Chapter 6

Lecture Notes

Chapter theme: Two general approaches are used for valuing inventories and cost of goods sold. One approach, called absorption costing, is generally used for external reporting purposes. The other approach, called variable costing, is preferred by some managers for internal decision making and must be used when an income statement is prepared in the contribution format. This chapter shows how these two methods differ from each other. It also explains how to create segmented contribution format income statements.

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1. **Overview of variable and absorption costing**

*Learning Objective 1: Explain how variable costing differs from absorption costing and compute unit product costs under each method.*

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* 1. **Variable costing** treats only those costs of production that vary with output as product costs. This approach **dovetails with the contribution approach** income statement and **supports CVP analysis** because of its emphasis on separating variable and fixed costs.
     1. The cost of a unit of product consists of **direct materials, direct labor, and variable overhead**.

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*Helpful Hint: For simplicity, nearly all examples, exhibits, problems, and exercises in this chapter treat direct labor as a variable cost. However, students should be reminded that labor is essentially a fixed cost in some companies. This is a growing phenomenon as pointed out in earlier chapters. Under variable costing, direct labor would not be included in product costs when it is a fixed cost. This point is reinforced in the discussion on theory of constraints at the end of the chapter.*

ii. **Fixed** manufacturing overhead, and both variable and fixed selling and administrative expenses are treated as **period costs** and deducted from revenue as incurred.

#### *Helpful Hint: Emphasize that the only difference between variable and absorption costing is in how the two methods treat fixed manufacturing overhead costs. Also, emphasize that under both methods, selling and administrative costs are period costs and are not product costs.*

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#### Absorption costing treats all costs of production as product costs, regardless of whether they are variable or fixed. Since no distinction is made between variable and fixed costs, absorption costing is not well suited for CVP computations.

* + 1. The cost of a unit of product consists of **direct materials, direct labor, and both variable and fixed overhead**.
    2. Variable and fixed selling and administrative expenses are treated as **period costs** and are deducted from revenue as incurred.

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#### *Quick Check – absorption vs. variable costing*

#### II. Harvey Company—an example

#### Unit cost computations

* + 1. Assume Harvey Company produces a single product with available information as shown.

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* + 1. The unit product costs under absorption and variable costing would be **$16** and **$10**, respectively.
       1. Under absorption costing, **all production costs**, variable and fixed, are included when determining unit product cost.

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* + - 1. Under variable costing, **only the variable production costs** are included in product costs.

*Helpful Hint: Before beginning the forthcoming income comparisons, remind students of the relationship between ending inventory and net operating income. Higher ending inventory results in higher net operating income since costs of goods available for sale less ending inventory equals cost of goods sold. Therefore, a higher ending inventory results in a lower expense (cost of goods sold) deducted to arrive at net operating income.*

*Learning Objective 2: Prepare income statements using both variable and absorption costing.*

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B. **Income comparison** of variable and absorption costing

#### Harvey Company—additional assumptions.

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1. 20,000 units were sold during the year.
2. The selling price per unit is $30.
3. There is no beginning inventory.
4. **Variable costing**
   * + 1. The unit product cost is **$10**.

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* + - 1. All **$150,000** of fixed manufacturing cost is **expensed** in the current period.
      2. The net operating income is **$90,000**.

1. **Absorption costing**
2. The unit product cost is **$16**.
3. The **fixed manufacturing overhead cost deferred in inventory** is **$30,000** (5,000 units × $6 per unit).

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1. The net operating income is **$120,000**.

*Helpful Hint: Explain that under absorption costing, the recognition of fixed costs as an expense is really a timing issue. When the items are sold, the fixed costs will be reflected on the income statement as part of cost of goods sold.*

*Learning objective 3: Reconcile variable costing and absorption costing net operating incomes and explain why the two amounts differ.*

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1. **Comparing the two methods**
2. Under absorption costing, **$120,000** of fixed manufacturing overhead is included in cost of goods sold and **$30,000** is deferred in ending inventory as an asset on the balance sheet.
3. Under variable costing, the entire **$150,000** of fixed manufacturing overhead is treated as a period expense.

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* + - * 1. The variable costing ending inventory is **$30,000 less than absorption costing**, thus explaining the difference in net operating income between the two methods.

1. The difference in net operating income between the two methods (**$30,000**) can also be reconciled by multiplying the number of units in ending inventory (**5,000 units**) by the fixed manufacturing overhead per unit (**$6**) that is deferred in ending inventory under absorption costing.

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C. **Extended comparisons of income** **data**

#### Harvey Company—additional assumptions/facts

1. 30,000 units were sold in year 2.

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1. The selling price per unit, variable costs per unit, total fixed costs, and number of units produced **remain unchanged**.
2. 5,000 units are in beginning inventory.

#### Unit cost computations

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

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1. **Variable costing**
2. The unit product cost is **$10**.

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1. All **$150,000** of fixed manufacturing overhead cost is **expensed** in the current period.
2. The net operating income is **$260,000**.
3. **Absorption** **costing**
4. The unit product cost is **$16**.

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1. The **fixed manufacturing overhead cost released from inventory** is **$30,000**.
2. The net operating income is **$230,000**.
3. **Comparing the two** **methods**
4. The difference in net operating income between the two methods (**$30,000**) can be reconciled by multiplying the number of units in beginning inventory (**5,000 units**) by the fixed manufacturing overhead per unit (**$6**) that is released from beginning inventory under absorption costing.

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1. Across the two-year time frame, both methods reported the **same total net operating income ($350,000)**. This is because over an extended period of time sales cannot exceed production, nor can production much exceed sales. The shorter the time period, the more the net operating income figures will tend to differ.

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#### D. Summary of key insights

1. When **units produced equals units sold,** the two methods report **the same net operating income**.
2. When **units produced are greater than units sold**, as in year 1 for Harvey, **absorption income is greater than variable costing income**.

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1. When **units produced are less than units sold**, as in year 2 for Harvey, **absorption costing income is less than variable costing income**.

#### III. Advantages of variable costing and the contribution approach

#### A. Enabling CVP analysis

1. Variable costing categorizes costs as fixed and variable so it is much easier to use this income statement format for CVP analysis.

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1. Absorption costing assigns per unit fixed manufacturing overhead costs to production. **This can potentially produce positive net operating income even when the number of units sold is less than the breakeven point**.

B. Explaining **changes in net operating income**

1. Variable costing income is **only affected by changes in unit sales**. It is not affected by the number of units produced. As a general rule, when sales go up net operating income goes up and vice versa.

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1. Absorption costing income is influenced by changes in unit sales and **units of production**. Net operating income can be increased simply by producing more units even if those units are not sold.

#### Supporting decision making

* + 1. Variable costing correctly identifies **the additional variable costs incurred to make one more unit**. It also emphasizes the impact of fixed costs on profits.

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* + 1. Absorption costing **gives the impression that fixed manufacturing overhead is variable** with respect to the number of units produced, but it is not. This can lead to inappropriate pricing decisions and product discontinuation decisions.

IV. **Segmented income statements** and the contribution approach

*Learning Objective 4: Prepare a segmented income statement that differentiates traceable fixed costs from common fixed costs and use it to make decisions.*

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#### A. Key concepts/definitions

1. A **segment** is a part or activity of an organization about which managers would like cost, revenue, or profit data.

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1. **Examples of segments include** divisions of a company, sales territories, individual stores, service centers, manufacturing plants, marketing departments, individual customers, and product lines.
2. There are two keys to **building segmented income statements.**
3. First, a **contribution format** should be used because it **separates fixed from variable costs** and it enables the calculation of a **contribution margin**.

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* + - * 1. The contribution margin is especially useful in decisions involving **temporary uses of capacity** such as special orders.

1. Second, **traceable** **fixed costs** should be separated from **common** **fixed costs** to enable the calculation of a **segment margin**. Further clarification of these terms is as follows:
2. **A traceable fixed cost** of a segmentis a fixed cost that is incurred because of the existence of the segment. If the segment were eliminated, the fixed cost would disappear. Examples of traceable fixed costs include:

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The salary of the Fritos product manager at PepsiCo is a traceable fixed cost of the Fritos business segment of PepsiCo.

The maintenance cost for the building in which Boeing 747s are assembled is a traceable fixed cost of the 747 business segment of Boeing.

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1. A **common fixed cost** is a fixed cost that supports the operations of more than one segment, but **is not traceable in whole or in part to any one segment**. Examples of common fixed costs include:
2. The salary of the CEO of General Motors is a common fixed cost of the various divisions of General Motors.

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1. The cost of heating a Safeway or Kroger grocery store is a common fixed cost of the various departments – groceries, produce, bakery, etc.

c. It is important to realize that the **traceable fixed costs of one segment may be a common fixed cost of another segment**. For example:

1. The landing fee paid to land an airplane at an airport is traceable to a particular flight, but it is not traceable to first-class, business-class, and economy-class passengers.

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*Helpful Hint: In practice, a great deal of disagreement exists about what costs are traceable and what costs are common. Some people claim that except for direct materials, virtually all costs are common fixed costs that cannot be traced to products. Others assert that all costs are traceable to products; there are no common costs. The truth probably lies somewhere in the middle – many costs can be traced to products but not all costs.*

d. A **segment margin** is computed by subtracting the traceable fixed costs of a segment from its contribution margin.

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1. The segment margin is a valuable tool for assessing the **long-run profitability** of a segment.
2. Allocating common costs to segments **reduces the value of the segment margin** as a guide to long-run segment profitability.

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*Helpful Hint: Explain that a segment should not automatically be eliminated if its segment margin is negative. If a company that produces hair-styling products discontinues its styling gel, sales on its shampoo and conditioner might fall due to the unavailability of the eliminated product.*

#### B. Segmented income statements – an example

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1. Assume that **Webber, Inc.** has two divisions – the Computer Division and the Television Division.
2. The **contribution format** income statement for the Television Division is as shown. Notice:

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1. **Cost of goods sold** consists of variable manufacturing costs.
2. Fixed and variable costs are listed in **separate sections**.
3. **Contribution margin** is computed by taking sales minus variable costs.

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1. The **divisional segment margin** represents the Television Division’s contribution to overall company profits.

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1. The Television Division’s results can be rolled into Webber, Inc.’s overall results as shown. Notice:

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1. The results of the Television and Computer Divisions **sum** to the results shown for the whole company.
2. The common costs for the company as a whole (**$25,000**) **are not allocated to the divisions**.

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1. The Television Division’s results can also be broken down into smaller segments. This enables us to see how **traceable fixed costs of the Television Division can become common costs of smaller segments**.

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a. Assume that the Television Division can be broken down into two major product lines – **Regular and Big Screen**.

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b. Assume that the **segment margins** for these two product lines are as shown.

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1. Of the **$90,000** of fixed costs that were previously traceable to the Television Division, **$80,000** ($45,000 + $35,000) is traceable to the two product lines and **$10,000** is a common cost.

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#### C. Segmented income statements—decision making and break-even analysis

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1. To illustrate how the Television Division’s results can be used for **decision making,** assume Webber believes that if the Television Division spends $5,000 additional dollars on advertising it will increase sales of Regular and Big Screen televisions by 5%. Webber can compute the profit impact of this course of action as follows:

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1. The Regular contribution margin would increase by **$5,250**.

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2. The Big Screen contribution margin would increase by **$2,250**.

3. The Television Division’s segment margin would increase by **$2,500**.

*Learning Objective 5: Compute companywide and segment break-even points for a company with traceable fixed costs.*

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1. To demonstrate how to calculate **companywide and segmented break-even points**, let’s refer back to the companywide income statement segmented into the Television and Compute Divisions.

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1. The companywide break-even point is computed by dividing **the sum of the company’s traceable fixed costs and common fixed costs by the company’s overall contribution margin ratio**.

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a. This equation can be used to compute Webber’s companywide break-even point of **$361,111**.

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2. A business segment’s break-even point is computed by dividing **its traceable fixed costs by its contribution margin ratio**.

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a. Using this equation, the break-even point for the Television Division is **$180,000**.

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b. The break-even point for the Computer Division is **$133,333**.

3. Notice that the companywide common fixed costs are excluded from the segment break-even calculations. This occurs because the common fixed costs are not traceable to segments and they are not influenced by segment-level decisions.

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V. Segmented income statements—**common mistakes**

#### A. Omission of costs

1. The costs assigned to a segment should include all the costs attributable to that segment from the company’s entire value chain as discussed in Chapter 12.
2. Since **only manufacturing costs** are included in product costs under absorption costing, those companies that choose to use absorption costing for segment reporting purposes will **omit** from their profitability analysis all “upstream” and “downstream” costs.

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1. **“Upstream” costs** include research and development and product design costs.
2. **“Downstream” costs** include marketing, distribution, and customer service costs.
3. Although these “upstream” and “downstream” costs are nonmanufacturing costs, they are just as essential to determining product profitability as are manufacturing costs. Omitting them from profitability analysis will result in the undercosting of products.

*Helpful Hint: An example of a company with a very high amount of upstream and downstream costs is a pharmaceutical company such as Merck. A great deal of its costs are comprised of research and development and marketing.*

B. **Inappropriate methods for assigning traceable costs to segments**

1. **Failure to trace costs directly**
2. Costs that can be traced directly to specific segments of a company **should not be allocated to other segments**. Rather, such costs should be charged directly to the responsible segment. For example:
3. The rent for a branch office of an insurance company should be charged directly against the branch office rather than included in a companywide overhead pool and then spread throughout the company.

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* + 1. **Inappropriate allocation base**
       1. Some companies allocate costs to segments using **arbitrary bases**. Costs should be allocated to segments for internal decision making purposes only when the allocation base actually drives the cost being allocated. For example:
          1. Sales are frequently used to allocate selling and administrative expenses to segments. This should only be done if sales drive these expenses.

C. **Arbitrarily dividing common costs among segments**

1. **Common costs should not be arbitrarily allocated to segments** based on the rationale that “someone has to cover the common costs” for two reasons:

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1. First, this practice may make a profitable business segment appear to be unprofitable. If the segment is eliminated the revenue lost may exceed the traceable costs that are avoided.
2. Second, allocating common fixed costs forces managers to be held accountable for costs that they cannot control.

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*Quick Check – common costs*

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V. Income statements—an **external reporting perspective**

#### A. Companywide income statements

1. Practically speaking, **absorption costing is required for external reports in the United States**. IFRS also require absorption costing for external reports.

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1. Probably because of the cost of maintaining two separate costing systems, most companies use absorption costing for their external and internal reports.
2. With all of the advantages of the contribution approach, one may wonder why the absorption approach is used at all. Perhaps the biggest reason is because:

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1. Advocates of **absorption costing** argue that it **better matches costs with revenues**. They contend that fixed manufacturing costs are just as essential to manufacturing products as are the variable costs.
2. Advocates of variable costing view fixed manufacturing costs as **capacity costs**. They argue that fixed manufacturing costs would be incurred even if no units were produced.

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B**. Segmented financial information**

i. U.S. GAAP and IFRS require publicly-traded companies to **include segmented financial data** in their annual reports. These rulings have implications for internal segment reporting because:

1. They mandate that companies must prepare external segmented reports using the **same methods** that they use for internal segmented reports. This requirement motivates managers to avoid using the contribution approach for internal reporting purposes because if they did they would be required to:

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a. Share this sensitive data with the public.

b. Reconcile these reports with applicable rules for consolidated reporting purposes.