

## Taking a Physical Inventory

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sold then is determined by subtracting this ending inventory from the cost of goods available for sale shown as follows:

Cost of goods available for sale .....	\$3,000
Less: Ending inventory (specific identification) .....	1,240
Cost of goods sold .....	<u>\$1,760</u>

**Average Cost** The average cost is determined by dividing the total cost of goods available for sale during the year by the total number of units available for sale. The average per-unit cost is \$100 ( $\$3,000 \div 30$  units). Under the average-cost method, the ending inventory would be priced at \$1,200 (12 units  $\times$  \$100 per unit), and the cost of goods sold would be \$1,800 ( $\$3,000$  cost of goods available for sale, less \$1,200 in costs assigned to the ending inventory).

**FIFO** Under the FIFO flow assumption, the oldest units are assumed to be the first sold. The ending inventory, therefore, is assumed to consist of the most recently acquired goods. (Remember, we are now talking about the goods *remaining in inventory*, not the goods sold.) The inventory of 12 food processors would be valued at the following costs and the cost of goods sold would be \$1,550 ( $\$3,000 - \$1,450$ ).

5 units from the Dec. 1 purchase @ \$130 .....	\$ 650
5 units from the Oct. 1 purchase @ \$120 .....	600
2 units from the July 1 purchase @ \$100 .....	200
Ending inventory, 12 units at FIFO cost .....	<u>\$1,450</u>

Notice that the FIFO method results in an inventory valued at relatively recent purchase costs. The cost of goods sold, however, is based on the older acquisition costs.

**LIFO** Under LIFO, the last units purchased are considered to be the first goods sold. Therefore, the ending inventory is assumed to contain the *earliest* purchases. The 12 food processors in inventory would be valued as:

The cost of goods sold under the LIFO method is \$2,020 ( $\$3,000 - \$980$ ).

10 units from the beginning inventory @ \$80 .....	\$800
2 units from the Mar. 1 purchase @ \$90 .....	180
Ending inventory, 12 units at LIFO cost .....	<u>\$980</u>

Notice that the cost of goods sold under LIFO is *higher* than that determined by the FIFO method ( $\$2,020$  under LIFO, as compared with  $\$1,550$  under FIFO). LIFO always results in a higher cost of goods sold when purchase costs are rising. LIFO usually minimizes reported net income and income taxes during periods of rising prices in both perpetual and periodic systems.

Notice also that the LIFO method may result in an ending inventory that is priced *well below* its current replacement cost. In this illustration, ending inventory is determined at \$80 and \$90 per unit, but the most recent purchase price is \$130 per unit.


**INTERNATIONAL CASE IN POINT**

Although FIFO techniques are allowed for financial reporting in nearly all countries, LIFO is more controversial in international settings. International accounting standards prohibit LIFO because it leads to outdated inventory numbers in the balance sheet. To make inventory amounts between U.S. companies using LIFO and non-U.S. companies using FIFO (or weighted-average methods) comparable, a financial analyst must revalue inventory numbers.

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**Receiving the Maximum Tax Benefit from the LIFO Method** Many companies that use LIFO in a perpetual inventory system *restate* their year-end inventory at the costs indicated by the *periodic* LIFO costing procedures illustrated above. This restatement is accomplished by either debiting or crediting the Inventory account and making an offsetting entry to the Cost of Goods Sold account.

Often, restating ending inventory using periodic costing procedures results in older (and lower) unit costs than those shown in the perpetual inventory records. When less cost is assigned to the ending inventory, it follows that more of these costs will be assigned to the cost of goods sold. A higher cost of goods sold, in turn, means lower taxable income.

Why would applying LIFO on a periodic basis at year-end result in a lower valuation of inventory than does applying LIFO on a perpetual basis? Consider the last purchase in our food processor example. This purchase of five food processors was made on December 1, at the relatively high unit cost of \$130. Assuming that no additional units were sold in December, they would be included in the year-end inventory in perpetual inventory records, even if these records were maintained on a LIFO basis. When the ending inventory is priced using “periodic LIFO,” however, a last-minute purchase is *not* included in inventory, but rather is transferred to the income statement as part of cost of goods sold.

Both the LIFO and average-cost methods produce different valuations of inventory under perpetual and periodic costing procedures. Only companies using LIFO, however, usually adjust their perpetual records to indicate the unit costs determined by periodic costing procedures. When FIFO is in use, the perpetual and periodic costing procedures result in the same valuation of inventory.

**Pricing the Year-End Inventory by Computer** If purchase records are maintained by computer, as is now the case for most companies, the value of the ending inventory can be computed automatically using any of the flow assumptions that have been discussed. Only the number of units must be entered at year-end. A computer also can apply the specific identification method, but the system requires an identification number for each unit in the ending inventory. This is one reason why the specific identification method usually is not used for inventories consisting of a large number of low-cost items.

## INTERNATIONAL FINANCIAL REPORTING STANDARDS

To introduce this chapter we covered the importance of establishing the cost of inventory and the movement of that cost to the income statement as cost of goods sold. The general principles upon which this important feature of financial reporting are based are essentially the same in U.S. generally accepted accounting principles and in international financial reporting standards. There are differences, however, in how those principles are applied.

One major difference is that international standards do not recognize the LIFO method of accounting for the cost of inventory. Only the first-in, first-out (FIFO) or weighted-average cost methods are acceptable under international standards. This is a major difference because of the widespread use of LIFO in the United States due to its income tax benefits. Remember that the conformity requirement in U.S. tax law requires a company that uses LIFO for tax purposes to also use that method in its financial statements.

For several years, efforts have been made to bring U.S. generally accepted accounting principles and international financial reporting standards closer together. This effort is often referred to as “convergence” of the two. The fact that international standards do not permit the use of LIFO and LIFO is the most popular inventory method for companies reporting under U.S. generally accepted accounting principles is a major barrier to convergence. In the authors’ opinion, either to change U.S. standards to preclude the use of LIFO or to include LIFO as an acceptable method in international standards is unlikely. The most logical approach appears to be to eliminate the conformity requirement, thereby allowing companies accounting by U.S. standards to use LIFO in their income tax filings, but not require that LIFO be used in their financial statements. LIFO would, in effect, become a tax method that is not used in a company’s financial statements. The current conformity requirement has been in place for many years and any change in it would require a significant change in the U.S. tax law. The political process that would be required for such a change is unlikely

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to happen quickly, but could eventually be the outcome as we seek conformity between U.S. and International Financial Reporting Standards.

There are other areas where accounting for inventories differs between U.S. and international standards. One of those is accounting for the lower-of-cost-or-market. Under U.S. generally accepted accounting standards, once an inventory is written down to a lower market value, recovery of that value before the inventory is sold is not permitted. Under international standards, however, the subsequent recovery of market value is treated as a reduction in cost of goods sold in the period of the recovery.

### IMPORTANCE OF AN ACCURATE VALUATION OF INVENTORY

The most important liquid assets in the balance sheets of most companies are cash, accounts receivable, and inventory. Of these assets, inventory often is the largest. It also is the only one of these assets for which alternative valuation methods are acceptable.

Because of the relatively large size of inventory, and because many different products may be stored in different locations, errors in inventory valuation may not be readily apparent. Even a small error in the valuation of inventory may have a material effect on net income. Therefore, care must be taken in counting and pricing the inventory at year-end.

An error in the valuation of inventory will affect several balance sheet measurements, including assets and total owners' equity. It also will affect key figures in the *income statement*, including the cost of goods sold, gross profit, and net income. And remember that the ending inventory of one year is the beginning inventory of the next. This means that an error in inventory valuation will carry over into the financial statements of the following year.

**Effects of an Error in Valuing Ending Inventory** To illustrate, assume that some items of merchandise in a company's inventory are overlooked during the year-end physical count. As a result of this error, the ending inventory is understated. The costs of the uncounted merchandise erroneously are transferred out of the Inventory account and included in the cost of goods sold. This overstatement of the cost of goods sold, in turn, results in an understatement of gross profit and net income.<sup>7</sup>

**Inventory Errors Affect Two Years** An error in the valuation of ending inventory affects not only the financial statements of the current year but also the income statement for the following year.

Assume that the ending inventory in the first year is understated by \$10,000. As we have described previously, the cost of goods sold of that year is overstated by this amount, and both gross profit and net income are understated.

The ending inventory of the first year then becomes the beginning inventory of the second year. An understatement of the beginning inventory results in an understatement of the cost of goods sold and, therefore, an overstatement of gross profit and net income in the second year.

Notice that the original error has exactly the opposite effects on the net incomes of the two successive years. Net income was understated by the amount of the error in the first year and overstated by the same amount in the second year. For this reason, inventory errors are sometimes said to be "counterbalancing" or "self-correcting" over a two-year period.

The fact that offsetting errors occur in the financial statements of two successive years does not lessen the consequences of errors in inventory valuation. Rather, it exaggerates the misleading effects of the error on trends in the company's performance from one year to the next.

**Effects of Errors in Inventory Valuation: A Summary** In Exhibit 8-9 we summarize the effects of an error in the valuation of ending inventory over two successive years. In this exhibit we indicate the effects of the error on various financial statement measurements using the code letters **U** (understated), **O** (overstated), and **NE** (no effect). The effects of errors in the valuation of inventory are the same regardless of whether the company uses a perpetual or a periodic inventory system. The **NE** for owners' equity at year-end in the Following Year column results from the offsetting of the first-year error in the second year.

<sup>7</sup> If income tax effects are ignored, the amount of the error is exactly the same in inventory, gross profit, and net income. If tax effects are considered, the amount of the error may be lessened in the net income figure.

LO8-5

**LEARNING OBJECTIVE**  
Explain the effects on the income statement of errors in inventory valuation.

## EXHIBIT 8-9

## Effects of Inventory Errors

	Year of the Error	Following Year
<b>Original Error: Ending Inventory Understated</b>		
Beginning inventory .....	NE	U
Cost of goods available for sale .....	NE	U
Ending inventory .....	U	NE
Cost of goods sold .....	O	U
Gross profit .....	U	O
Net income .....	U	O
Owners' equity at year-end .....	U	NE
<b>Original Error: Ending Inventory Overstated</b>		
Beginning inventory .....	NE	O
Cost of goods available for sale .....	NE	O
Ending inventory .....	O	NE
Cost of goods sold .....	U	O
Gross profit .....	O	U
Net income .....	O	U
Owners' equity at year-end .....	O	NE

## TECHNIQUES FOR ESTIMATING THE COST OF GOODS SOLD AND THE ENDING INVENTORY

Taking a physical inventory several times during a year would be expensive and time-consuming. Therefore, if a business using a periodic inventory system prepares monthly or quarterly financial statements, it may need to estimate the amounts of its inventory and cost of goods sold except at the end of its annual period. One approach to making these estimates is called the gross profit method; another—used primarily by retail stores—is the retail method.

### THE GROSS PROFIT METHOD

The **gross profit method** is a technique for estimating the cost of goods sold and the amount of inventory on hand. Using this method assumes that the rate of gross profit earned in the preceding year (or several years) will remain the same for the current year. When we know the rate of gross profit, we can divide the dollar amount of net sales into two elements: (1) the gross profit and (2) the cost of goods sold. We view net sales as 100 percent. If the gross profit rate, for example, is 40 percent of net sales, the cost of goods sold must be 60 percent. The cost of goods sold percentage (or **cost ratio**) is determined by deducting the gross profit rate from 100 percent.

When the gross profit rate is known, the ending inventory can be estimated by the following procedures:

1. Determine the *cost of goods available for sale* from the accounting records of beginning inventory and net purchases.
2. Estimate the *cost of goods sold* by multiplying the net sales by the cost ratio.
3. Deduct the estimated *cost of goods sold* from the *cost of goods available for sale* to find the estimated ending inventory.

To illustrate, assume that Metro Hardware has a beginning inventory of \$50,000 on January 1. During the month of January, net purchases amount to \$20,000 and net sales total \$30,000. Assume that the company's normal gross profit rate is 40 percent of net sales; it follows that the cost ratio is 60 percent. Using these facts, the inventory on January 31 may be estimated as indicated in the following analysis.

LO8-6

**LEARNING OBJECTIVE**

Estimate the cost of goods sold and ending inventory by the gross profit method and by the retail method.

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Goods available for sale:	
Beginning inventory, Jan. 1 .....	\$50,000
Purchases .....	20,000
Cost of goods available for sale .....	\$70,000
Deduct: Estimated cost of goods sold:	
Net sales .....	\$30,000
Cost ratio (100% - 40%) .....	60%
Estimated cost of goods sold (\$30,000 × 60%) .....	18,000
Estimated ending inventory, Jan. 31 .....	<u>\$52,000</u>

The gross profit method of estimating inventory has several uses apart from the preparation of interim financial statements. For example, if an inventory is destroyed by fire, the company must estimate the amount of the inventory on hand at the date of the fire to file an insurance claim. One way to determine this inventory amount is the gross profit method.

The gross profit method can also be used at year-end after the taking of a physical inventory to confirm the overall reasonableness of the amount determined by the counting and pricing process. The gross profit method is not, however, a satisfactory substitute for periodically taking an actual physical inventory.

## THE RETAIL METHOD

The **retail method** of estimating inventory and the cost of goods sold is similar to the gross profit method. The basic difference is that the retail method requires that management determine the value of ending inventory at *retail* prices. The retail value of ending inventory is then converted to its approximate cost using a cost ratio.

To determine the cost ratio, a business must keep track of goods available for sale at both cost and at retail prices. To illustrate, assume that Ski Valley has merchandise available for sale costing \$450,000 for the year, and that management offers this merchandise for sale to customers at retail prices totaling \$1,000,000. This means that Ski Valley's cost ratio for the year is 45 percent ( $\$450,000 \div \$1,000,000$ ). Ski Valley can use this ratio to convert the retail value of its ending merchandise inventory to its estimated cost.

Assume that Ski Valley's employees determine that inventory on hand at the end of the year has a total retail value of \$300,000. This amount is converted to cost using the 45 percent cost ratio as follows:

a Goods available for sale at <i>cost</i> .....	\$ 450,000
b Goods available for sale at <i>retail</i> .....	1,000,000
c Cost ratio [a ÷ b] .....	45%
d Physical count of ending inventory priced at <i>retail</i> .....	300,000
e Estimated ending inventory at cost [c × d] .....	<u>\$ 135,000</u>

This application of the retail method approximates a valuation of ending inventory at its average cost. A widely used variation of this method enables management to estimate a LIFO valuation of ending inventory.

## "TEXTBOOK" INVENTORY SYSTEMS CAN BE MODIFIED . . . AND THEY OFTEN ARE

In this chapter we have described the basic characteristics of several commonly used inventory systems. In practice, businesses often modify these systems to suit their particular needs. Some businesses also use different inventory systems for different purposes.

We described one modification in Chapter 6—a company that maintains only a small inventory may simply charge (debit) all purchases directly to the cost of goods sold. Another common modification is to maintain perpetual inventory records showing only the *quantities*

When gross profit rate is known:

Step 1 Determine cost of goods available for sale (COGAS);

Step 2 Estimate the cost of goods sold (COGS) (multiply net sales by cost ratio); and

Step 3 Deduct estimated COGS from the COGAS to find estimated ending inventory.

A=L+LOE

of merchandise bought and sold, with no dollar amounts. Such systems require less record-keeping than a full-blown perpetual system, and they still provide management with useful information about sales and inventories. To generate the dollar amounts needed in financial statements and tax returns, these companies might use the gross profit method, the retail method, or a periodic inventory system.

Businesses such as restaurants often update their inventory records by physically counting products on a daily or weekly basis. In effect, they use frequent periodic counts as the basis for maintaining a perpetual inventory system.

In summary, real-world inventory systems often differ from the illustrations in a textbook. But the underlying principles remain the same.



## PATHWAYS CONNECTION

The true value of accounting information is how it informs decision making. This requires significant judgment and attention to detail. However, what ultimately matters most is how investors, creditors, management, and others are able to make well-informed decisions based on fair and accurate information. Much of that information is provided by the accounting processes and information systems that underlie a company's financial statements.

Inventory often is the largest of a company's current assets. But how liquid is this asset? How quickly will it be converted into cash? As a step toward answering these questions, short-term creditors often compute the **inventory turnover**.

### INVENTORY TURNOVER

The inventory turnover is equal to the cost of goods sold divided by the average amount of inventory (beginning inventory plus ending inventory, divided by 2). This ratio indicates how many times in the course of a year the company is able to sell the amount of its average inventory. The higher this rate, the more quickly the company sells its inventory.

LO8-7

**LEARNING OBJECTIVE**  
Compute inventory turnover and explain its uses.



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To illustrate, a recent annual report of Target shows a cost of goods sold of \$51,278 million and average inventory of \$8,534 million. The inventory turnover rate for Target, therefore, is 6.01 (\$51,278 million ÷ \$8,534 million). We may compute the number of days required for the company to sell its inventory by dividing 365 days by the turnover rate. Target requires 61 days to turn over (sell) the amount of its average inventory. The computation of Target's inventory turnover and the average number of days required to sell its inventory are summarized as follows:

#### Inventory Turnover

$$\frac{\text{Cost of Goods Sold}}{\text{Average Inventory}^*} = \frac{\$51,278}{\$8,534} = 6.01 \text{ times}$$

#### Average Number of Days to Sell Inventory

$$\frac{\text{Days in the Year}}{\text{Inventory Turnover}} = \frac{365 \text{ days}}{6.01 \text{ times}} = 61 \text{ days}$$

$$^* \text{Average Inventory} = (\text{Beginning Inventory} + \text{Ending Inventory}) \div 2$$

Users of financial statements find the inventory turnover useful in evaluating the liquidity of the company's inventory. Managers and independent auditors may use this computation to help identify inventory that is not selling well and that may have become obsolete. A declining turnover indicates that merchandise is not selling as quickly as in the past. Comparing a company's inventory turnover with that of competitors is particularly useful in evaluating how effective a company is at managing its inventory, often one of its largest assets.

### RECEIVABLES TURNOVER

Many businesses sell inventory on account. Therefore, the sale of inventory often does not provide an immediate source of cash. To determine how quickly inventory is converted into cash, the number of days required to sell the inventory must be combined with the number of days required to collect the accounts receivable that result from the sale.

The number of days required to collect accounts receivable depends on a company's *accounts receivable turnover*. This figure is computed by dividing net sales by the average

accounts receivable. The number of days required to collect these receivables then is determined by dividing 365 days by the turnover rate.

### Length of the Operating Cycle

The *operating cycle* of a merchandising company is the average time period between the purchase of merchandise and the conversion of this merchandise back into cash. In other words, the merchandise acquired as inventory gradually is converted into accounts receivable by sale of the goods on account, and

these receivables are later converted into cash through the process of collection.

From the viewpoint of short-term creditors, the shorter the operating cycle, the higher the quality of the company's liquid assets because they will be converted into cash more quickly.

In calculating the inventory turnover and the receivables turnover, we used the average inventory and average receivables for the year. If these amounts do not vary greatly during the year, using the year-end amounts may be an acceptable alternative.



## YOUR TURN

### You as a Credit Analyst

Assume that you are employed by GE Capital as a credit analyst, and that Waller Company is seeking to borrow money using its merchandise inventory as collateral. You have determined that the company's inventory turnover is 3.6 times, and that the average time to sell its inventory is slightly over 100 days. Assume that the company's inventory reported at cost is currently \$3.2 million, and that its gross profit as a percentage of sales is approximately 40 percent. Estimate the *market value* of the company's inventory for use as collateral.

(See our comments in Connect.)



## ETHICS, FRAUD, & CORPORATE GOVERNANCE

As discussed previously in this chapter, the valuation of inventory and the cost of goods sold is of critical importance to managers and to users of the company's financial statements. The two primary issues with regard to inventory valuation are existence and valuation.

In a well-known case of inventory fraud, the Securities and Exchange Commission (SEC) brought an enforcement action against an officer of **MiniScribe Corporation** related to his involvement in overstating inventory reported in the company's balance sheet. The overstatement of inventory resulted in an understatement of cost of goods sold and an overstatement of profits reported in the company's income statement (MiniScribe's net income was actually inflated by \$22 million, or 244 percent).

Prior to being acquired by **Maxtor Corporation**, MiniScribe manufactured computer disk drives and its stock

was quoted on NASDAQ. The company had discovered a material shortfall in its inventory balance. Reporting this shortfall would have increased the cost of goods sold and reduced the company's net income significantly. So MiniScribe concealed the shortfall from its independent auditors by taking a number of actions to inappropriately overstate its actual inventory balance. First, it recorded a fictitious transfer of nonexistent inventory from its headquarters to an overseas subsidiary. Second, it repackaged scrap items and obsolete inventory as if they were "good" inventory items. Third, it packed *bricks* into computer disk drive boxes and shipped them to its distributors (these shipments were still counted as inventory by MiniScribe until the distributors sold the boxes).

## Concluding Remarks

Throughout this chapter we have learned about different inventory valuation methods. Each method is based upon a particular assumption about cost flows and does not necessarily parallel the physical movement of merchandise. Moreover, the choice of valuation by management can have significant effects on a company's income statement, balance sheet, and tax returns.

In the following chapter, we will see that a similar situation exists with respect to alternative methods used to account for plant and equipment.