Al Farabi University

Inventory Costing and Capacity Analysis

- Management Department
  - "Cost Management" Course
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Inventory Costing Choices: Overview

- Absorption costing—product costs are capitalized; period costs are expensed.
- Variable costing—variable product and period costs are capitalized; fixed product and period costs are expensed.
- Throughput costing—only direct materials are capitalized; all other costs are expensed.

Costing Comparison

- Variable costing is a method of inventory costing in which *only* variable manufacturing costs are included as inventoriable costs.
- Absorption costing is a method of inventory costing in which *all* variable manufacturing costs and *all* fixed manufacturing costs are included as inventoriable costs.

Differences in Income

- Operating income will differ between absorption and variable costing.
- The amount of the difference represents the amount of fixed product costs capitalized as inventory under absorption costing, and expensed as a period costs under variable costing.

Comparative Income Statements

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A	B	C	D	E	F	G
Panel A: VARIABLE COSTING				**Panel B: ABSORPTION COSTING**		
Revenues: $1,000 x 6,000 units		$6,000,000		Revenues: $1,000 x 6,000 units		$6,000,000
Variable cost of goods sold:				Cost of goods sold:		
Beginning inventory	$ 0			Beginning inventory	$ 0	
Variable manufacturing costs: $200 x 8,000 units	1,600,000			Variable manufacturing costs: $200 x 8,000 units	1,600,000	
				Allocated fixed manufacturing costs: $135 x 8,000 units	1,080,000	
Cost of goods available for sale	1,600,000			Cost of goods available for sale	2,680,000	
Deduct ending inventory: $200 x 2,000 units	(400,000)			Deduct ending inventory: $335 x 2,000 units	(670,000)	
Variable cost of goods sold		1,200,000		Cost of goods sold		2,010,000
Variable marketing costs: $185 x 6,000 units sold		1,110,000				
Contribution margin		3,690,000		Gross Margin		3,990,000
Fixed manufacturing costs		1,080,000		Variable marketing costs: $185 x 6,000 units sold		1,110,000
Fixed marketing cost		1,380,000		Fixed marketing costs		1,380,000
Operating income		$1,230,000		Operating Income		$1,500,000
Manufacturing costs expensed in Panel A:				Manufacturing costs expensed in Panel B:		
Variable cost of goods sold		$1,200,000				
Fixed manufacturing costs		1,080,000				
Total		$2,280,000		Cost of goods sold		$2,010,000

Comparative Income Statements—Three Years

	A	B	C	D	E	F	G
1	**Panel A: VARIABLE COSTING**						
2		2012		2013		2014	
3	Revenues: $1,000 × 6,000; 6,500; 7,500 units		$6,000,000		$6,500,000		$7,500,000
4	Variable cost of goods sold:						
5	Beginning inventory: $200 × 0; 2,000; 500 units	$ 0		$ 400,000		$ 100,000	
6	Variable manufacturing costs: $200 × 8,000; 5,000; 10,000 units	1,600,000		1,000,000		2,000,000	
7	Cost of goods available for sale	1,600,000		1,400,000		2,100,000	
8	Deduct ending inventory: $200 × 2,000; 500; 3,000 units	(400,000)		(100,000)		(600,000)	
9	Variable cost of goods sold		1,200,000		1,300,000		1,500,000
10	Variable marketing costs: $185 × 6,000; 6,500; 7,500 units		1,110,000		1,202,500		1,387,500
11	Contribution margin		3,690,000		3,997,500		4,612,500
12	Fixed manufacturing costs		1,080,000		1,080,000		1,080,000
13	Fixed marketing costs		1,380,000		1,380,000		1,380,000
14	Operating income		$1,230,000		$1,537,500		$2,152,500
15							
16	**Panel B: ABSORPTION COSTING**						
17		2012		2013		2014	
18	Revenues: $1,000 × 6,000; 6,500; 7,500 units		$6,000,000		$6,500,000		$7,500,000
19	Cost of goods sold:						
20	Beginning inventory: $335 × 0; 2,000; 500 units	$ 0		$ 670,000		$ 167,500	
21	Variable manufacturing costs: $200 × 8,000; 5,000; 10,000 units	1,600,000		1,000,000		2,000,000	
22	Allocated fixed manufacturing costs: $135 × 8,000; 5,000; 10,000 units	1,080,000		675,000		1,350,000	
23	Cost of goods available for sale	2,680,000		2,345,000		3,517,500	
24	Deduct ending inventory: $335 × 2,000; 500; 3,000 units	(670,000)		(167,500)		(1,005,000)	
25	Adjustment for production-volume variance[a]	0		405,000	U	(270,000)	F
26	Cost of goods sold		2,010,000		2,582,500		2,242,500
27	Gross Margin		3,990,000		3,917,500		5,257,500
28	Variable marketing costs: $185 × 6,000; 6,500; 7,500 units		1,110,000		1,202,500		1,387,500
29	Fixed marketing costs		1,380,000		1,380,000		1,380,000
30	Operating Income		$1,500,000		$1,335,000		$2,490,000
31							
32	[a]Production-volume variance = Budgeted fixed manufacturing costs – Fixed manufacturing overhead allocated using budgeted cost per output unit allowed for actual output produced (Panel B, line 22)						
33	2012: $1,080,000 – ($135 × 8,000) = $1,080,000 – $1,080,000 = $0						
34	2013: $1,080,000 – ($135 × 5,000) = $1,080,000 – $675,000 = $405,000 U						
35	2014: $1,080,000 – ($135 × 10,000) = $1,080,000 – $1,350,000 = ($270,000) F						
36							
37	Production volume variance can also be calculated as follows:						
38	Fixed manufacturing cost per unit × (Denominator level – Actual output units produced)						
39	2012: $135 × (8,000 – 8,000) units = $135 × 0 = $0						
40	2013: $135 × (8,000 – 5,000) units = $135 × 3,000 = $405,000 U						
41	2014: $135 × (8,000 – 10,000) units = $135 × (2,000) = ($270,000) F						

Comparative Income Effects

	Variable Costing	Absorption Costing
Are fixed product costs inventoried?	No	Yes
Is there a production-volume variance?	No	Yes
Are classifications between variable and fixed costs routinely made?	Yes	Infrequently

Comparative Income Effects

	Variable Costing	Absorption Costing
How do changes in unit inventory cost affect operating income if…?		
Production = Sales	Equal	Equal
Production > Sales	Lower	Higher
Production < Sales	Higher	Lower

Comparative Income Effects

	Variable Costing	Absorption Costing
What are the effects on cost-volume-profit for a given level of fixed costs and a given contribution margin per unit?	Driven by: unit level of sales	Driven by: 1. Unit level of sales 2. Unit level of production 3. Chosen denominator level

Comparison of Alternative Inventory Costing Systems

- Variable Direct Manufacturing Cost

Actual Costing	Normal Costing	Standard Costing
Actual prices X Actual quantity of inputs used	Actual prices X Actual quantity of inputs used	Standard prices X Standard quantity of inputs allowed for actual output achieved

Comparison of Alternative Inventory Costing Systems

- Variable Indirect Manufacturing Cost

Actual Costing	Normal Costing	Standard Costing
Actual variable indirect rates X Actual quantity of cost-allocation bases used	Budgeted variable indirect rates X Actual quantity of cost-allocation bases used	Standard variable indirect rates X Standard quantity of cost-allocation bases allowed for actual output achieved

Comparison of Alternative Inventory Costing Systems

- Fixed Direct Manufacturing Cost

Actual Costing	Normal Costing	Standard Costing
Actual prices X Actual quantity of inputs used	Actual prices X Actual quantity of inputs used	Standard prices X Standard quantity of inputs allowed for actual output achieved

Comparison of Alternative Inventory Costing Systems

- Fixed Indirect Manufacturing Cost

Actual Costing	Normal Costing	Standard Costing
Actual fixed indirect rates X Actual quantity of cost-allocation bases used	Budgeted fixed indirect rates X Actual quantity of cost-allocation bases used	Standard fixed indirect rates X Standard quantity of cost-allocation bases allowed for actual output achieved

Performance Issues and Absorption Costing

- Managers may seek to manipulate income by producing too many units.
- Production beyond demand will increase the amount of inventory on hand.
- This will result in more fixed costs being capitalized as inventory.
- That will leave a smaller amount of fixed costs to be expensed during the period.
- Profit increases, and potentially, so does a manger's bonus.

Inventories and Costing Methods

- One way to prevent the unnecessary buildup of inventory for bonus purposes is to base manager's bonuses on profit calculated using variable costing.
- Drawback: complicated system of producing two inventory figures—one for external reporting and the other for bonus calculations.

Other Manipulation Schemes Beyond Simple Overproduction

- Deciding to manufacture products that absorb the highest amount of fixed costs, regardless of demand (“cherry-picking”)
- Accepting an order to increase production, even though another plant in the same firm is better suited to handle that order
- Deferring maintenance

Management Countermeasures for Fixed Cost Manipulation Schemes

- Careful budgeting and inventory planning
- Incorporate an internal carrying charge for inventory
- Change (lengthen) the period used to evaluate performance
- Include nonfinancial as well as financial variables in the measures to evaluate performance

Income Effects of Inventory Buildup

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	A	B	C	D	E	F	G	H	I	J	K
1	**Unit Data**										
2	Beginning inventory	2,000		2,000		2,000		2,000		2,000	
3	Production	4,500		5,000		6,500		8,000		9,000	
4	Goods available for sale	6,500		7,000		8,500		10,000		11,000	
5	Sales	6,500		6,500		6,500		6,500		6,500	
6	Ending inventory	0		500		2,000		3,500		4,500	
7											
8	**Income Statement**										
9	Revenues	$6,500,000		$6,500,000		$6,500,000		$6,500,000		$6,500,000	
10	Cost of goods sold:										
11	Beginning inventory ($335 x 2,000)	670,000		670,000		670,000		670,000		670,000	
12	Variable manufacturing costs: $200 x production	900,000		1,000,000		1,300,000		1,600,000		1,800,000	
13	Allocated fixed manufacturing costs: $135 x production	607,500		675,000		877,500		1,080,000		1,215,000	
14	Cost of goods available for sale	2,177,500		2,345,000		2,847,500		3,350,000		3,685,000	
15	Deduct ending inventory: $335 x ending inventory	0		(167,500)		(670,000)		(1,172,500)		(1,507,500)	
16	Adjustment for production-volume variance[a]	472,500	U	405,000	U	202,500	U	0		(135,000)	F
17	Cost of goods sold	2,650,000		2,582,500		2,380,000		2,177,500		2,042,500	
18	Gross Margin	3,850,000		3,917,500		4,120,000		4,322,500		4,457,500	
19	Marketing costs: ($1,380,000 + $185 per unit x 6,500 units sold)	2,582,500		2,582,500		2,582,500		2,582,500		2,582,500	
20	Operating Income	$1,267,500		$1,335,000		$1,537,500		$1,740,000		$1,875,000	
21											
22	[a]Production-volume variance = Budgeted fixed manufacturing costs - Allocated fixed manufacturing costs (Income Statement, line 13)										
23	At production of 4,500 units: $1,080,000 - $607,500 = $472,500 U										
24	At production of 5,000 units: $1,080,000 - $675,000 = $405,000 U										
25	At production of 6,500 units: $1,080,000 - $877,500 = $202,500 U										
26	At production of 8,000 units: $1,080,000 - $1,080,000 = $0										
27	At production of 9,000 units: $1,080,000 - $1,215,000 = ($135,000) F										

Extreme Variable Costing: Throughput Costing

- Throughput costing (super-variable costing) is a method of inventory costing in which *only* direct material costs are included as inventory costs. All other product costs are treated as operating expenses.

Throughput Costing Illustrated

	A	B	C	D
1		**2012**	**2013**	**2014**
2	Revenues: $1,000 × 6,000; 6,500; 7,500 units	$6,000,000	$6,500,000	$7,500,000
3	Direct material cost of goods sold			
4	Beginning inventory: $110 × 0; 2,000; 500 units	0	220,000	55,000
5	Direct materials: $110 × 8,000; 5,000; 10,000 units	880,000	550,000	1,100,000
6	Cost of goods available for sale	880,000	770,000	1,155,000
7	Deduct ending inventory: $110 × 2,000; 500; 3,000 units	(220,000)	(55,000)	(330,000)
8	Direct material cost of goods sold	660,000	715,000	825,000
9	Throughput margin[a]	5,340,000	5,785,000	6,675,000
10	Manufacturing costs (other than direct materials)[b]	1,800,000	1,530,000	1,980,000
11	Marketing costs[c]	2,490,000	2,582,500	2,767,500
12	Operating income	$1,050,000	$1,672,500	$ 1,927,500
13				
14	[a]Throughput margin equals revenues minus all direct material cost of goods sold			
15	[b]Fixed manuf. costs + [(variable manuf. labor cost per unit + variable manuf. overhead cost per unit)			
16	× units produced]; $1,080,000 + [($40 + $50) × 8,000; 5,000; 10,000 units]			
17	[c]Fixed marketing costs + (variable marketing cost per unit × units sold);			
18	$1,380,000 + ($185 × 6,000; 6,500; 7,500 units)			

Costing Systems Compared

		Actual Costing	Normal Costing	Standard Costing
Absorption Costing / Variable Costing	Variable Direct Manufacturing Cost	Actual prices × Actual quantity of inputs used	Actual prices × Actual quantity of inputs used	Standard prices × Standard quantity of inputs allowed for actual output achieved
Absorption Costing / Variable Costing	Variable Manufacturing Overhead Costs	Actual variable overhead rates × Actual quantity of cost-allocation bases used	Budgeted variable overhead rates × Actual quantity of cost-allocation bases used	Standard variable overhead rates × Standard quantity of cost-allocation bases allowed for actual output achieved
Absorption Costing	Fixed Direct Manufacturing Costs	Actual prices × Actual quantity of inputs used	Actual prices × Actual quantity of inputs used	Standard prices × Standard quantity of inputs allowed for actual output achieved
Absorption Costing	Fixed Manufacturing Overhead Costs	Actual fixed overhead rates × Actual quantity of cost-allocation bases used	Budgeted fixed overhead rates × Actual quantity of cost-allocation bases used	Standard fixed overhead rates × Standard quantity of cost-allocation bases allowed for actual output achieved