

# Online Course Manual

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## Module 5

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## Module 5 Summary

### I. Variable Costing and Absorption Costing.

- A. **Variable costing** (also called *direct costing*) is a product costing method that is very useful in decision-making. It is often applied in decision models and in reports created for internal use.
1. Under a variable costing approach only *variable* labor, materials and overhead costs (the *direct costs*) are applied to production and become part of inventory and COGS (i.e., *product costs*); while the fixed costs are recorded as expenses of the period (*period costs*).
  2. Variable costing is not allowed for income tax reporting and is not acceptable under GAAP. Because of its usefulness in decision-making, it is often the basis for internal reports prepared for managers.
- B. The method that is acceptable for public reporting and tax accounting is the method that we have used in this course to date – the **absorption costing** (also called *full costing*) method. Here, the fixed factory overhead costs are applied to production along with the variable cost.
- C. Since the fixed manufacturing costs are treated differently in the two approaches, the reported cost of goods sold, gross profit and net income will differ depending on the method used.

*Here's an Example!*

To illustrate these differences, assume that Coal Company produces 100,000 units of a product and sells 50,000 of them. Other information follows:

Selling price	\$5 per unit sold
Variable costs	\$2 per unit produced
Fixed Manufacturing Costs	\$100,000 (or \$1 per unit produced)
Variable Operating expenses	\$.10 per unit sold
Fixed Operating Expenses	\$5,000

The computed *unit cost* will differ under absorption and variable costing because of the way that fixed costs are handled. Since the fixed cost of \$1 per unit are not applied to production under variable costing, the unit cost will be \$1 less if that method is used than it is under absorption costing.

	Variable <u>Costing</u>	Absorption <u>Costing</u>
Variable costs	\$2	\$2
Fixed costs	<u>0</u>	<u>1</u>
Total cost per unit	\$2	\$3



Click the link below to play a video that illustrates and discusses this example and the other illustrations shown in the sections below.

[Link to Variable Cost Examples](#)

*Example, Continued*

Since the unit product costs are different, the period costs, COGS, and inventory balances will be different, too. Therefore, unless all the units are sold, the net income figures will not be the same. The income statements prepared using both methods follow:

Income Statement Period 1 Variable Costing		
Sales (50,000 x \$5)		250,000
COGS (50,000 x \$2)		<u>100,000</u>
Gross Profit		150,000
Fixed OH Expenses	100,000	
Variable Operating Expenses (50,000 x \$.10)	5,000	
Fixed Operating Exp.	<u>5,000</u>	<u>110,000</u>
Net Income		<u>40,000</u>
Ending Finished Goods Inventory = \$100,000		

Income Statement Period 1 Absorption Costing		
Sales (50,000 x \$5)		250,000
COGS (50,000 x \$3)		<u>150,000</u>
Gross Profit		100,000
Variable Operating Expenses (50,000 x \$.10)	5,000	
Fixed Operating Exp.	<u>5,000</u>	<u>10,000</u>
Net Income		<u>90,000</u>
Ending Finished Goods Inventory = \$150,000		

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**II. Why Are They Different? – Fixed Costs Deferred.** Note in the example above that the \$50,000 difference in income is explained solely by the way that the fixed overhead costs are handled.

- A. Under variable costing, none of the fixed costs “attach” to inventory and instead simply appear as expense on the statement. Under absorption costing, \$1 of fixed overhead is applied to the 100,000 units produced. Since only 50,000 units were sold, the \$1 of fixed costs applied to the other 50,000 units that were *not sold* (i.e., the ending finished goods inventory) does not appear in COGS for the period. This results in \$50,000 less COGS reported for the period, and a net income figure that is \$50,000 higher.
- B. The cost of the 50,000 units in ending inventory is \$2 per unit under variable costing, and \$3 under absorption costing. The extra \$1 per unit produced by absorption costing will remain on the balance sheet as part of the cost of the inventory, and will not appear on the income statement (as part of COGS) until these units are sold

- C. Note that net income and inventory valuations will be equal only if all the units produced in the period are sold. In that case, no overhead cost is deferred since no inventory remains unsold. The income statements from above, this time prepared under the assumption that all of the 100,000 units produced were sold, are presented below:

Income Statement Period 1 Variable Costing			Income Statement Period 1 Absorption Costing		
Sales (100,000 x \$5)		500,000	Sales (100,000 x \$5)		500,000
COGS (100,000 x \$2)		<u>200,000</u>	COGS (100,000 x \$3)		<u>300,000</u>
Gross Profit		300,000	Gross Profit		200,000
Fixed OH Expenses	100,000				
Variable Operating Expenses (100,000 x \$.10)	10,000		Variable Operating Expenses (100,000 x \$.10)	10,000	
Fixed Operating Exp.	<u>5,000</u>	<u>115,000</u>	Fixed Operating Exp.	<u>5,000</u>	<u>15,000</u>
Net Income		<u>185,000</u>	Net Income		<u>185,000</u>
Ending Finished Goods Inventory = \$0			Ending Finished Goods Inventory = \$0		

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**III. Fixed Costs Released from Inventory.** We just saw that absorption costing and variable costing produce different COGS, net income, and inventory valuation balances when inventory levels rise. The same thing happens when inventory balances fall.

- A. Recall that Coal Company in the example above ended period 1 with 50,000 units in finished goods inventory. Assume that 50,000 more units are produced during period 2, and they, along with the finished goods inventory, are all sold. Note that fixed manufacturing costs are now applied at \$2 per unit under absorption costing since only 50,000 units were produced ( $\$100,000 \div 50,000 \text{ units} = \$2 \text{ per unit}$ ). Therefore, these new units will be costed at \$4 each under absorption costing. The following facts apply:

Units Produced	50,000
Units Sold	100,000
Selling price	\$5 per unit
Variable costs	\$2 per unit
Fixed manufacturing costs	\$100,000 (or \$2/unit)
Variable operating expenses	\$ 10,000
Fixed operating expenses	\$ 5,000

- B. Now the income statements under variable and absorption costing appear as shown below:

Income Statement Period 2 Variable Costing			Income Statement Period 2 Absorption Costing		
Sales (100,000 x \$5)		500,000	Sales (100,000 x \$5)		500,000
COGS (50,000 produced x \$2)+(50,000 from beg. inventory x \$2)		<u>200,000</u>	COGS (50,000 produced x \$4)+(50,000 from beg. Inventory x \$3)		<u>350,000</u>
Gross Profit		300,000	Gross Profit		150,000
Fixed OH Expenses	100,000				
Variable Operating Expenses (100,000 x \$.10)	10,000		Variable Operating Expenses (100,000 x \$.10)	10,000	
Fixed Operating Exp.	<u>5,000</u>	<u>115,000</u>	Fixed Operating Exp.	<u>5,000</u>	<u>15,000</u>
Net Income		<u>185,000</u>	Net Income		<u>135,000</u>
Ending Finished Goods Inventory = \$0			Ending Finished Goods Inventory = \$0		

- C. Note that the difference in net income is again \$50,000, but this time net income is higher under variable costing than it is under absorption costing. This happens because the \$50,000 of fixed costs that were *deferred* in inventory in period 1 under the absorption method have been ***released from inventory*** in period 2, the period in which the goods were sold. This results in \$50,000 more expense reported on the income statement and \$50,000 less income.
- D. Note also that the total net income reported for the two periods sums up to the same amount no matter which method is used:

$$\text{Total Income Under Variable Costing} = \$40,000 + \$185,000 = \underline{\underline{\$225,000}}$$

$$\text{Total Income Under Absorption Costing} = \$90,000 + \$135,000 = \underline{\underline{\$225,000}}$$

Therefore, once the deferred fixed costs absorbed in inventory are finally released, both variable costing and absorption costing produce the same results. The difference in the methods revolves around the *timing* of the recognition of fixed costs on the income statement. Under variable costing, fixed costs are recognized in the period they are incurred; under absorption costing the fixed costs are recognized in the period the goods they were incurred to produce are sold.

**IV. Contribution Margin Format Income Statements** were introduced in the previous module. They are simply rearrangements of the traditional income statement and report the same income figures. All variable costs, including

variable selling and administrative costs, are grouped together and subtracted from sales revenue so that contribution margin can be reported on the statement. This is illustrated below for the variable cost and absorption cost income statements above. In this format it is easy to see that contribution margin is the same under the two methods, and that it is only the amounts of fixed overhead cost reported on the statements that are responsible for the differences in net income.

- A. Either absorption cost or variable cost income statements may be prepared in contribution margin formats, but it is awkward to apply the format to absorption cost statements. Contribution margin formats are most often associated with variable costing.
- B. If the statement is set up so that the variable production costs (labeled *Variable COGS* in the illustrated statements below) are subtracted from *Sales*, the resulting figure cannot be called *Contribution Margin* because the variable operating expenses have not yet been subtracted. It is instead called ***Manufacturing Margin***, equal to sales revenue minus variable production costs. Note that the income statement does not *have* to be formatted in this way. The remaining illustrations in this module do not report the *manufacturing margin*.
- C. The examples below are a reconstruction of the variable cost and absorption cost income statements from above, done in contribution margin format and set up to report *manufacturing margin*.

Contribution Margin Income Statement		
Period 1		
Variable Costing		
Sales (50,000 x \$5)		250,000
COGS (50,000 x \$2 Variable OH per unit)		<u>100,000</u>
Manufacturing Margin		150,000
Variable Operating Exp.		<u>5,000</u>
Contribution Margin		145,000
Fixed OH Expenses	100,000	
Fixed Operating Exp.	<u>5,000</u>	<u>105,000</u>
Net Income		<u>40,000</u>
Ending Finished Goods Inventory = \$100,000		

Contribution Margin Income Statement		
Period 1		
Absorption Costing		
Sales (50,000 x \$5)		250,000
Variable OH in COGS (50,000 x \$2)		<u>100,000</u>
Manufacturing Margin		150,000
Variable Operating Exp.		<u>5,000</u>
Contribution Margin		145,000
Fixed OH in COGS (50,000 x \$1)	50,000	
Fixed Operating Exp.	<u>5,000</u>	<u>55,000</u>
Net Income		<u>90,000</u>
Ending Finished Goods Inventory = \$150,000		

Contribution Margin Income Statement		
Period 2		
Variable Costing		
Sales (100,000 x \$5)		500,000
COGS (50,000 produced x \$2)+(50,000 from beg. inventory x \$2)	200,000	
Variable Operating Exp.	<u>10,000</u>	<u>210,000</u>
Contribution Margin		290,000
Fixed OH Expenses	100,000	
Fixed Operating Exp.	<u>5,000</u>	<u>105,000</u>
Net Income		<u>185,000</u>
Ending Finished Goods Inventory = \$0		

Contribution Margin Income Statement		
Period 2		
Absorption Costing		
Sales (100,000 x \$5)		500,000
Variable COGS (50,000 produced x \$2)+(50,000 from beg. Inventory x \$2)	200,000	
Variable Operating Exp.	<u>10,000</u>	<u>210,000</u>
Contribution Margin		290,000
Fixed OH (50,000 produced x \$2 + 50,000 from beg. Inventory x \$1)	150,000	
Fixed Operating Exp.	<u>5,000</u>	<u>155,000</u>
Net Income		<u>135,000</u>
Ending Finished Goods Inventory = \$0		

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**V. Variable Costing versus Absorption Costing.** Though it is not acceptable for public reporting or income tax reporting purposes, variable costing does provide advantages over absorption costing.

A. ***Reported net income is consistent with CVP analysis results.*** The deferral of fixed costs in inventory under the absorption costing method can result in distorted income statements that do not agree with the results of break-even analyses.

- For example, recall that the units produced by Coal Company in the examples above had a selling price of \$5 per unit with variable manufacturing costs of \$2. Variable operating expenses were \$.10 per unit sold. Therefore, the contribution margin per unit is \$2.90 (\$5.00 – 2.10), and the break-even point is 36,207 units (\$105,000 total fixed costs ÷ \$2.90).
- What if, during period 1, the company produced 100,000 units but, because of product obsolescence, sold only 36,000? Since the company is operating below its break-even point, we should expect that a loss will be reported for the period. The absorption cost and variable cost income statements for the period differ significantly, with the absorption-cost statement actually reporting net income for the period (see below).

Contribution Margin Income Statement Period 1 Variable Costing		
Sales (36,000 x \$5)		180,000
COGS (36,000 x \$2)	72,000	
Variable Operating Exp.	<u>3,600</u>	<u>75,600</u>
Contribution Margin		104,400
Fixed OH Expenses	100,000	
Fixed Operating Exp.	<u>5,000</u>	<u>105,000</u>
Net Loss		(600)
Ending Finished Goods Inventory = \$128,000		

Contribution Margin Income Statement Period 1 Absorption Costing		
Sales (36,000 x \$5)		180,000
Variable OH in COGS (36,000 x \$2)	72,000	
Variable Operating Exp.	<u>3,600</u>	<u>75,600</u>
Contribution Margin		104,400
Fixed OH in COGS (36,000 x \$1)	36,000	
Fixed Operating Exp.	<u>5,000</u>	<u>41,000</u>
Net Income		63,400
Ending Finished Goods Inventory = \$192,000		

3. What did happen during the period? Did the company make a profit of \$63,400 or did it lose \$600? The difference in reported income is equal to the \$64,000 (64,000 units x \$1 per unit) of fixed manufacturing costs that are applied to inventory under absorption costing. The deferral of these costs produces a large net income figure instead of the expected loss, which can mislead both managers and stockholders. They may believe that the company is operating very profitably when in fact the profits will not be realized unless the goods that have accumulated in inventory can be sold.
  - B. Profit reported under variable costing method is not affected by changes in inventory levels. This means that unintended buildups or draw-downs of inventory levels cannot produce a misleading income figure. It also means that income cannot be manipulated through intentional inventory building or liquidation.
  - C. Why is absorption costing acceptable under GAAP while variable costing is not?
    1. Supporters of absorption costing argue that the fixed manufacturing costs are incurred in order to manufacture the product, and are therefore product costs and not period costs. Recording these costs as part of the inventory balance ensures that they will be properly matched against revenues when these units are sold. Expensing fixed costs when incurred can result in mismatched expenses and revenues on the income statement and lead to distortions, they would say.



2. Supporters of variable costing argue that fixed costs are not incurred directly to manufacture products. They are incurred to *facilitate* production and are, therefore, more a cost of the period (a cost of maintaining the *capacity* to produce) than a direct cost of manufacturing the product. They point out that distortions of the income statement can happen just as easily with absorption costing methods as they can with variable costing methods.
3. The debate will continue, but in the meantime it is common to see variable costing used for internal reporting while absorption costing is used for public reporting purposes.

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## VI. Contribution Margin Reporting.

- A. ***Segments and Segment Reports.*** Since decisions are made by several decision-makers in decentralized organizations, ways must be found to evaluate decisions and the managers who make them. Decentralized organizations do this by dividing the operation into individual *segments* for which records are kept. Segment reports may then be prepared for evaluation purposes.
- B. ***Segment Reporting.*** Segments may represent different geographical regions, product lines, departments, and so on. Reports must be prepared for them so they can be analyzed and evaluated.
  1. Segments may be defined in many different ways with reports prepared accordingly. For example, individual production department reports may be prepared, product-line reports may be created, or reports may be prepared for individual work cells. The company would probably prepare all three sets of reports and others as well for use in managing overall operations.
  2. ***Controllable and Uncontrollable Fixed Costs.*** Revenues and variable costs can usually be traced directly to the segment for which the report is being prepared. Fixed costs, though, may not be a direct cost of any particular segment.
    - a. ***Controllable Fixed Costs*** are those that can be “traced” directly to the segment. They would not exist if the segment did not exist, so it is fair to include them among the costs for which the segment manager is responsible.
    - b. ***Uncontrollable Fixed Costs*** are those that benefit all the segments of the organization. They cannot be traced to any individual segment, so it is *not* appropriate to include them among the costs for which the segment manager is responsible.
  3. The contribution margin income statement prepared for a segment should list only those costs for which the segment manager is responsible. This means that only the segment’s variable costs and its controllable fixed costs should appear on the segment

report and be used to determine the segment’s contribution margin and profit. A company-wide income statement combined with segment information would follow this format:

	Segment A	Segment B	Total
Sales Revenue	\$X	\$X	\$X
Controllable Variable Costs	(X)	(X)	(X)
Contribution Margin	X	X	X
Controllable Fixed Costs	(X)	(X)	(X)
Segment Income	X	X	X

4. The variable and controllable fixed costs assigned to segments should include **all** the costs in the *value chain* that are attributable to the segment. **The value chain** is the “chain” of value-adding activities that the company completes in order to produce a finished product.
  - a. Note that these activities include non-manufacturing costs as well as manufacturing costs. The goal is to match all the costs generated by the segment against its revenues.
  - b. “**Upstream**” costs (product design, research and development, etc.) as well as “**downstream**” costs (marketing and distribution) are selling and administrative expenses that should be included, along with manufacturing costs, in determining segment margin.
5. Costs must be assigned to segments appropriately if the segment margin is to be a meaningful figure. **Cross-subsidization** is a term that refers to misapplications of cost across segment lines. This distorts segment margins and leads to evaluation errors.

**C. Analyzing Segment Contribution Margin.** Once a period has passed and the segment reports have been prepared, the segments’ contribution margins may be thoroughly examined. This may provide insights that are helpful in managing the segments and evaluating their managers.

1. All companies budget for future periods, and this requires that they establish production targets and cost estimates for the coming period.
2. Suppose the *budgeted* income statement, and the actual results, for the Sporting Goods division of Apex Industries appears as follows:

Sporting Goods Division <i>Budgeted</i> Income Statement (Variable Costing)		
Sales (36,000 x \$5)		180,000
COGS (36,000 x \$2)	72,000	<u>72,000</u>
Contribution Margin		108,000
Fixed OH Expenses	90,000	
Fixed Operating Exp.	<u>10,000</u>	<u>100,000</u>
Segment Income		8,000

Sporting Goods Division <i>Actual</i> Income Statement (Variable Costing)		
Sales (40,000 x \$4)		160,000
COGS (40,000 x \$1.75)		<u>70,000</u>
Contribution Margin		90,000
Fixed OH Expenses	90,000	
Fixed Operating Exp.	<u>10,000</u>	<u>100,000</u>
Segment Loss		(10,000)

3. Since the Sporting Goods division has run a loss rather than the expected profit and since the fixed costs were exactly as expected, the segment's contribution margin might be analyzed to attempt to identify the causes of the loss. The contribution margin can be broken into two pieces for analysis: the *quantity factor* and the *price/cost factor*.
- a. The *quantity factor* looks at the effect of the difference in the quantity of units that were expected to be produced and sold versus those that actually were. *It is based on the original, budgeted sales price and cost estimates.*

Quantity Factor Effect			
<b>Actual Units Sold</b>	<b>40,000</b>		
<b>Budgeted Units</b>	<b><u>36,000</u></b>		
<b>Additional Units Sold</b>	<b>4,000</b>		
<b>x Budgeted Sales Price</b>	<b><u>\$5.00</u></b>	<b>= \$20,000</b>	<b>Revenue Quantity Factor</b>
<b>Additional Units Sold</b>	<b>4,000</b>		
<b>x Budgeted Variable Cost</b>	<b><u>\$2.00</u></b>	<b>= (8,000)</b>	<b>Cost Quantity Factor</b>
		<b>\$12,000</b>	<b>Total Quantity Factor</b>

- b. The *price/cost factor* looks at the effect of the difference in the price that was expected to be received for the units versus the price that actually was; and/or the cost at which it was expected the units would be produced versus the cost at which they actually were. *It is based on the actual quantity that was sold:*

<b>Price/Cost Factor Effect</b>			
<b>Actual Sales Price</b>	<b>\$4.00</b>		
<b>Budgeted Sales Price</b>	<b><u>\$5.00</u></b>		
<b>Difference in Price</b>	<b>\$(1.00)</b>		
<b>x Actual Units Sold</b>	<b><u>40,000</u></b>	<b>=\$(40,000)</b>	<b>Revenue Price Factor</b>
<b>Budgeted COGS</b>	<b>\$2.00</b>		
<b>Actual COGS</b>	<b><u>\$1.75</u></b>		
<b>Difference in COGS</b>	<b>\$0.25</b>		
<b>x Actual Units Sold</b>	<b><u>40,000</u></b>	<b>= \$10,000</b>	<b>COGS Cost Factor</b>
		<b>\$(30,000)</b>	<b>Total Price/Cost Factor</b>

- c. We can now clearly see the following:
1. The \$18,000 unfavorable difference between budgeted income and actual results occurred despite better-than-expected production and sales. In fact, selling 40,000 units rather than just 36,000 had a \$12,000 overall favorable quantity factor effect.
  2. The culprit was the unfavorable selling price (\$4 per unit instead of \$5) which more than offset a favorable decline in the cost of production (\$1.75 versus \$2), and resulted in an overall negative price/cost factor effect of \$30,000.
  3. Together the two factors explain the \$18,000 unfavorable difference between the income that was budgeted and the income that was earned. In this case a \$12,000 favorable quantity factor minus a \$30,000 unfavorable price/cost factor produced the \$18,000 negative overall effect.

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