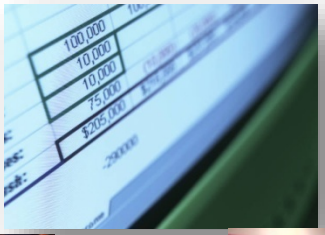

Absorption Costing and Variable Costing

Chapter 6

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Learning Objectives

- Explain how variable costing differs from absorption costing and compute unit product costs under each method.
- Understand the advantages and disadvantages of both variable and absorption costing.
- Methods to analyze mixed costs.
- The contribution format for the income statement.

Absorption Costing

- Required by GAAP for external reporting
- Assign all manufacturing costs (DM, DL, Variable MOH and Fixed MOH) to products
- Traditional income statement

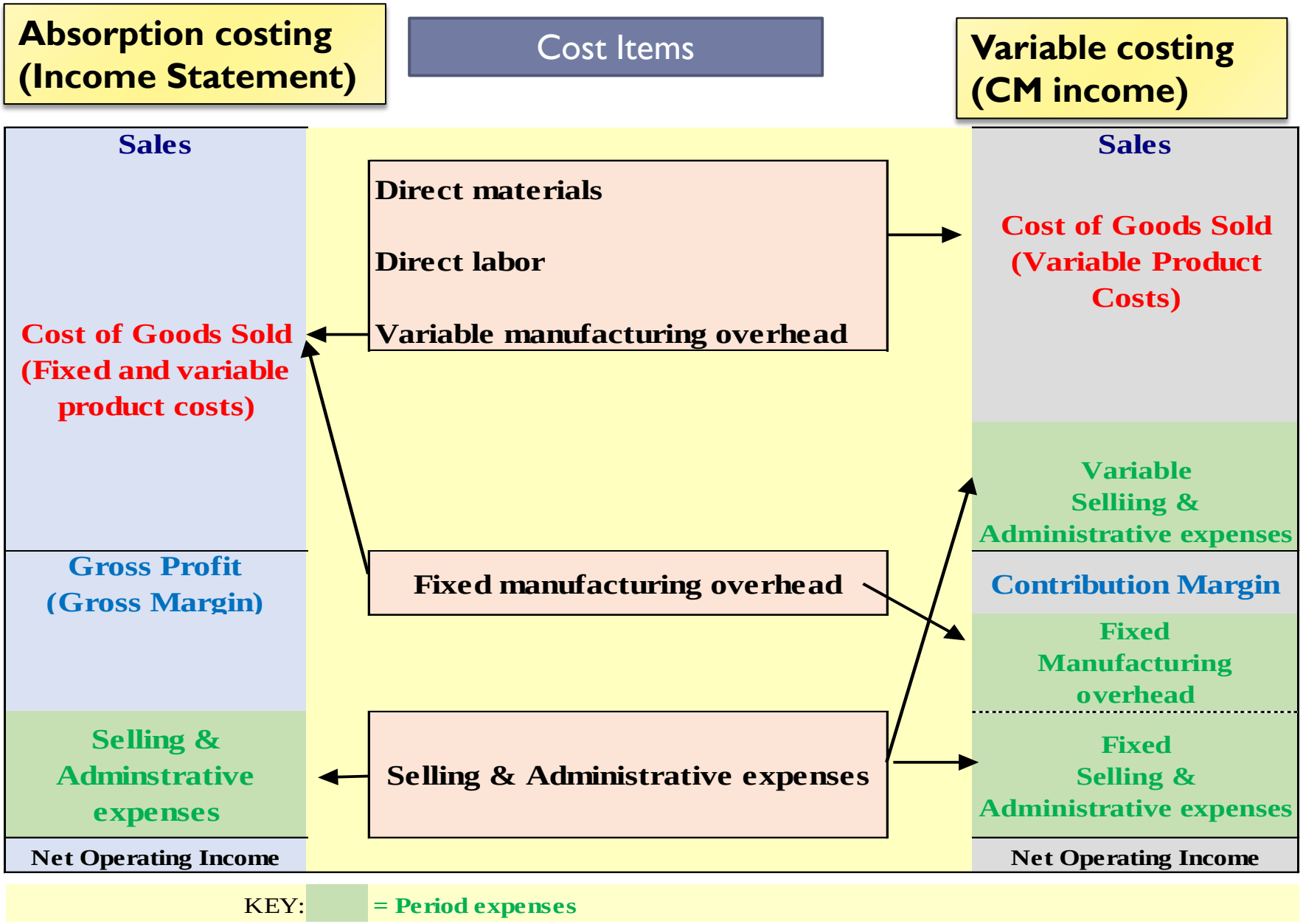
One key concept: Matching principle under GAAP for external reporting

The **matching principle** states that all expenses must be matched in the same accounting period as the revenues they helped to earn.

Variable Costing

- For internal management decisions Only
- Assigns only **variable** manufacturing costs (DM, DL, Variable MOH) to products
- Fixed MOH = period cost
  = expensed in the period as it incurs
- Contribution Margin Income Statement

  ➢ Variable non-manufacturing costs (e.g., variable selling expenses) are used for the calculation of contribution margin (CM).


Absorption costing (Income Statement)
Cost Items
Variable costing (CM income)
Sales
Direct materials
Direct labor
Variable manufacturing overhead
Cost of Goods Sold (Variable Product Costs)
Sales
Cost of Goods Sold (Fixed and variable product costs)
Variable Selliing & Administrative expenses
Gross Profit (Gross Margin)
Fixed manufacturing overhead
Contribution Margin
Fixed Manufacturing overhead
Selling & Adminstrative expenses
Selling & Administrative expenses
Fixed Selling & Administrative expenses
Net Operating Income
Net Operating Income
KEY:
= Period expenses

Why does matching principle play a role?

Recall that GAAP requires matching principle

If Fixed manufacturing overhead (FMOH) is included in the product cost,

- FMOH is recorded as part of cost of goods sold (COGS) in the income statement when the product is sold this year;
- FMOH is part of the inventory and carried forward to next year if this product is NOT sold this year.

If Fixed manufacturing overhead (FMOH) is expensed as period cost,

- FMOH is recorded as expense in the income statement no matter whether the product is sold or not in this year;
- This method (variable costing) does not comply with matching principle.

The key difference is really the timing issue: the time at which **fixed** manufacturing overhead costs are charged against revenue, i.e. either when units are sold (absorption costing) or when units are produced (variable costing).

Key issues

- ✓ For manufacturing firms, the calculation of product costs is different between these two costing methods; Hence net income numbers are different between these two.
- ✓ Difference is caused by **fixed Manufacturing Overhead (fixed MOH).** For other costs, DM & DL, the treatment is the same.
- ✓ If fixed MOH is included in inventory cost (i.e., absorption costing), then some fixed MOH will remain in the ending inventory (assets), instead of being expensed for this year!
- ✓ Only if produced units = sold units; these two methods are the same when reporting the net income.
- ✓ In the same vein, under absorption costing, when the produced units < sold units, some previous years' FMOH goes to this year's COGS.

Unit Cost Computations

Harvey Company produces a single product with the following information available:

Number of units produced annually		**25,000**
Variable costs per unit:		
Direct materials, direct labor, and variable mfg. overhead	**$**	**10**
Selling & administrative expenses	**$**	**3**
Fixed costs per year:		
Manufacturing overhead	**$**	**150,000**
Selling & administrative expenses	**$**	**100,000**

Unit Cost Computations

Unit product cost is determined as follows:

	Absorption Costing	Variable Costing
Direct materials, direct labor, and variable mfg. overhead	$ 10	$ 10
Fixed mfg. overhead ($150,000 ÷ 25,000 units)	6	-
Unit product cost	$ 16	$ 10

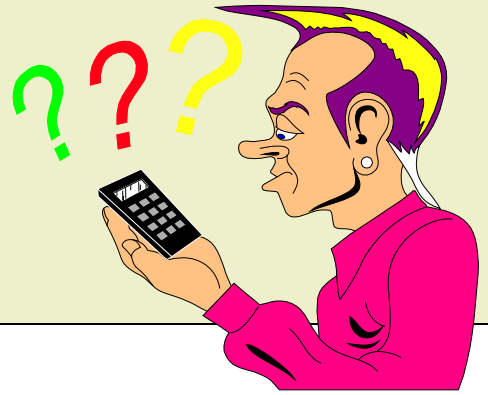
Under absorption costing, all production costs, variable and fixed, are included when determining unit product cost. Under variable costing, only the variable production costs are included in product costs while all fixed production costs will be deducted later.

Comparison b/w Absorption and Variable Costing

Let's assume the following additional information for Harvey Company.

- 20,000 units were sold during the year at a price of $30 each.
- There is no beginning inventory.

Now, let's compute net operating income using both absorption and variable costing.

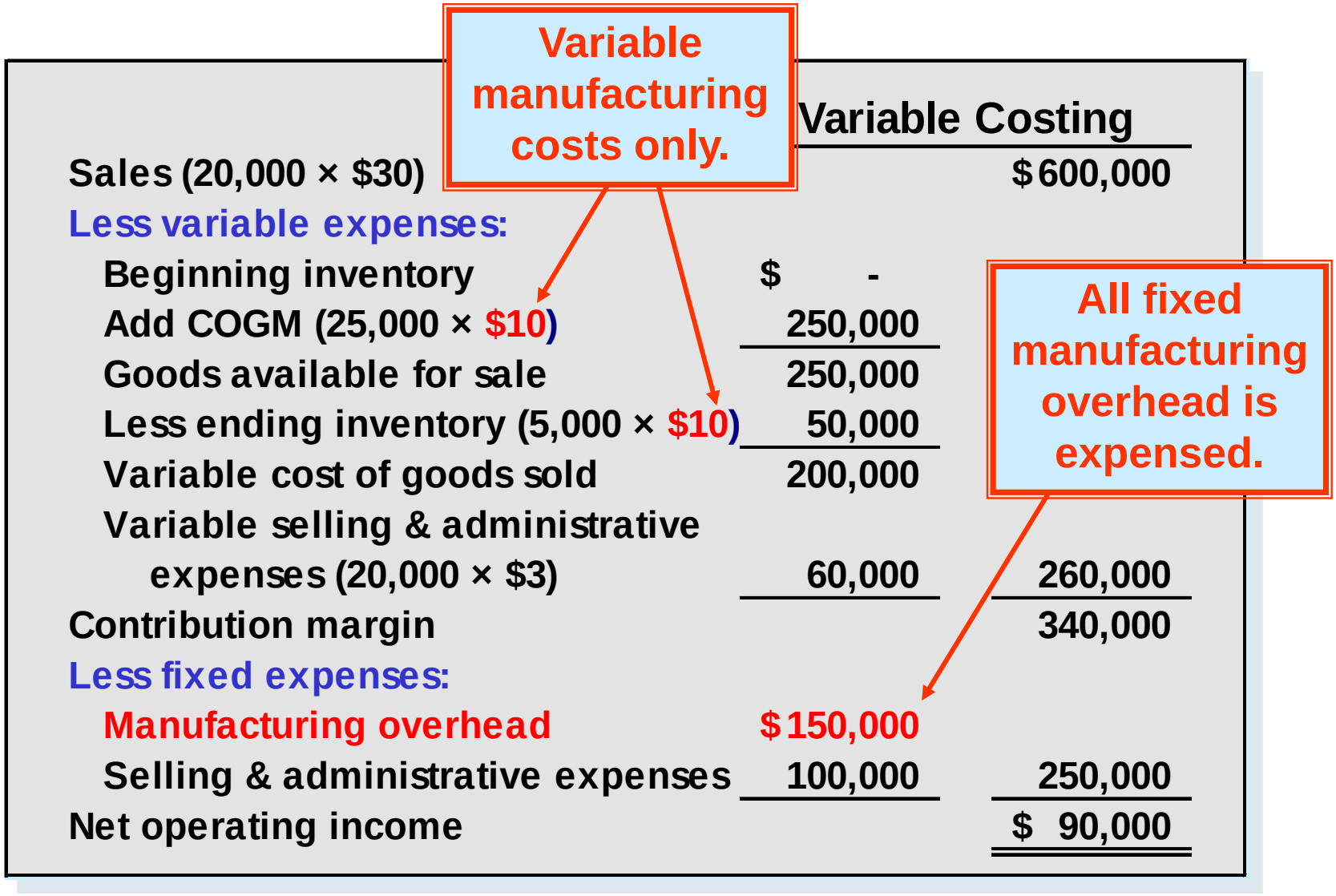


Absorption Costing

	Absorption Costing	
Sales (20,000 × $30)		$600,000
Less cost of goods sold:		
Beginning inventory	$ -	
Add COGM (25,000 × $16)	400,000	
Goods available for sale	400,000	
Ending inventory (5,000 × $16)	80,000	320,000
Gross margin		280,000
Less selling & admin. exp.		
Variable (20,000 × $3)	$ 60,000	
Fixed	100,000	160,000
Net operating income		$120,000

Fixed manufacturing overhead deferred in ending inventory is 5,000 units × $6 = $30,000. *Key issue: $16 is based on the PRODUCED units; When Produced ≠ Sold units, the net income is different b/w these two methods (absorption costing vs. variable costing) (next page)*

Variable Costing



	Variable Costing	
Sales (20,000 × $30)		$600,000
Less variable expenses:		
Beginning inventory	$ -	
Add COGM (25,000 × $10)	250,000	
Goods available for sale	250,000	
Less ending inventory (5,000 × $10)	50,000	
Variable cost of goods sold	200,000	
Variable selling & administrative expenses (20,000 × $3)	60,000	260,000
Contribution margin		340,000
Less fixed expenses:		
Manufacturing overhead	$150,000	
Selling & administrative expenses	100,000	250,000
Net operating income		$ 90,000

Comparing the Two Methods

Question: Why is there a difference of $30,000?

	Cost of Goods Sold	Ending Inventory	Period Expense	Total
Absorption costing				
Variable mfg. costs	$200,000	$ 50,000	$ -	$250,000
Fixed mfg. costs	120,000	30,000	-	150,000
	$320,000	$ 80,000	$ -	$400,000
Variable costing				
Variable mfg. costs	$200,000	$ 50,000	$ -	$250,000
Fixed mfg. costs	-	-	150,000	150,000
	$200,000	$ 50,000	$150,000	$400,000

Comparing the Two Methods

We can reconcile the difference between absorption and variable costing methods as follows:

Variable costing net operating income	$ 90,000
Add: Fixed mfg. overhead costs deferred in inventory (5,000 units × $6 per unit)	30,000
Absorption costing net operating income	$ 120,000

$$\frac{\text{Fixed mfg. overhead}}{\text{Units produced}} = \frac{\$150{,}000}{25{,}000 \text{ units}} = \$6 \text{ per unit}$$

Extended Comparisons of Income Data
Harvey Company – ***Year #Two*** (continue to produce)

Number of units produced		25,000
Number of units sold		30,000
Units in beginning inventory		5,000
Unit sales price	$	30
Variable costs per unit:		
Direct materials, direct labor		
variable mfg. overhead	$	10
Selling & administrative		
expenses	$	3
Fixed costs per year:		
Manufacturing overhead	$	150,000
Selling & administrative		
expenses	$	100,000

Unit Cost Computations

	Absorption Costing	Variable Costing
Direct materials, direct labor, and variable mfg. overhead	$ 10	$ 10
Fixed mfg. overhead ($150,000 ÷ 25,000 units)	6	-
Unit product cost	$ 16	$ 10

Since the variable costs per unit, total fixed costs, and the number of units produced remained unchanged, the unit cost computations also remain unchanged.

Absorption Costing

Unit product cost.

	Absorption Costing	
Sales (30,000 × $30)		$900,000
Less cost of goods sold:		
Beg. inventory (5,000 × $16)	$ 80,000	
Add COGM (25,000 × $16)	400,000	
Goods available for sale	480,000	
Less ending inventory	-	480,000
Gross margin		420,000
Less selling & admin. exp.		
Variable (30,000 × $3)	$ 90,000	
Fixed	100,000	190,000
Net operating income		$230,000

Fixed manufacturing overhead released from inventory is 5,000 units × $6 = $30,000. (sold units are 5,000 more than produced units)

Variable Costing

Variable manufacturing costs only.

All fixed manufacturing overhead is expensed.

Variable Costing		
Sales (30,000 × $30)		$900,000
Less variable expenses:		
Beg. inventory (5,000 × $10)	$ 50,000	
Add COGM (25,000 × $10)	250,000	
Goods available for sale	300,000	
Less ending inventory	-	
Variable cost of goods sold	300,000	
Variable selling & administrative expenses (30,000 × $3)	90,000	390,000
Contribution margin		510,000
Less fixed expenses:		
Manufacturing overhead	$150,000	
Selling & administrative expenses	100,000	250,000
Net operating income		$260,000

Comparing the Two Methods

We can reconcile the difference between absorption and variable costing methods as follows:

Variable costing net operating income	$ 260,000
Deduct: Fixed manufacturing overhead costs released from inventory (5,000 units × $6 per unit)	30,000
Absorption costing net operating income	$ 230,000

$$\frac{\text{Fixed mfg. overhead}}{\text{Units produced}} = \frac{\$150{,}000}{25{,}000 \text{ units}} = \$6 \text{ per unit}$$

Comparing the Two Methods

Net Operating Income			
Costing Method	1st Period	2nd Period	Total
Absorption	$ 120,000	$ 230,000	$ 350,000
Variable	90,000	260,000	350,000

Summary of Key Insights

Relation between production and sales	Effect on inventories	variable costing vs. absorption costing net income
Units produced = Units sold	No change In inventories	Absorption = Variable
Units produced > Units sold	Inventories Increase	Absorption > Variable
Units produced < Units sold	Inventories decrease	Absorption < Variable

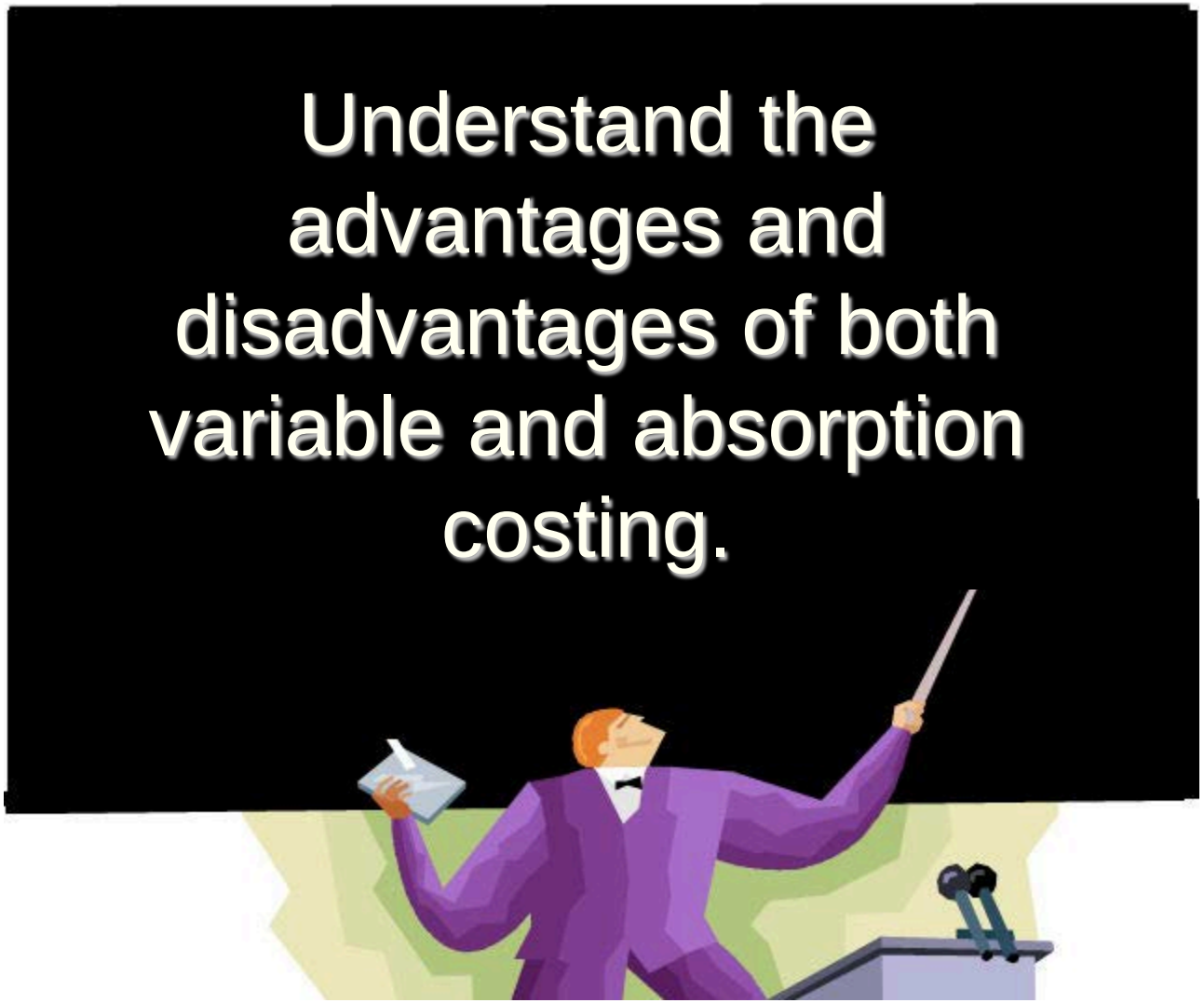
Extended discussion

- Read the news article “Why the Big Three Put Too Many Cars on the Lot?”

Some points:

- Overproduction driven by the absorption costing.
- The exaggerated income is for short-term or long-term period?
- Why do CEOs pursue a short-term trend?
- Why not sell at discounted price? (e.g., sell at variable cost?)
- What is the typical financial indicator about inventory?
- Two suggestions to improve the decisions.

Learning Objective 2



Advantage of Absorption Costing

Fixed manufacturing costs must be assigned to products to properly match revenues and costs.

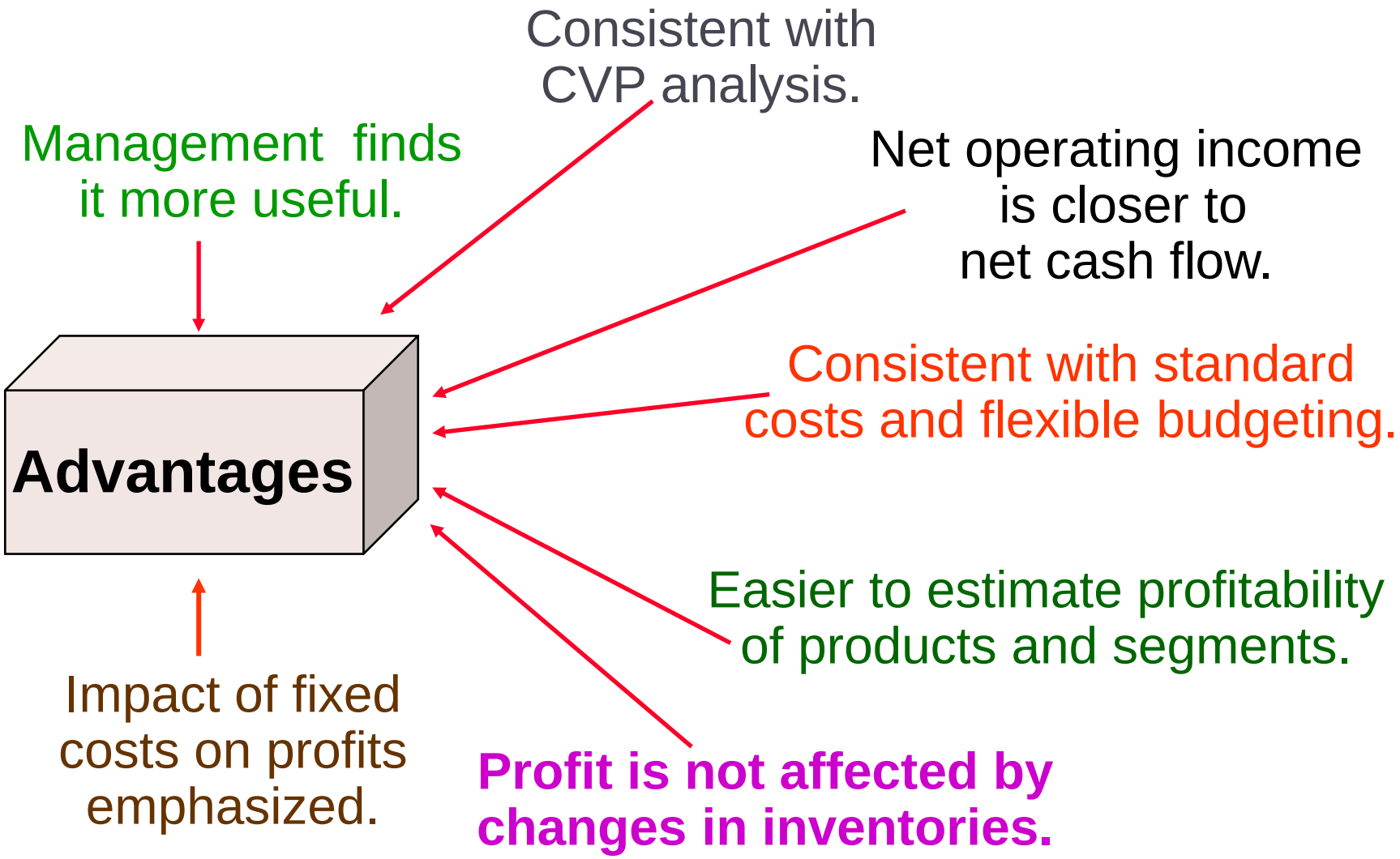
Absorption Costing

The absorption costing method dovetails with the matching principle. (see previous slides)

Fixed manufacturing costs are capacity costs and will incur even if nothing is produced.

Variable Costing

Advantages of Variable Costing and the Contribution Approach



CVP Analysis, Decision Making, and Absorption costing

Absorption costing does not dovetail with CVP analysis, nor does it support decision making. It treats fixed manufacturing overhead as a variable cost. It assigns per unit fixed manufacturing overhead costs to production.

Treating fixed manufacturing overhead as a variable cost can:

- Lead to faulty pricing decisions and faulty keep-or-drop decisions.

Assigning per unit fixed manufacturing overhead costs to production can:

- Potentially produce positive net operating income even when the number of units sold is less than the breakeven point.

Question: Why?

Absorption Costing and Manager Incentives

Suppose managers will receive a bonus based on absorption-costing net income. Will the manager increase or decrease production?

- Managers may increase production to build up inventory (Units produced > units sold) to maximize income under absorption costing and therefore their own bonus!!
- Especially when the CEOs are myopic (or plan to join other companies in the short-run) (because in the long-run, this trick does not work).

Ethical issue: incentives created by absorption costing (in-class discussion)

Carlos Cavalas, the manager of Echo Products' Brazilian Division, is trying to set the production schedule for the last quarter of the year. The Brazilian Division had planned to sell 3,600 units during the year. But by September 30 only the following activities had been reported:

	Units
Inventory, January 1	0
Production	2,400
Sales	2,000
Inventory, September 30	400

Beginning inventory for the last quarter: 400 units

The division's warehouse can store up to 1,000 units. The minimum inventory level should be 50 units. Mr. Cavalas is aware that production must be at least 200 units per quarter in order to retain key employees. Max. production capacity is 1,500 units per quarter.

The sales forecast for the last quarter is only 600 units. Fixed manufacturing overhead is a major element of product cost.

1. Assume that the division is using **variable costing** for division managers' performance. How many units should be scheduled for production during the last quarter?

Key points:

- There is inventory carrying costs (not explicitly stated above; small cost)→ managers want to avoid overstocking if the net income is the same.

- The number of units scheduled for production will not affect the reported net operating income or loss for the year after meeting the market demand if variable costing is in use.

[The max net income would be meeting the market demand under the variable costing. But we still need to meet other constraints]

- This plan would save inventory carrying costs such as storage (rent, insurance), interest, and obsolescence.
- The inventory should be drawn down to the minimum level of 50 units.

2. Assume that the division is using **absorption costing** for division managers' performance. How many units should be scheduled for production during the last quarter?

Key points:

- Managers want to maximize the operating income this year.
- By producing more units, Mr. Cavalas would be able to defer a portion of the year's fixed manufacturing overhead costs to future years through the inventory account, rather than having all of these costs appear as charges on the current year's income statement.
- The more units go to inventory (instead of being sod), the higher percentage of fixed MOH goes to inventory (instead of being expensed). Hence, the managers will produce to the limit.
- the ending inventory should reach the max. capacity of warehouse of 1,000.

3. Discussion: how to design the bonus compensation system to solve the Brazilian division's incentive problem caused by the use of absorption costing (given that top managers usually have no 100% information about the variable costing categories).

Key points:

- Long term vs. short term performance?
- Rewarding system based on the accounting-based performance?
- Link division managers' performance with the overall firm performance?
- Others.

Answers:

Q1:

Desired inventory, December 31	50 units
Expected sales, last quarter	600 units
Total needs	650 units
Less inventory, September 30	400 units
Required production	250 units

Q2:

Desired inventory, December 31	1,000 units
Expected sales, last quarter	600 units
Total needs	1,600 units
Less inventory, September 30	400 units
Required production	1,200 units

In-class data analytics (Landau Company)

- The Concept of variable costing vs. absorption costing
- The impacts on the inventory and net income.
- How do they serve different managers' incentives
- Let's work on the simplified worksheet to understand the flows of FMOH.

End of Chapter 6