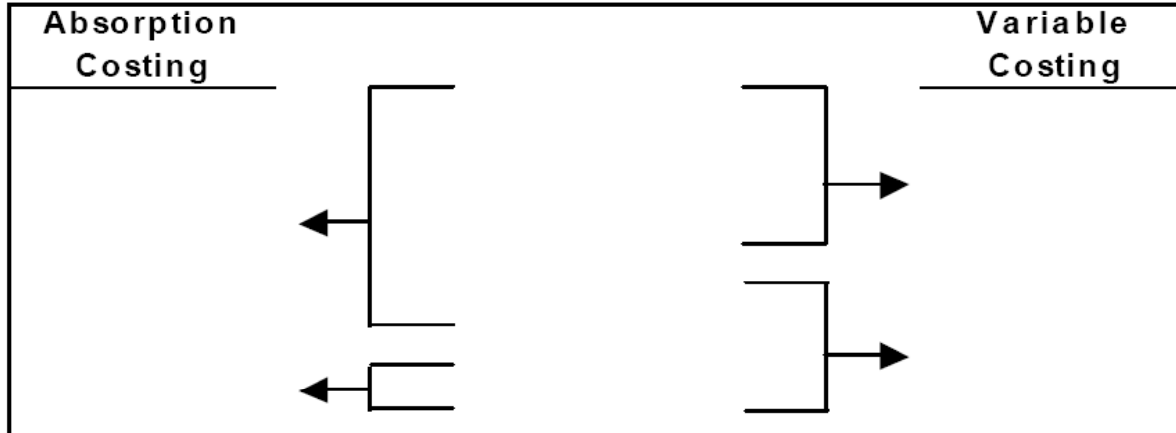
- Absorption costing is required for external financial reports and for tax reporting.
- Under absorption costing, product costs include **all** manufacturing costs:
  - Direct materials.
  - Direct labor.
  - Variable manufacturing overhead.
  - Fixed manufacturing overhead.
- Under absorption costing, 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.

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# Overview of Absorption and Variable Costing



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## Summary

Year	Relation between production and sales	Effect on inventory	Relation between variable and absorption income
1st year	Production > Sales 25,000 > 20,000	Inventory increases by 5,000 units.	Absorption > Variable
2nd year	Production < Sales 25,000 < 30,000	Inventory decreases to zero.	Absorption < Variable
Both years combined	Production = Sales 50,000 = 50,000	No change	Absorption = Variable

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Learning Objective 1: Identify what distinguishes variable costing. . . fixed manufacturing costs excluded from inventoriable costs from absorption costing. . . fixed manufacturing costs included in inventoriable costs

The main difference between variable costing and absorption costing is

- a. the treatment of nonmanufacturing costs.
- b. the accounting for variable manufacturing costs.
- c. the accounting for fixed manufacturing costs.
- d. their value for decision makers.

**[EXERCISE]** Last year, Nichols, Inc. had sales of 75,000 units and production of 100,000 units. Other information for the year included:

Direct manufacturing labor	\$187,500
Variable manufacturing overhead	100,000
Direct materials	150,000
Variable selling expenses	100,000
Fixed administrative expenses	100,000
Fixed manufacturing overhead	200,000

There was no beginning inventory.

Required:

- a. Compute the ending finished goods inventory under both absorption and variable costing.
- b. Compute the cost of goods sold under both absorption and variable costing.

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**[SOLUTION]**

a.		<u>Absorption</u>	<u>Variable</u>
	Direct materials	\$150,000	\$150,000
	Direct manufacturing labor	187,500	187,500
	Variable MOH	100,000	100,000
	Fixed MOH	<u>200,000</u>	<u>0</u>
	Total	<u>\$637,500</u>	<u>\$437,500</u>
	Unit costs:		
	\$637,500/100,000 units	\$6.375	
	\$437,500/100,000 units		\$4.375
	Ending inventory:		
	25,000 units x \$6.375	\$159,375	
	25,000 units x \$4.375		\$109,375
b.	Cost of goods sold:		
	75,000 x \$6.375	\$478,125	
	75,000 x \$4.375		\$328,125

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Learning Objective 2: Compute income under absorption costing (using the gross-margin format) and variable costing (using the contribution-margin format) and explain the difference in income. . . affected by the unit level of production and sales under absorption costing, but only by the unit level of sales under variable costing

[EXERCISE]

Bruster Company sells its products for \$66 each. The current production level is 25,000 units, although only 20,000 units are anticipated to be sold.

Unit manufacturing costs are:

Direct materials	\$12.00	
Direct manufacturing labor	\$18.00	
Variable manufacturing costs	\$9.00	
Total fixed manufacturing costs	\$180,000	
Marketing expenses	\$6.00 per unit,	
	plus \$60,000 per year	

Required:

- Prepare an income statement using absorption costing.
- Prepare an income statement using variable costing.

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[SOLUTION]

a. Absorption-costing income statement:

Sales (20,000 x \$66)		\$1,320,000
CGS (20,000 x \$46.20*)		<u>924,000</u>
Gross margin		\$396,000
Marketing:		
Variable (20,000 x \$6)	\$120,000	
Fixed	<u>60,000</u>	<u>180,000</u>
Operating income		<u>\$216,000</u>

\*  $\$12.00 + \$18.00 + \$9.00 + (\$180,000/25,000) = \$46.20$

b. Variable-costing income statement:

Sales (20,000 x \$66)		\$1,320,000
Variable costs:		
CGS (20,000 x \$39*)	\$780,000	
Marketing (20,000 x \$6)	<u>120,000</u>	<u>900,000</u>
Contribution margin		<u>\$420,000</u>
Fixed costs:		
Manufacturing	\$180,000	
Marketing	<u>60,000</u>	<u>240,000</u>
Operating income		<u>\$180,000</u>

\*  $\$12.00 + \$18.00 + \$9.00 = \$39$

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Learning Objective 3: Understand how absorption costing can provide undesirable incentives for managers to build up inventory . . . producing more units for inventory absorbs fixed manufacturing costs and increases operating income

Absorption costing enables managers to increase operating income in the short run by changing production schedules. Which statement is *true* regarding such action?

- a. The reason for increased operating income is the deferral of fixed manufacturing overhead contained in unsold inventory.
- b. A desirable effect of these changes in production is "cherry picking" the production line.
- c. This is done through decreases in the production schedule as customer demand for product falls.
- d. None of the above statements are true regarding manager's action to increase operating income through changes in the production schedule.

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Learning Objective 3: Understand how absorption costing can provide undesirable incentives for managers to build up inventory . . . producing more units for inventory absorbs fixed manufacturing costs and increases operating income

- One motivation for an undesirable buildup of inventories could be due to the fact that a manager's bonus is based on absorption-costing operating income.
- Top management can take several steps to reduce the undesirable effects of absorption costing.
  - Focus on careful budgeting and inventory planning to reduce management's freedom to build up excess inventory.
  - Incorporate a "carrying charge" for inventory in the internal accounting system.
  - Change the period to evaluate performance. Instead of quarterly or annual horizon, evaluate the manager over a three-to-five year period.
  - Include nonfinancial as well as financial variables in the measures of performance evaluation.

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Learning Objective 4: Differentiate throughput costing (direct material costs inventoried) from variable costing (variable manufacturing costs inventoried) and absorption costing (variable and fixed manufacturing costs inventoried)

Absorption		Variable		Throughput	
Sales	500	Sales	500	Sales	500
CGS	120	VC	155	DM	50
Gross Profit	380	Contr. Margin	345	Through Margin	450
S & A exp	350	FC	315	Op ex	420
Profit	<u>30</u>	Profit	<u>30</u>	Profit	<u>30</u>

- In the very short run, many variable costs do behave as though they were fixed.
  - For example, consider a restaurant. When a server comes on duty, that server will likely work until the end of the shift.
  - Even though business may fluctuate and the server may not stay busy the entire time, the employer is on the hook for 8 hours pay.
  - The employer cannot (from a practical standpoint) tell the employee to take an hour off because business is slow.
  - Thus, the server's wages for the day are in a very real sense, fixed.

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Learning Objective 5: Describe the various capacity concepts that can be used in absorption costing. . . theoretical capacity, practical capacity, normal capacity utilization, and master-budget capacity utilization

1. Determining the appropriate level of capacity is one of the most strategic and difficult decisions managers face. Too much capacity means incurring costs of unused capacity. Too little capacity means that demand may go unfilled.
2. Four different capacity levels are used to compute the budgeted fixed manufacturing cost rate. They are:
  - Theoretical capacity
  - Practical capacity
  - Normal capacity utilization
  - Master-budget capacity utilization
3. **Theoretical capacity** is the level of capacity based on producing at full efficiency all the time. This measure of capacity does not allow for plant maintenance, shutdowns, interruptions, or any other factors. Theoretical capacity may be achieved for short periods of time, but it cannot be sustained. Theoretical capacity represents an ideal goal of capacity utilization.

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Learning Objective 5: Describe the various capacity concepts that can be used in absorption costing. . . theoretical capacity, practical capacity, normal capacity utilization, and master-budget capacity utilization

4. **Practical capacity** is the level of capacity that reduces theoretical capacity by considering unavoidable operating interruptions—scheduled maintenance or holidays, for example.
5. **Normal capacity** is the level of capacity utilization that satisfies average customer demand over a period of time—often two to three years.
6. **Master-budget capacity utilization** is the level of capacity that managers expect for the current time period, frequently one year.
7. Theoretical and practical capacity measure capacity in terms of what a plant can supply. Normal capacity and master-budget utilization measure capacity in terms of demand.
8. The capacity level chosen will affect the budgeted fixed overhead cost rate. As a lower capacity level is chosen, the fixed cost per unit increases.

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### Variable vs. Absorption Costing Problem

The Zwatch Company manufactures trendy, high-quality moderately priced watches. As Zwatch's senior financial analyst, you are asked to recommend a method of inventory costing. The CFO will use your recommendation to construct Zwatch's 2004 income statement. The following data are for the year ended December 31, 2004:

Beginning inventory, January 1, 2004	85,000 units
Ending inventory, December 31, 2004	34,500 units
2004 sales	345,400 units
Selling price (to distributor)	\$22.00 per unit
Variable mnc cost per unit, incl. DM	\$5.10 per unit
Variable operating cost per unit sold	\$1.10 per unit sold
Fixed MOH	\$1,440,000
Denominator-level machine-hours	6,000
Standard production rate	50 units per machine-hour
Fixed operating costs	\$1,080,000

Assume standard costs per unit are the same for units in beginning inventory and units produced during the year. Also, assume no price, spending, or efficiency variances.

1. Prepare income statements under variable and absorption costing for the year ended December 31, 2004.
2. What is Zwatch's operating income under each costing method (in percentage terms)?
3. Explain the difference in operating income between the two methods.
4. Which costing method would you recommend to the CFO? Why?

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## Solution

### Income Statement for the Zwatch Company, Variable Costing For the Year Ended December 31, 2004

Revenues: $\$22 \times 345,400$	\$7,598,800
Variable costs	
Beginning inventory: $\$5.10 \times 85,000$	\$ 433,500
Variable manufacturing costs: $\$5.10 \times 294,900$	<u>1,503,990</u>
Cost of goods available for sale	1,937,490
Deduct ending inventory: $\$5.10 \times 34,500$	<u>175,950</u>
Variable cost of goods sold	1,761,540
Variable operating costs: $\$1.10 \times 345,400$	<u>379,940</u>
Total variable costs (at standard costs)	2,141,480
Adjustment for variances	<u>0</u>
Total variable costs	<u>2,141,480</u>
Contribution margin	5,457,320
Fixed costs	
Fixed manufacturing overhead costs	1,440,000
Fixed operating costs	1,080,000
Adjustment for fixed cost variances	<u>0</u>
Total fixed costs	<u>2,520,000</u>
Operating income	<u><u>\$2,937,320</u></u>

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## Solution

### Absorption Costing Data

Fixed MOH allocation rate =  $\text{FMOH} / \text{Denominator level MHs} = \$1,440,000 / 6,000$   
= \$240 per machine-hour

Fixed MOH allocation rate per unit =  $\text{FMOH allocation rate} / \text{standard production rate} = \$240 / 50 = \$4.80$  per unit

### Income Statement for the Zwatch Company, Absorption Costing For the Year Ended December 31, 2004

Revenues: $\$22 \times 345,400$	\$7,598,800
Cost of goods sold	
Beginning inventory $(\$5.10 + \$4.80) \times 85,000$	\$ 841,500
Variable manuf. costs: $\$5.10 \times 294,900$	1,503,990
Fixed manuf. costs: $\$4.80 \times 294,900$	<u>1,415,520</u>
Cost of goods available for sale	\$3,761,010
Deduct ending inv: $(\$5.10 + \$4.80) \times 34,500$	(341,550)
Adjust for manuf. variances $(\$4.80 \times 5,100)^a$	<u>24,480</u>
Cost of goods sold	<u>3,443,940</u>
Gross margin	4,154,860
Operating costs	
Variable operating costs: $\$1.10 \times 345,400$	\$ 379,940
Fixed operating costs	1,080,000
Adjust for operating cost variances	<u>0</u>
Total operating costs	<u>1,459,940</u>
Operating income	<u><u>\$2,694,920</u></u>

<sup>a</sup> Production volume variance  
=  $[(6,000 \text{ hours} \times 50) - 294,900] \times \$4.80$   
=  $(300,000 - 294,900) \times \$4.80$   
= \$24,480

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## Solution

Zwatch's pre-tax profit margins –

<u>Under variable costing:</u>		<u>Under absorption costing:</u>	
Revenues	\$7,598,800	Revenues	\$7,598,800
Operating income	2,937,320	Operating income	2,694,920
Pre-tax profit margin	38.7%	Pre-tax profit margin	35.5%

3. Operating income using variable costing is about 9% higher than operating income calculated using absorption costing.

$$\text{Variable costing operating income} - \text{Absorption costing operating income} = \\ \$2,937,320 - \$2,694,920 = \$242,400$$

$$\text{Fixed manufacturing costs in beginning inventory under absorption costing} - \\ \text{Fixed manufacturing costs in ending inventory under absorption costing} = \\ (\$4.80 \times 85,000) - (\$4.80 \times 34,500) = \$242,400$$

4. The factors the CFO should consider include:
- Effect on managerial behavior, and
  - Effect on external users of financial statements.

Absorption costing has many critics. However, the dysfunctional aspects associated with absorption costing can be reduced by:

- Careful budgeting and inventory planning,
- Adding a capital charge to reduce the incentives to build up inventory, and
- Monitoring nonfinancial performance measures.

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## Variable vs. Absorption Costing Problems

Osawa, Inc., planned and actually manufactured 200,000 units of its single product in 2004, its first year of operation. Variable manufacturing costs was \$20 per unit produced. Variable operating cost was \$10 per unit sold. Planned and actual fixed manufacturing costs were \$600,000. Planned and actual fixed operating costs totaled \$400,000 in 2004. Osawa sold 120,000 units of product in 2004 at \$40 per unit.

1. Osawa's 2004 operating income using absorption costing is:

- \$440,000
- \$200,000
- \$600,000
- \$840,000
- None of these.

2. Osawa's 2004 operating income using variable costing is:

- \$800,000
- \$440,000
- \$200,000
- \$600,000
- None of these.

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## Solution

1. Osawa's 2004 operating income using absorption costing is:

a. **\$440,000**

1. Absorption Costing:

Revenues <sup>a</sup>		\$4,800,000
Cost of goods sold:		
Variable manufacturing costs <sup>b</sup>	\$2,400,000	
Fixed manufacturing costs <sup>c</sup>	<u>360,000</u>	<u>2,760,000</u>
Gross margin		2,040,000
Operating costs:		
Variable operating <sup>d</sup>	1,200,000	
Fixed operating	<u>400,000</u>	<u>1,600,000</u>
Operating income		<u>\$ 440,000</u>

a  $\$40 \times 120,000$

b  $\$20 \times 120,000$

c Fixed manufacturing rate =  $\$600,000 \div 200,000 = \$3$  per output unit

Fixed manufacturing costs =  $\$3 \times 120,000$

d  $\$10 \times 120,000$

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## Solution

1. Osawa's 2004 operating income using variable costing is:

c. **\$200,000**

2. Variable Costing:

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Revenues <sup>a</sup>		\$4,800,000
Variable costs:		
Variable manufacturing cost of goods sold <sup>b</sup>	\$2,400,000	
Variable operating costs <sup>c</sup>	<u>1,200,000</u>	<u>3,600,000</u>
Contribution margin		1,200,000
Fixed costs:		
Fixed manufacturing costs	600,000	
Fixed operating costs	<u>400,000</u>	<u>1,000,000</u>
Operating income		<u>\$ 200,000</u>

a  $\$40 \times 120,000$

b  $\$20 \times 120,000$

c  $\$10 \times 120,000$

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ABC, Inc. produced 50,000 widgets but only sold 45,000 widgets in its first year. Shown below is ABC's cost structure:

	VC per widget	Total FC for the year
Manufacturing Cost	\$55.20	\$638,000
Selling & Administrative	\$13.50	\$456,000

ABC's gross margin in this first year was \$1,889,000 and their contribution margin was \$1,855,700. Construct an absorption income statement and a variable costing income statement for ABC, Inc.

Absorption Costing		Variable Costing	
S	<input type="text"/>	<input type="text"/>	S
CGS	<input type="text"/>	<input type="text"/>	VC
GP	<input type="text"/>	<input type="text"/>	CM
S&A	<input type="text"/>	<input type="text"/>	FC
NI <sub>ABS</sub>	<input type="text"/>	<input type="text"/>	NI <sub>VC</sub>

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ABC, Inc. produced 50,000 widgets but only sold 45,000 widgets in its first year. Shown below is ABC's cost structure:

FG (units)		VC per widget	Total FC for the year	FMOH
50,000 Produced	Manufacturing Cost	\$55.20	\$638,000	$\frac{\$638,000}{50,000 \text{ produced}} = \$12.76 \text{ per widget produced}$
45,000 Sold		Selling & Administrative	\$13.50	
5,000 not sold		<u>\$68.70</u>	<u>\$1,094,000</u>	

ABC's gross margin in this first year was \$1,889,000 and their contribution margin was \$1,855,700. Construct an absorption income statement and a variable costing income statement for ABC, Inc.

Absorption Costing		Variable Costing	
S	4,947,200	4,947,200	S
CGS	3,058,200	3,091,500	VC
GP	1,889,000	1,855,700	CM
S&A	$\begin{matrix} \text{V. } 607,500 \\ \text{F. } 456,000 \end{matrix}$	1,094,000	FC
NI <sub>ABS</sub>	825,500	761,700	NI <sub>VC</sub>

$45,000 \text{ sold} \times (\text{Var. Mfg. } 55.20 + \text{FMOH } 12.76)$

$\Delta = \$63,800 = \$12.76 \times 5,000 \text{ widgets not sold}$

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