Chapter 9: Absorption/Variable Costing

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.
Overview of Absorption and Variable Costing

Summary

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

[SOLUTION]

<table>
<thead>
<tr>
<th></th>
<th>Absorption</th>
<th>Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct materials</td>
<td>$150,000</td>
<td>$150,000</td>
</tr>
<tr>
<td>Direct manufacturing labor</td>
<td>187,500</td>
<td>187,500</td>
</tr>
<tr>
<td>Variable MOH</td>
<td>100,000</td>
<td>100,000</td>
</tr>
<tr>
<td>Fixed MOH</td>
<td>200,000</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>$637,500</td>
<td>$437,500</td>
</tr>
</tbody>
</table>

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
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:
- a. Prepare an income statement using absorption costing.
- b. Prepare an income statement using variable costing.

[SOLUTION]

a. Absorption-costing income statement:

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

* $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) 120,000 900,000
  Contribution margin 420,000
Fixed costs:
  Manufacturing 180,000
  Marketing 60,000 240,000
Operating income 180,000

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

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.
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).

<table>
<thead>
<tr>
<th>Absorption</th>
<th>Variable</th>
<th>Throughput</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>500</td>
<td>Sales</td>
</tr>
<tr>
<td>CGS</td>
<td>120</td>
<td>VC</td>
</tr>
<tr>
<td>Gross Profit</td>
<td>380</td>
<td>Contr. Margin</td>
</tr>
<tr>
<td>S &amp; A exp</td>
<td>350</td>
<td>FC</td>
</tr>
<tr>
<td>Profit</td>
<td>30</td>
<td>Profit</td>
</tr>
</tbody>
</table>

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.

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.
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.

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?
Solution

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

Revenues: $22 × 345,400 $7,598,800

Variable costs
Beginning inventory: $5.10 × 85,000 $433,500
Variable manufacturing costs: $5.10 × 294,900 1,503,990
Cost of goods available for sale 1,937,490
Deduct ending inventory: $5.10 × 34,500 175,950
Variable cost of goods sold 1,761,540

Variable operating costs:
$1.10 × 345,400 379,940
Total variable costs (at standard costs) 2,141,480
Adjustment for variances 0
Total variable costs 2,141,480

Cost of goods sold 3,761,010
Deduct ending inventory: ($5.10 + $4.80) × 34,500 341,550
Adjust for manuf. variances ($4.80 × 5,100)a 24,480
Cost of goods sold 3,443,940

Gross margin 4,154,860

Operating costs
Variable operating costs: $1.10 × 345,400 $379,940
Fixed operating costs 1,080,000
Adjust for operating cost variances 0
Total operating costs 1,459,940

Operating income $2,694,920

a Production volume variance
= [(6,000 hours × 50) – 294,900] × $4.80
= (300,000 – 294,900) × $4.80
= $24,480

Solution

Absorption Costing Data
Fixed MOH allocation rate = FMOH/Denominator level MHs = $1,440,000/6,000
= $240 per machine-hour
Fixed MOH allocation rate per unit = FMOH allocation rate/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 × 345,400 $7,598,800

Cost of goods sold
Beginning inventory: ($5.10 + $4.80) × 85,000 $841,500
Variable manuf. costs: $5.10 × 294,900 1,503,990
Fixed manuf. costs: $4.80 × 294,900 1,415,520
Cost of goods available for sale $3,761,010
Deduct ending inv: ($5.10 + $4.80) × 34,500 (341,550)
Adjust for manuf. variances ($4.80 × 5,100)a 24,480
Cost of goods sold 3,443,940

Gross margin 4,154,860

Operating costs
Variable operating costs: $1.10 × 345,400 $379,940
Fixed operating costs 1,080,000
Adjust for operating cost variances 0
Total operating costs 1,459,940

Operating income $2,694,920

a Production volume variance
= [(6,000 hours × 50) – 294,900] × $4.80
= (300,000 – 294,900) × $4.80
= $24,480
Solution

Zwatch’s pre-tax profit margins –

<table>
<thead>
<tr>
<th></th>
<th>Under variable costing:</th>
<th></th>
<th>Under absorption costing:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td>$7,598,800</td>
<td>Revenues</td>
<td>$7,598,800</td>
</tr>
<tr>
<td>Operating income</td>
<td>2,937,320</td>
<td>Operating income</td>
<td>2,694,920</td>
</tr>
<tr>
<td>Pre-tax profit margin</td>
<td>38.7%</td>
<td>Pre-tax profit margin</td>
<td>35.5%</td>
</tr>
</tbody>
</table>

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

Variable costing operating income – Absorption costing operating income = $2,937,320 – $2,694,920 = $242,400

Fixed manufacturing costs in beginning inventory under absorption costing –
Fixed manufacturing costs in ending inventory under absorption costing = ($4.80 × 85,000) – ($4.80 × 34,500) = $242,400

4. The factors the CFO should consider include:
   (a) Effect on managerial behavior, and
   (b) 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.

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:
   a. $440,000
   b. $200,000
   c. $600,000
   d. $840,000
   e. None of these.

2. Osawa’s 2004 operating income using variable costing is:
   a. $800,000
   b. $440,000
   c. $200,000
   d. $600,000
   e. None of these.
### Solution

1. **Osawa’s 2004 operating income using absorption costing is:**
   
a.  $440,000

#### 1. Absorption Costing:

<table>
<thead>
<tr>
<th>Revenues(^a)</th>
<th>$4,800,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of goods sold:</td>
<td></td>
</tr>
<tr>
<td>Variable manufacturing costs(^b)</td>
<td>$2,400,000</td>
</tr>
<tr>
<td>Fixed manufacturing costs(^c)</td>
<td>$360,000</td>
</tr>
<tr>
<td>Gross margin</td>
<td>$2,040,000</td>
</tr>
<tr>
<td>Operating costs:</td>
<td></td>
</tr>
<tr>
<td>Variable operating(^d)</td>
<td>$1,200,000</td>
</tr>
<tr>
<td>Fixed operating</td>
<td>$400,000</td>
</tr>
<tr>
<td>Operating income</td>
<td>$440,000</td>
</tr>
</tbody>
</table>

\(^a\) $40 \times 120,000 \\
\(^b\) $20 \times 120,000 \\
\(^c\) Fixed manufacturing rate = $600,000 / 200,000 = $3 per output unit \\
\(^d\) 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:

<table>
<thead>
<tr>
<th>Revenues(^a)</th>
<th>$4,800,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable costs:</td>
<td></td>
</tr>
<tr>
<td>Variable manufacturing cost of goods sold(^b)</td>
<td>$2,400,000</td>
</tr>
<tr>
<td>Variable operating costs(^c)</td>
<td>$1,200,000</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>$1,200,000</td>
</tr>
<tr>
<td>Fixed costs:</td>
<td></td>
</tr>
<tr>
<td>Fixed manufacturing costs</td>
<td>$600,000</td>
</tr>
<tr>
<td>Fixed operating costs</td>
<td>$400,000</td>
</tr>
<tr>
<td>Operating income</td>
<td>$200,000</td>
</tr>
</tbody>
</table>

\(^a\) $40 \times 120,000 \\
\(^b\) $20 \times 120,000 \\
\(^c\) $10 \times 120,000
ABC, Inc. produced 50,000 widgets but only sold 45,000 widgets in its first year. Shown below is ABC’s cost structure:

<table>
<thead>
<tr>
<th>VC per widget</th>
<th>Total FC for the year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing Cost</td>
<td>$55.20</td>
</tr>
<tr>
<td>Selling &amp; Administrative</td>
<td>$13.50</td>
</tr>
</tbody>
</table>

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

- S
- CGS
- GP
- S&A
- NI_{ABS}

### Variable Costing

- S
- VC
- CM
- FC
- NI_{VC}

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

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</table>

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

- S: $4,947,200
- CGS: $3,058,200
- GP: $1,889,000
- S&A: $607,500
- NI_{ABS}: $825,500

### Variable Costing

- S: $4,947,200
- VC: $3,091,500
- CM: $1,855,700
- FC: $1,094,000
- NI_{VC}: $761,700

\[ \Delta = \frac{63,800}{50,000 \times 12.76} = \frac{63,800}{638,000} = 0.10 \]