

# Analysis of Financial Statements

## CHAPTER

# 4



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### Can You Make Money Analyzing Stocks?

For many years, a debate has raged over this question. Some argue that the stock market is highly efficient and that all available information regarding a stock is already reflected in its price. The “efficient market advocates” point out that there are thousands of smart, well-trained analysts working for institutions with billions of dollars. These analysts have access to the latest information, and they spring into action—buying or selling—as soon as a firm releases any information that has a bearing on its future profits. The “efficient market advocates” also point out that few mutual funds, which hire good people and pay them well, actually beat the averages. If these experts earn only average returns, how can the rest of us expect to beat the market?

Others disagree, arguing that analysis can pay off. They point out that some fund managers perform better than average year after year. Also, they note that some “activist” investors analyze firms carefully, identify those with weaknesses

that appear to be correctable, and then persuade their managers to take actions to improve the firms’ performances.

Arguably, the world’s best-known investor is Warren Buffett. Through his company Berkshire Hathaway, Buffett has made significant investments in a number of well-known companies, including Coca-Cola, American Express, DIRECTV, IBM, and Wells Fargo. Buffett is well known for taking a long-run view of things. His value-investing approach, which borrows heavily from the ideas espoused decades ago by Benjamin Graham, looks for stocks trading at prices that are significantly lower than their estimated intrinsic value. Value investors rely heavily on the type of analysis described in this chapter to assess a company’s strengths and weaknesses and to derive the key inputs for their estimates of intrinsic value.

Berkshire Hathaway’s performance under Buffett’s management has been nothing short of amazing. A recent article in *Fortune*

calculates that in the 50 years that Buffett has been at the helm (1964–2014), Berkshire Hathaway has provided its investors with a staggering total return of 1,826,163%, which translates into a compound annual return of 21.6%! And so far, Buffett is showing no signs of slowing down. Always looking for new opportunities, in June 2013, Berkshire Hathaway partnered with private equity firm 3G Capital and acquired H.J. Heinz Company for \$28 billion. A year later in November 2014, Buffett saw what he thought was another good opportunity. In that transaction, Berkshire purchased the Duracell battery unit from Procter and Gamble. And in March 2015, he once again combined forces with 3G Capital

to help finance the merger between Heinz and Kraft Foods. In each case, Buffett purchased a well-established brand that he believes has even greater potential for improvement.

So, although many people regard financial statements as “just accounting,” they really are much more. As you will see in this chapter, these statements provide a wealth of information that can be used for a wide variety of purposes by managers, investors, lenders, customers, suppliers, and regulators. An analysis of its statements can highlight a company’s strengths and shortcomings, and this information can be used by management to improve the company’s performance and by others to predict future results.

Sources: Carol J. Loomis, “Grading Berkshire after 50 Years under Buffett: How Does a 1,826,163% Stock Rise Sound?” *Fortune* (www.fortune.com), February 28, 2015; and Jonathan Stempel and Devika Krishna Kumar, “Buffett’s Berkshire Hathaway Buys P&G’s Duracell,” *Reuters* (www.reuters.com), November 13, 2014.



## PUTTING THINGS IN PERSPECTIVE

The primary goal of financial management is to maximize shareholders’ wealth, not accounting measures such as net income or earnings per share (EPS). However, accounting data influence stock prices, and these data can be used to see why a company is performing the way it is and where it is heading. Chapter 3 described the key financial statements and showed how they change as a firm’s operations change. Now, in Chapter 4, we show how the statements are used by managers to improve the firm’s stock price; by lenders to evaluate the likelihood that borrowers will be able to pay off loans; and by security analysts to forecast earnings, dividends, and stock prices.

If management is to maximize a firm’s value, it must take advantage of the firm’s strengths and correct its weaknesses. Financial analysis involves (1) comparing the firm’s performance to that of other firms in the same industry and (2) evaluating trends in the firm’s financial position over time. These studies help managers identify deficiencies and take corrective actions. In this chapter, we focus on how managers and investors evaluate a firm’s financial position. Then, in later chapters, we examine the types of actions managers can take to improve future performance and thus increase the firm’s stock price.

When you finish this chapter, you should be able to

- Explain what ratio analysis is.
- List the five groups of ratios and identify, calculate, and interpret the key ratios in each group.
- Discuss each ratio’s relationship to the balance sheet and income statement.
- Discuss why return on equity (ROE) is the key ratio under management’s control and how the other ratios impact ROE, and explain how to use the DuPont equation for improving ROE.
- Compare a firm’s ratios with those of other firms (benchmarking) and analyze a given firm’s ratios over time (trend analysis).
- Discuss the tendency of ratios to fluctuate over time (which may or may not be problematic); explain how they can be influenced by accounting practices as well as other factors; and explain why they must be used with care.

## 4-1 Ratio Analysis

Ratios help us evaluate financial statements. For example, at the end of 2016, Allied Food Products had \$860 million of interest-bearing debt and interest charges of \$88 million, while Midwest Products had \$52 million of interest-bearing debt and interest charges of \$4 million. Which company is stronger? The burden of these debts and the companies' ability to repay them can best be evaluated by comparing each firm's total debt to its total capital and comparing interest expense to the income and cash available to pay that interest. Ratios are used to make such comparisons. We calculate Allied's ratios for 2016 using data from the balance sheets and income statements given in Tables 3.1 and 3.2. We also evaluate the ratios relative to food industry averages, using data in millions of dollars.<sup>1</sup> As you will see, we can calculate many different ratios, with different ones used to examine different aspects of the firm's operations. You will get to know some ratios by name, but it's better to understand what they are designed to do than to memorize names and equations.

We divide the ratios into five categories:

1. *Liquidity ratios*, which give an idea of the firm's ability to pay off debts that are maturing within a year.
2. *Asset management ratios*, which give an idea of how efficiently the firm is using its assets.
3. *Debt management ratios*, which give an idea of how the firm has financed its assets as well as the firm's ability to repay its long-term debt.
4. *Profitability ratios*, which give an idea of how profitably the firm is operating and utilizing its assets.
5. *Market value ratios*, which give an idea of what investors think about the firm and its future prospects.

Satisfactory liquidity ratios are necessary if the firm is to continue operating. Good asset management ratios are necessary for the firm to keep its costs low and thus its net income high. Debt management ratios indicate how risky the firm is and how much of its operating income must be paid to bondholders rather than stockholders. Profitability ratios combine the asset and debt management categories and show their effects on ROE. Finally, market value ratios tell us what investors think about the company and its prospects.

All of the ratios are important, but different ones are more important for some companies than for others. For example, if a firm borrowed too much in the past and its debt now threatens to drive it into bankruptcy, the debt ratios are key. Similarly, if a firm expanded too rapidly and now finds itself with excess inventory and manufacturing capacity, the asset management ratios take center stage. The ROE is always important; but a high ROE depends on maintaining liquidity, on efficient asset management, and on the proper use of debt. Managers are, of course, vitally concerned with the stock price; but managers have little direct control over

<sup>1</sup>Financial statement data for most publicly traded firms can be obtained from the Internet. Free sites that provide this information include Google Finance ([google.com/finance](http://google.com/finance)) and Yahoo! Finance ([finance.yahoo.com](http://finance.yahoo.com)). These sites provide financial statements, which can be copied to an Excel file and used to create your own ratios; but the websites also provide calculated ratios.

In addition to the ratios discussed in this chapter, financial analysts often employ a tool known as *common size analysis*. To form a *common size balance sheet*, simply divide each asset, liability, and equity item by total assets and then express the results as percentages. To develop a *common size income statement*, divide each income statement item by sales. The resultant percentage statements can be compared with statements of larger or smaller firms or with those of the same firm over time. One would normally obtain the basic statements from a source such as Google Finance and copy them to Excel, so constructing common size statements is quite easy. Note too that industry average data are generally given as percentages, which make them easy to compare with a firm's own common size statements. We provide Allied Food Products's common size statements in Web Appendix 4A.

the stock market's performance, while they do have control over their firm's ROE. So ROE tends to be the main focal point.

## 4-2 Liquidity Ratios

The liquidity ratios help answer this question: Will the firm be able to pay off its debts as they come due and thus remain a viable organization? If the answer is no, liquidity must be addressed.

A **liquid asset** is one that trades in an active market and thus can be quickly converted to cash at the going market price. As shown in Table 3.1 in Chapter 3, Allied has \$310 million of current liabilities that must be paid off within the coming year. Will it have trouble meeting that obligation? A full liquidity analysis requires the use of a cash budget, which we discuss in Chapter 15; however, by relating cash and other current assets to current liabilities, ratio analysis provides a quick and easy-to-use measure of liquidity. Two of the most commonly used **liquidity ratios** are discussed below.

### Liquid Asset

An asset that can be converted to cash quickly without having to reduce the asset's price very much.

### Liquidity Ratios

Ratios that show the relationship of a firm's cash and other current assets to its current liabilities.

### Current Ratio

This ratio is calculated by dividing current assets by current liabilities. It indicates the extent to which current liabilities are covered by those assets expected to be converted to cash in the near future.

### 4-2A CURRENT RATIO

The primary liquidity ratio is the **current ratio**, which is calculated by dividing current assets by current liabilities:

$$\begin{aligned} \text{Current ratio} &= \frac{\text{Current assets}}{\text{Current liabilities}} \\ &= \frac{\$1,000}{\$310} = 3.2 \times \\ \text{Industry average} &= 4.2 \times \end{aligned}$$

Current assets include cash, marketable securities, accounts receivable, and inventories. Allied's current liabilities consist of accounts payable, accrued wages and taxes, and short-term notes payable to its bank, all of which are due within one year.

If a company is having financial difficulty, it typically begins to pay its accounts payable more slowly and to borrow more from its bank, both of which increase current liabilities. If current liabilities are rising faster than current assets, the current ratio will fall; and this is a sign of possible trouble. Allied's current ratio is 3.2, which is well below the industry average of 4.2. Therefore, its liquidity position is somewhat weak, but by no means desperate.<sup>2</sup>

Although industry average figures are discussed later in some detail, note that an industry average is not a magic number that all firms should strive to maintain; in fact, some very well-managed firms may be above the average, while other good firms are below it. However, if a firm's ratios are far removed from the averages for its industry, an analyst should be concerned about why this variance occurs. Thus, a deviation from the industry average should signal the analyst (or management) to check further. Note too that a high current ratio generally indicates a very strong, safe liquidity position; it might also indicate that the firm has too much old inventory that will have to be written off and too many old accounts receivable that may turn into bad debts. Or the high current ratio might indicate that the firm has too much cash, receivables, and inventory relative to its sales, in which case these assets are not being managed efficiently. So it is always necessary to thoroughly examine the full set of ratios before forming a judgment as to how well the firm is performing.

<sup>2</sup>Because current assets should be convertible to cash within a year, it is likely that they could be liquidated at close to their stated value. With a current ratio of 3.2, Allied could liquidate current assets at only 31% of book value and still pay off current creditors in full:  $1/3.2 = 0.31$ , or 31%. Note also that  $0.31(\$1,000) = \$310$ , the current liabilities balance.

## FINANCIAL ANALYSIS ON THE INTERNET

A wide range of valuable financial information is available on the Internet. With just a couple of clicks, an investor can find the key financial statements for most publicly traded companies.

Suppose you are thinking of buying some Disney stock, and you want to analyze its recent performance. Here's a partial (but by no means complete) list of sites you can access to get started:

- One source is Yahoo! Finance ([finance.yahoo.com](http://finance.yahoo.com)). Here you will find updated market information along with links to a variety of research sites. Enter a stock's ticker symbol, and you will see the stock's current price along with recent news about the company. Click "Key Statistics" to find a report on the company's key financial ratios. Links to the company's financials (income statement, balance sheet, and statement of cash flows) can also be found. Yahoo! Finance also has a list of insider transactions that tell you whether a company's CEO and other key insiders are buying or selling the company's stock. In addition, the site has a message board where investors share opinions about the company and a link is provided to the company's filings with the Securities and Exchange Commission (SEC). Note also that, in most cases, a more complete listing of SEC filings can be found at the SEC website ([sec.gov](http://sec.gov)).
- Two other websites with similar information are Google Finance ([google.com/finance](http://google.com/finance)) and *MSN Money* ([money.msn.com](http://money.msn.com)). After entering a stock's ticker symbol, you will see the current stock price and a list of recent news stories. At either of these sites, you will find links to a company's financial statements and key ratios, as well as other information including analyst ratings, historical charts, earnings estimates, and a summary of insider transactions.
- Other sources for up-to-date market information are CNNMoney.com ([money.cnn.com](http://money.cnn.com)), Zacks Investment Research ([zacks.com](http://zacks.com)), and MarketWatch ([marketwatch.com](http://marketwatch.com)), part of *The Wall Street Journal* Digital Network. On these sites, you also can obtain stock quotes, financial statements, links to Wall Street research and SEC filings, company profiles, and charts of a firm's stock price over time.
- CNBC ([cnbc.com](http://cnbc.com)) is another good source of financial information. Here, you enter a firm's ticker symbol to obtain the firm's stock price and fundamentals like its market cap, beta, and dividend yield. You can also chart a firm's stock price and obtain news about the company, earnings history and estimates, industry peer comparisons, and quarterly or annual financial statements.
- Seekingalpha.com provides stock price quotes; fundamentals like EPS, P/E, and dividend yield information as well as stock price charts. In addition, you can obtain breaking news on any stocks you've listed in your portfolio or any that you wish to follow.
- If you're looking for data on bond yields, key money rates, and currency rates, Bloomberg ([bloomberg.com](http://bloomberg.com)) is an excellent source for this type of information.
- Another good place to look is Reuters ([reuters.com](http://reuters.com)). Here you can find links to analysts' research reports along with the key financial statements.
- A valuable subscriber website from *Value Line Investment Survey* ([valueline.com](http://valueline.com)) provides industry-specific and detailed company income statement data, capital structure data, returns data, EPS, book value per share, cash flow per share, and other investment data.
- If you're interested in obtaining baseline values on individual stocks, you will find ValuePro ([valuepro.net](http://valuepro.net)) helpful. It identifies key financial numbers used to obtain a stock's value and allows the user to make changes and see their impact on the stock's value.
- After accumulating all of this information, you may want to look at a site that provides opinions regarding the direction of the overall market and a particular stock. Two popular sites are The Motley Fool ([fool.com](http://fool.com)) and The Street ([thestreet.com](http://thestreet.com)).
- A popular source is *The Wall Street Journal* website ([online.wsj.com](http://online.wsj.com)). It is a great resource, but you have to subscribe to access the full range of materials.

When analyzing ratios using different sources, it is important that you understand how each source calculates a particular ratio. Differences among sources could be attributable to timing differences (using an average number versus a trailing 12-month number) or to different definitions. It is quite possible that, if you were to examine the same ratio for a particular company, you might see different values for the same ratio depending on the source chosen. You can often click "Help" within the particular website and search for the site's specific finance glossary to determine how ratios are defined. Keep this in mind when conducting ratio analysis.

This list is just a small subset of the information available online and available to you to work the end-of-chapter Internet exercises Taking a Closer Look. Sites come and go and change their content over time. In addition, new and interesting sites are constantly being added to the Internet.

### 4-2B QUICK, OR ACID TEST, RATIO

#### Quick (Acid Test) Ratio

This ratio is calculated by deducting inventories from current assets and then dividing the remainder by current liabilities.

The second liquidity ratio is the **quick, or acid test, ratio**, which is calculated by deducting inventories from current assets and then dividing the remainder by current liabilities:

$$\begin{aligned}\text{Quick, or acid test, ratio} &= \frac{\text{Current assets} - \text{Inventories}}{\text{Current liabilities}} \\ &= \frac{\$385}{\$310} = 1.2 \times \\ \text{Industry average} &= 2.2 \times\end{aligned}$$

Inventories are typically the least liquid of a firm's current assets; and if sales slow down, they might not be converted to cash as quickly as expected.<sup>3</sup> Also, inventories are the assets on which losses are most likely to occur in the event of liquidation. Therefore, the quick ratio, which measures the firm's ability to pay off short-term obligations without relying on the sale of inventories, is important.

The industry average quick ratio is 2.2, so Allied's 1.2 ratio is relatively low. Still, if the accounts receivable can be collected, the company can pay off its current liabilities even if it has trouble disposing of its inventories.

### SelfTest



What are the characteristics of a liquid asset? Give examples of some liquid assets.

What question are the two liquidity ratios designed to answer?

Which is the least liquid of the firm's current assets?

A company has current liabilities of \$500 million, and its current ratio is 2.0. What is the total of its current assets? (\$1,000 million) If this firm's quick ratio is 1.6, how much inventory does it have? (\$200 million) (Hint: To answer this problem and some of the other problems in this chapter, write out the equation for the ratio in the question, insert the given data, and solve for the missing value.) Examples:

Current ratio = 2.0 = CA / CL = CA / \$500, so CA = 2(\$500) = \$1,000.

Quick ratio = 1.6 = (CA - Inventories) / CL = (\$1,000 - Inventories) / \$500, so \$1,000 - Inventories = 1.6(\$500) and Inventories = \$1,000 - \$800 = \$200.

### 4-3 Asset Management Ratios

#### Asset Management Ratios

A set of ratios that measure how effectively a firm is managing its assets.

The second group of ratios, the **asset management ratios**, measure how effectively the firm is managing its assets. These ratios answer this question: Does the amount of each type of asset seem reasonable, too high, or too low in view of current and projected sales? These ratios are important because when Allied and other companies acquire assets, they must obtain capital from banks or other sources and capital is expensive. Therefore, if Allied has too many assets, its cost of capital will be too

<sup>3</sup>Some companies also report "Other current assets" on their balance sheet. Our definition of the quick ratio would implicitly assume that these other current assets could be easily converted to cash. As an alternative measure, some analysts define the quick ratio as:

$$(\text{Cash and equivalents} + \text{Accounts receivable}) / \text{Current liabilities}$$

This alternative measure assumes that the other current assets cannot be easily converted to cash. In the case of Allied, because it has no other current assets, the two measures would yield the same number.

high, which will depress its profits. On the other hand, if its assets are too low, profitable sales will be lost. So Allied must strike a balance between too many and too few assets, and the asset management ratios will help it strike this proper balance.

### 4-3A INVENTORY TURNOVER RATIO

“Turnover ratios” divide sales by some asset: Sales/Various assets. As the name implies, these ratios show how many times the particular asset is “turned over” during the year. Here is the **inventory turnover ratio**:

$$\begin{aligned} \text{Inventory turnover ratio} &= \frac{\text{Sales}}{\text{Inventories}} \\ &= \frac{\$3,000}{\$615} = 4.9 \times \\ \text{Industry average} &= 10.9 \times \end{aligned}$$

As a rough approximation, each item of Allied’s inventory is sold and restocked, or “turned over,” 4.9 times per year. *Turnover* is a term that originated many years ago with the old Yankee peddler who would load up his wagon with pots and pans, and then go off on his route to peddle his wares. The merchandise was called working capital because it was what he actually sold, or “turned over,” to produce his profits, whereas his “turnover” was the number of trips he took each year. Annual sales divided by inventory equaled turnover, or trips per year. If he made 10 trips per year, stocked 100 pots and pans, and made a gross profit of \$5 per item, his annual gross profit was  $(100)(\$5)(10) = \$5,000$ . If he went faster and made 20 trips per year, his gross profit doubled, other things held constant. So his turnover directly affected his profits.

Allied’s inventory turnover of 4.9 is much lower than the industry average of 10.9. This suggests that it is holding too much inventory. Excess inventory is, of course, unproductive and represents an investment with a low or zero rate of return. Allied’s low inventory turnover ratio also makes us question its current ratio. With such a low turnover, the firm may be holding obsolete goods that are not worth their stated value.<sup>4</sup>

Note that sales occur over the entire year, whereas the inventory figure is for one point in time. For this reason, it might be better to use an average inventory measure.<sup>5</sup> If the business is highly seasonal or if there has been a strong upward or downward sales trend during the year, it is especially useful to make an adjustment. Allied’s sales are not growing especially fast though; and to maintain comparability with industry averages, we used year-end rather than average inventories.

### 4-3B DAYS SALES OUTSTANDING

Accounts receivable are evaluated by the **days sales outstanding (DSO) ratio**, also called the average collection period (ACP).<sup>6</sup> It is calculated by dividing accounts receivable by the average daily sales to find how many days’ sales are tied up in

#### Inventory Turnover Ratio

This ratio is calculated by dividing sales by inventories.

#### Days Sales Outstanding (DSO) Ratio

This ratio is calculated by dividing accounts receivable by average sales per day. It indicates the average length of time the firm must wait after making a sale before it receives cash.

<sup>4</sup>Our measure of inventory turnover is frequently used by established compilers of financial ratio statistics such as *Value Line* (valueline.com) and *Morningstar* (morningstar.com). However, you should recognize that other sources calculate inventory using cost of goods sold in place of sales in the formula’s numerator. The rationale for this alternative measure is that sales are stated at market prices; so if inventories are carried at cost, as they generally are, the calculated turnover overstates the true turnover ratio. Therefore, it might be more appropriate to use cost of goods sold in place of sales in the formula’s numerator. When evaluating and comparing financial ratios from various sources, it is important to understand how those sources are specifically calculating financial ratios.

<sup>5</sup>Preferably, the average inventory value should be calculated by summing the monthly figures during the year and dividing by 12. If monthly data are not available, the beginning and ending figures can be added and then divided by 2. Both methods adjust for growth, but not for seasonal effects.

<sup>6</sup>We could use the receivables turnover to evaluate receivables. Allied’s receivables turnover is  $\$3,000/\$375 = 8 \times$ . However, the DSO ratio is easier to interpret and judge.

receivables. Thus, the DSO represents the average length of time the firm must wait after making a sale before receiving cash. Allied has 46 days' sales outstanding, well above the 36-day industry average:

$$\begin{aligned} \text{DSO} &= \frac{\text{Days sales outstanding}}{\text{Receivables}} = \frac{\text{Receivables}}{\text{Average sales per day}} = \frac{\text{Receivables}}{\text{Annual sales}/365} \\ &= \frac{\$375}{\$3,000/365} = \frac{\$375}{\$8,2192} = 45.625 \text{ days} = 46 \text{ days} \\ \text{Industry average} &= 36 \text{ days} \end{aligned}$$

The DSO can be compared with the industry average, but it is also evaluated by comparing it with Allied's credit terms. Allied's credit policy calls for payment within 30 days. So the fact that 46 days' sales are outstanding, not 30 days', indicates that Allied's customers, on average, are not paying their bills on time. This deprives the company of funds that could be used to reduce bank loans or some other type of costly capital. Moreover, the high average DSO indicates that if some customers are paying on time, quite a few must be paying very late. Late-paying customers often default, so their receivables may end up as bad debts that can never be collected.<sup>7</sup> Note too that the trend in the DSO over the past few years has been rising, but the credit policy has not been changed. This reinforces our belief that Allied's credit manager should take steps to collect receivables faster.

#### 4-3C FIXED ASSETS TURNOVER RATIO

The fixed assets turnover ratio, which is the ratio of sales to net fixed assets, measures how effectively the firm uses its plant and equipment:

$$\begin{aligned} \text{Fixed assets turnover ratio} &= \frac{\text{Sales}}{\text{Net fixed assets}} \\ &= \frac{\$3,000}{\$1,000} = 3.0 \times \\ \text{Industry average} &= 2.8 \times \end{aligned}$$

Allied's ratio of 3.0 times is slightly above the 2.8 industry average, indicating that it is using its fixed assets at least as intensively as other firms in the industry. Therefore, Allied seems to have about the right amount of fixed assets relative to its sales.

Potential problems may arise when interpreting the fixed assets turnover ratio. Recall that fixed assets are shown on the balance sheet at their historical costs less depreciation. Inflation has caused the value of many assets that were purchased in the past to be seriously understated. Therefore, if we compare an old firm whose fixed assets have been depreciated with a new company with similar operations that acquired its fixed assets only recently, the old firm will probably have the higher fixed assets turnover ratio. However, this would be more reflective of the age of the assets than of inefficiency on the part of the new firm. The accounting profession is trying to develop procedures for making financial statements reflect current values rather than historical values, which would help us make better comparisons. However, at the moment, the problem still exists; so financial analysts must recognize this problem and deal with it judgmentally. In Allied's case, the issue is not serious because all firms in the industry have been expanding at about the same rate; hence, the balance sheets of the comparison firms are reasonably comparable.<sup>8</sup>

<sup>7</sup>For example, if further analysis along the lines suggested in Part 6 of this text (Working Capital Management) indicates that 85% of the customers pay in 30 days, for the DSO to average 46 days, the remaining 15% must be paying, on average, in 136.67 days. Paying that late suggests financial difficulties. A DSO of 46 days would alert a good analyst of the need to dig deeper.

<sup>8</sup>Refer to FASB Accounting Standards Codification Topic 255, Changing Prices, for a discussion of the effects of inflation on financial statements. ASC 255 references FAS 89, Financial Reporting and Changing Prices, issued in December 1986.

**Fixed Assets  
Turnover Ratio**  
The ratio of sales to net  
fixed assets.



### 4-3D TOTAL ASSETS TURNOVER RATIO

The final asset management ratio, the **total assets turnover ratio**, measures the turnover of all of the firm's assets, and it is calculated by dividing sales by total assets:

$$\begin{aligned} \text{Total assets turnover ratio} &= \frac{\text{Sales}}{\text{Total assets}} \\ &= \frac{\$3,000}{\$2,000} = 1.5 \times \\ \text{Industry average} &= 1.8 \times \end{aligned}$$

#### Total Assets Turnover Ratio

This ratio is calculated by dividing sales by total assets.

Allied's ratio is somewhat below the industry average, indicating that it is not generating enough sales given its total assets. We just saw that Allied's fixed assets turnover is in line with the industry average; so the problem is with its current assets, inventories and accounts receivable, whose ratios were below the industry standards. Inventories should be reduced and receivables collected faster, which would improve operations.

### Self Test



Write the equations for four ratios that are used to measure how effectively a firm manages its assets.

If one firm is growing rapidly and another is not, how might this distort a comparison of their inventory turnover ratios?

If you wanted to evaluate a firm's DSO, with what could you compare it?

How might the different ages of firms distort comparisons of their fixed assets turnover ratios?

A firm has annual sales of \$100 million, \$20 million of inventory, and \$30 million of accounts receivable. What is its inventory turnover ratio? (5×) What is its DSO? (109.5 days)

### 4-4 Debt Management Ratios

The use of debt will increase, or "leverage up," a firm's ROE if the firm earns more on its assets than the interest rate it pays on debt. However, debt exposes the firm to more risk than if it financed only with equity. In this section we discuss **debt management ratios**.

Table 4.1 illustrates the potential benefits and risks associated with debt.<sup>9</sup> Here we analyze two companies that are identical except for how they are financed. Firm U (for *Unleveraged*) has no debt; thus, it uses 100% common equity. Firm L (for *Leveraged*) obtained 50% of its capital as debt at an interest rate of 10%. Both firms have \$100 of assets, and their sales are expected to range from a high of \$150 down to \$75 depending on business conditions. Some of their operating costs (e.g., rent and the president's salary) are fixed and will be

#### Debt Management Ratios

A set of ratios that measure how effectively a firm manages its debt.

<sup>9</sup>We discuss ROE in more depth later in this chapter, and we examine the effects of leverage in detail in Chapter 13. The relationship between various debt management ratios and bond ratings is discussed in Chapter 7 and illustrated in Table 7.4.

TABLE 4.1 The Effects of Financial Leverage

Firm U—Unleveraged (No Debt)				
Current assets	\$ 50	Debt		\$ 0
Fixed assets	<u>50</u>	Common equity		<u>100</u>
Total assets	<u>\$100</u>	Total liabilities and equity		<u>\$100</u>
State of the Economy				
		Good	Expected	Bad
Sales revenues		\$150.0	\$100.0	\$75.0
Operating costs	Fixed	45.0	45.0	45.0
	Variable	<u>60.0</u>	<u>40.0</u>	<u>30.0</u>
Total operating costs		<u>105.0</u>	<u>85.0</u>	<u>75.0</u>
Operating income (EBIT)		\$ 45.0	\$ 15.0	\$ 0.0
Interest (Rate = 10%)		<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
Earnings before taxes (EBT)		\$ 45.0	\$ 15.0	\$ 0.0
Taxes (Rate = 40%)		<u>18.0</u>	<u>6.0</u>	<u>0.0</u>
Net income (NI)		<u>\$ 27.0</u>	<u>\$ 9.0</u>	<u>\$ 0.0</u>
ROE <sub>U</sub>		27.0%	9.0%	0.0%
Firm L—Leveraged (Some Debt)				
Current assets	\$ 50	Debt		\$ 50
Fixed assets	<u>50</u>	Common equity		<u>50</u>
Total assets	<u>\$100</u>	Total liabilities and equity		<u>\$100</u>
State of the Economy				
		Good	Expected	Bad
Sales revenues		\$150.0	\$100.0	\$ 75.0
Operating costs	Fixed	45.0	45.0	45.0
	Variable	<u>60.0</u>	<u>40.0</u>	<u>30.0</u>
Total operating costs		<u>105.0</u>	<u>85.0</u>	<u>75.0</u>
Operating income (EBIT)		\$ 45.0	\$ 15.0	\$ 0.0
Interest (Rate = 10%)		<u>5.0</u>	<u>5.0</u>	<u>5.0</u>
Earnings before taxes (EBT)		\$ 40.0	\$ 10.0	-\$ 5.0
Taxes (Rate = 40%)		<u>16.0</u>	<u>4.0</u>	<u>0.0</u>
Net income (NI)		<u>\$ 24.0</u>	<u>\$ 6.0</u>	<u>-\$ 5.0</u>
ROE <sub>L</sub>		48.0%	12.0%	-10.0%

the same regardless of the level of sales, while other costs (e.g., manufacturing labor and materials costs) vary with sales.<sup>10</sup>

Notice that everything is the same in the table for the leveraged and unleveraged firms down through operating income—thus, their EBITs are the same in each state of the economy. However, things differ below operating income. Firm U has no debt, it pays no interest, its taxable income is the same as its operating income, it

<sup>10</sup>The financial statements do not show the breakdown between fixed and variable operating costs, but companies can and do make this breakdown for internal purposes. Of course, the distinction is not always clear because a fixed cost in the very short run can become a variable cost over a longer time horizon. It's interesting to note that companies are moving toward making more of their costs variable, using such techniques as increasing bonuses rather than base salaries, switching to profit-sharing plans rather than fixed pension plans, and outsourcing various operations.

pays a 40% state and federal tax rate, and its net income ranges from \$27 under good conditions down to \$0 under bad conditions. When U's net income is divided by its common equity, its ROEs range from 27% to 0% depending on the state of the economy.

Firm L has the same EBIT as U under each state of the economy, but L uses \$50 of debt with a 10% interest rate; so it has \$5 of interest charges regardless of the economy. This \$5 is deducted from EBIT to arrive at taxable income; taxes are taken out; and the result is net income, which ranges from \$24 to -\$5 depending on conditions.<sup>11</sup> At first, it looks as though Firm U is better off under all conditions, but this is not correct—we need to consider how much the two firms' stockholders have invested. Firm L's stockholders have put up only \$50; so when that investment is divided into net income, we see that their ROE under good conditions is a whopping 48% (versus 27% for U) and is 12% (versus 9% for U) under expected conditions. However, L's ROE falls to -10% under bad conditions, which means that Firm L would go bankrupt if those conditions persisted for several years.

Thus, firms with relatively high debt ratios typically have higher expected returns when the economy is normal, but lower returns and possibly bankruptcy if the economy goes into a recession. Therefore, decisions about the use of debt require firms to balance higher expected returns against increased risk. Determining the optimal amount of debt is a complicated process, and we defer a discussion of that subject until Chapter 13. For now, we simply look at two procedures that analysts use to examine the firm's debt. (1) They check the balance sheet to determine the proportion of total funds represented by debt. (2) They review the income statement to see the extent to which interest is covered by operating profits.

#### 4-4A TOTAL DEBT TO TOTAL CAPITAL

The ratio of **total debt to total capital** measures the percentage of the firm's capital provided by debtholders:

$$\begin{aligned} \frac{\text{Total debt}}{\text{Total capital}} &= \frac{\text{Total debt}}{\text{Total debt} + \text{Equity}} \\ &= \frac{\$110 + \$750}{\$1,800} = \frac{\$860}{\$1,800} = 47.8\% \end{aligned}$$

Industry average = 36.4%

#### Total Debt to Total Capital

The ratio of total debt to total capital.

Recall from Chapter 3 that total debt includes all short-term and long-term interest-bearing debt, but it does not include operating items such as accounts payable and accruals. Allied has total debt of \$860 million, which consists of \$110 million in short-term notes payable and \$750 million in long-term bonds. Its total capital is \$1.80 billion: \$860 million of debt plus \$940 million in total equity. To keep things simple, unless we say otherwise, we will generally refer to the total debt to total capital ratio as the company's *debt ratio*.<sup>12</sup> Creditors prefer low debt ratios because the lower the ratio, the greater the cushion against creditors' losses in the event of

<sup>11</sup>As we discussed in the last chapter, firms can carry losses back or forward for several years. Therefore, if firm L had profits and thus paid taxes in 2015, it could carry-back the 2016 loss under bad conditions and receive a credit (a check from the government). In Table 4.1, we disregard the carryback/carryforward provision.

<sup>12</sup>Two other debt ratios are often used in financial analysis:

1. Some analysts like to look at a broader debt ratio that includes all total liabilities (including accounts payables and accruals) divided by total assets. For Allied, the total liabilities-to-assets ratio is 53% (\$1,060 million divided by \$2,000 million), while the industry average is 40%.
2. Another measure, the debt-to-equity ratio equals total debt divided by total equity. Allied's debt-to-equity ratio is \$860 million/\$940 million = 91.5%.

liquidation. Stockholders, on the other hand, may want more leverage because it can magnify expected earnings, as we saw in Table 4.1.

Allied's debt ratio is 47.8%, which means that its creditors have supplied roughly half of its total funds. As we will discuss in Chapter 13, a number of factors affect a company's optimal debt ratio. Nevertheless, the fact that Allied's debt ratio exceeds the industry average by a large amount raises a red flag, and this will make it relatively costly for Allied to borrow additional funds without first raising more equity. Creditors will be reluctant to lend the firm more money, and management would probably be subjecting the firm to too high a risk of bankruptcy if it sought to borrow a substantial amount of additional funds.

#### 4-4B TIMES-INTEREST-EARNED RATIO

The **times-interest-earned (TIE) ratio** is determined by dividing earnings before interest and taxes (EBIT in Table 3.2) by the interest charges:

$$\begin{aligned} \text{Times-interest-earned (TIE) ratio} &= \frac{\text{EBIT}}{\text{Interest charges}} \\ &= \frac{\$283.8}{\$88} = 3.2 \times \\ \text{Industry average} &= 6.0 \times \end{aligned}$$

#### Times-Interest-Earned (TIE) Ratio

The ratio of earnings before interest and taxes (EBIT) to interest charges; a measure of the firm's ability to meet its annual interest payments.

The TIE ratio measures the extent to which operating income can decline before the firm is unable to meet its annual interest costs. Failure to pay interest will bring legal action by the firm's creditors and probably result in bankruptcy. Note that earnings before interest and taxes, rather than net income, are used in the numerator. Because interest is paid with pretax dollars, the firm's ability to pay current interest is not affected by taxes.

Allied's interest is covered 3.2 times. The industry average is 6 times, so Allied is covering its interest charges by a much lower margin of safety than the average firm in the industry. Thus, the TIE ratio reinforces our conclusion from the debt ratio, namely, that Allied would face difficulties if it attempted to borrow additional money.<sup>13</sup>

### Self Test



- How does the use of financial leverage affect stockholders' control position?
- How does the U.S. tax structure influence a firm's willingness to finance with debt?
- How does the decision to use debt involve a risk-versus-return trade-off?
- Explain the following statement: Analysts look at both balance sheet and income statement ratios when appraising a firm's financial condition.
- Name two ratios that are used to measure financial leverage and write their equations.

<sup>13</sup>Another commonly used debt management ratio, using earnings before interest, taxes, depreciation, and amortization (EBITDA), is the EBITDA coverage ratio calculated as:

$$\text{EBITDA coverage ratio} = \frac{\text{EBITDA} + \text{Lease payments}}{\text{Interest} + \text{Principal payments} + \text{Lease payments}}$$

This ratio is more complete than the TIE ratio because it recognizes that depreciation and amortization expenses are not cash expenses, and thus are available to service debt, and that lease payments and principal repayments on debt are fixed charges. For more on this ratio, see E. F. Brigham and P. R. Daves, *Intermediate Financial Management*, 12th edition (Mason, OH: Cengage Learning, 2016), Chapter 7.

## 4-5 Profitability Ratios

Accounting statements reflect events that happened in the past, but they also provide clues about what's really important—that is, what's likely to happen in the future. The liquidity, asset management, and debt ratios covered thus far tell us something about the firm's policies and operations. Now we turn to the **profitability ratios**, which reflect the net result of all of the firm's financing policies and operating decisions.

### 4-5A OPERATING MARGIN

The **operating margin**, calculated by dividing operating income (EBIT) by sales, gives the operating profit per dollar of sales:

$$\begin{aligned} \text{Operating margin} &= \frac{\text{EBIT}}{\text{Sales}} \\ &= \frac{\$283.8}{\$3,000} = 9.5\% \\ \text{Industry average} &= 10.0\% \end{aligned}$$

Allied's 9.5% operating margin is below the industry average of 10.0%. This subpar result indicates that Allied's operating costs are too high. This is consistent with the low inventory turnover and high days sales outstanding ratios that we calculated earlier.

### 4-5B PROFIT MARGIN

The **profit margin**, also sometimes called the *net profit margin*, is calculated by dividing net income by sales:

$$\begin{aligned} \text{Profit margin} &= \frac{\text{Net income}}{\text{Sales}} \\ &= \frac{\$117.5}{\$3,000} = 3.9\% \\ \text{Industry average} &= 5.0\% \end{aligned}$$

Allied's 3.9% profit margin is below the industry average of 5.0%, and this subpar result occurred for two reasons. First, Allied's operating margin was below the industry average because of the firm's high operating costs. Second, the profit margin is negatively impacted by Allied's heavy use of debt. To see this second point, recognize that net income is *after interest*. Suppose two firms have identical operations in the sense that their sales, operating costs, and operating income are identical. However, one firm uses more debt; hence, it has higher interest charges. Those interest charges pull down its net income; and because sales are identical, the result is a relatively low profit margin for the firm with more debt. We see then that Allied's operating inefficiency and its high debt ratio combine to lower its profit margin below the food processing industry average. It also follows that when two companies have the same operating margin but different debt ratios, we can expect the company with a higher debt ratio to have a lower profit margin.

Note too that while a high return on sales is good, we must also be concerned with turnover. If a firm sets a very high price on its products, it may earn a high return on each sale but fail to make many sales. It might generate a high profit margin but realize low sales, and hence experience a low net income. We will see shortly how, through the use of the DuPont equation, profit margins, the use of debt, and turnover ratios interact to affect overall stockholder returns.

#### Profitability Ratios

A group of ratios that show the combined effects of liquidity, asset management, and debt on operating results.

#### Operating Margin

This ratio measures operating income, or EBIT, per dollar of sales; it is calculated by dividing operating income by sales.

#### Profit Margin

This ratio measures net income per dollar of sales and is calculated by dividing net income by sales.

#### 4-5C RETURN ON TOTAL ASSETS

##### Return on Total Assets (ROA)

The ratio of net income to total assets.

Net income divided by total assets gives us the **return on total assets (ROA)**:

$$\begin{aligned}\text{Return on total assets (ROA)} &= \frac{\text{Net income}}{\text{Total assets}} \\ &= \frac{\$117.5}{\$2,000} = 5.9\% \\ \text{Industry average} &= 9.0\%\end{aligned}$$

Allied's 5.9% return is well below the 9.0% industry average. This is not good—it is obviously better to have a higher than a lower return on assets. Note, though, that a low ROA can result from a conscious decision to use a great deal of debt, in which case high interest expenses will cause net income to be relatively low. That is part of the reason for Allied's low ROA. Never forget—you must look at a number of ratios, see what each suggests, and then look at the overall situation before you judge the performance of a company and consider what actions it should undertake to improve.

#### 4-5D RETURN ON COMMON EQUITY

##### Return on Common Equity (ROE)

The ratio of net income to common equity; measures the rate of return on common stockholders' investment.

Another important accounting ratio is the **return on common equity (ROE)**, which is found as follows:

$$\begin{aligned}\text{Return on common equity (ROE)} &= \frac{\text{Net income}}{\text{Common equity}} \\ &= \frac{\$117.5}{\$940} = 12.5\% \\ \text{Industry average} &= 15.0\%\end{aligned}$$

Stockholders expect to earn a return on their money, and this ratio tells how well they are doing in an accounting sense. Allied's 12.5% return is below the 15.0% industry average, but not as far below as the return on total assets. This somewhat better ROE results from the company's greater use of debt, a point discussed earlier in the chapter.

#### 4-5E RETURN ON INVESTED CAPITAL

##### Return on Invested Capital (ROIC)

The ratio of after-tax operating income to total invested capital; it measures the total return that the company has provided for its investors.

The **return on invested capital (ROIC)** measures the total return that the company has provided for its investors:

$$\begin{aligned}\text{Return on invested capital (ROIC)} &= \frac{\text{EBIT}(1 - T)}{\text{Total invested capital}} \\ &= \frac{\text{EBIT}(1 - T)}{\text{Debt} + \text{Equity}} = \frac{\$170.3}{\$1,800} = 9.5\% \\ \text{Industry average} &= 10.8\%\end{aligned}$$

ROIC differs from ROA in two ways. First, its return is based on total invested capital rather than total assets. Second, in the numerator it uses after-tax operating income (NOPAT) rather than net income. The key difference is that net income subtracts the company's after-tax interest expense and therefore represents the total amount of income available to shareholders, while NOPAT is the amount of funds available to pay both stockholders and debt-holders.

quick question



QUESTION:

A company has \$20 billion of sales and \$1 billion of net income. Its total assets are \$10 billion. The company's total assets equal total invested capital, and its capital consists of half debt and half common equity. The firm's interest rate is 5%, and its tax rate is 40%.

1. What is its profit margin?
2. What is its ROA?
3. What is its ROE?
4. What is its ROIC?
5. Would this firm's ROA increase if it used less leverage? (The size of the firm does not change.)

ANSWER:

a. Profit margin =  $\frac{\text{Net income}}{\text{Sales}} = \frac{\$1 \text{ billion}}{\$20 \text{ billion}} = 5\%$ .

b. ROA =  $\frac{\text{Net income}}{\text{Total assets}} = \frac{\$1 \text{ billion}}{\$10 \text{ billion}} = 10\%$ .

c. ROE =  $\frac{\text{Net income}}{\text{Common equity}} = \frac{\$1 \text{ billion}}{\$5 \text{ billion}} = 20\%$ .

d. First, we need to calculate the firm's EBIT by working up the firm's income statement:

EBIT	\$1,916,666,667	EBT + Interest
Interest	250,000,000	$0.05 \times 0.5 \times \$10,000,000,000$
EBT	\$1,666,666,667	$\$1,000,000,000 / (1 - 0.4)$
Taxes (40%)	666,666,667	EBT $\times$ 0.4
Net income	<u>\$1,000,000,000</u>	

$$\text{ROIC} = \frac{\text{EBIT}(1 - T)}{\text{Total invested capital}} = \frac{\$1,916,666,667(0.6)}{\$10,000,000,000} = 11.5\%$$

e. If the company used less debt, it would increase net income because interest expense would be reduced. Because assets would not change and net income increases, ROA will increase.

4-5F BASIC EARNING POWER (BEP) RATIO

The basic earning power (BEP) ratio is calculated by dividing operating income (EBIT) by total assets:

$$\begin{aligned} \text{Basic earning power (BEP)} &= \frac{\text{EBIT}}{\text{Total assets}} \\ &= \frac{\$283.8}{\$2,000} = 14.2\% \\ \text{Industry average} &= 18.0\% \end{aligned}$$

**Basic Earning Power (BEP) Ratio**

This ratio indicates the ability of the firm's assets to generate operating income; it is calculated by dividing EBIT by total assets.

This ratio shows the raw earning power of the firm's assets before the influence of taxes and debt, and it is useful when comparing firms with different debt and tax situations. Because of its low turnover ratios and poor profit margin on sales, Allied has a lower BEP ratio than the average food processing company.

## SelfTest



Identify six profitability ratios, and write their equations.

Why does the use of debt lower the profit margin and the ROA?

Using more debt lowers profits and thus the ROA. Why doesn't debt have the same negative effect on the ROE?

A company has a 10% ROA. Assume that a company's total assets equal total invested capital, and that the company has no debt, so its total invested capital equals total equity. What are the company's ROE and ROIC? (10%, 10%)

### Market Value Ratios

Ratios that relate the firm's stock price to its earnings and book value per share.

### Price/Earnings (P/E) Ratio

The ratio of the price per share to earnings per share; shows the dollar amount investors will pay for \$1 of current earnings.

## 4-6 Market Value Ratios

ROE reflects the effects of all of the other ratios, and it is the single best accounting measure of performance. Investors like a high ROE, and high ROEs are correlated with high stock prices. However, other things come into play. For example, financial leverage generally increases the ROE but also increases the firm's risk; so if a high ROE is achieved by using a great deal of debt, the stock price might end up lower than if the firm had been using less debt and had a lower ROE. We use the final set of ratios—the **market value ratios**, which relate the stock price to earnings and book value price—to help address this situation. If the liquidity, asset management, debt management, and profitability ratios all look good, and if investors think these ratios will continue to look good in the future, the market value ratios will be high; the stock price will be as high as can be expected; and management will be judged as having done a good job.

The market value ratios are used in three primary ways: (1) by investors when they are deciding to buy or sell a stock, (2) by investment bankers when they are setting the share price for a new stock issue (an IPO), and (3) by firms when they are deciding how much to offer for another firm in a potential merger.

### 4-6A PRICE/EARNINGS RATIO

The **price/earnings (P/E) ratio** shows how much investors are willing to pay per dollar of reported profits. Allied's stock sells for \$23.06; so with an EPS of \$2.35, its P/E ratio is 9.8×:

$$\begin{aligned} \text{Price/Earnings (P/E) ratio} &= \frac{\text{Price per share}}{\text{Earnings per share}} \\ &= \frac{\$23.06}{\$2.35} = 9.8 \times \\ \text{Industry average} &= 11.3 \times \end{aligned}$$

As we will see in Chapter 9, P/E ratios are relatively high for firms with strong growth prospects and little risk but low for slowly growing and risky firms. Allied's P/E ratio is below its industry average; so this suggests that the company is regarded as being relatively risky, as having poor growth prospects, or both.<sup>14</sup>

P/E ratios vary considerably over time and across firms.<sup>15</sup> In March 2015, the S&P 500's P/E ratio was 21.4×. At this same point in time, Yahoo! Inc. had a P/E of 5.89×,

<sup>14</sup>Security analysts also look at the price-to-free-cash-flow ratio. In addition, analysts consider the PEG, or P/E-to-growth, ratio where the P/E is divided by the firm's forecasted growth rate. Allied's growth rate as forecasted by a number of security analysts for the next 5 years is 7.0%, so its PEG = 9.8/7.0 = 1.4×. The lower the ratio, the better; and most firms have ratios in the range of 1.0× to 2.0×. We note, though, that P/E ratios jump around from year to year because earnings and forecasted growth rates fluctuate. Like other ratios, PEG ratios are interesting, but must be interpreted with care and judgment.

<sup>15</sup>On his website ([www.econ.yale.edu/~shiller/data.htm](http://www.econ.yale.edu/~shiller/data.htm)), Professor Robert Shiller reports the annual P/E ratio of the overall stock market dating back to 1871. His calculations show that the historical average P/E ratio for the market has been 16.6×, and it has ranged from 4.8× to 44.2×.



while Under Armour, Inc., a rapidly growing apparel company, had a P/E of 82.61×. Moreover, once high-flying growth stocks such as Intel and Exxon Mobil (both of which a decade ago had P/E ratios above 20) have seen their P/Es fall below 14× as they become larger, more stable companies with fewer growth opportunities.

#### 4-6B MARKET/BOOK RATIO

The ratio of a stock's market price to its book value gives another indication of how investors regard the company. Companies that are well regarded by investors—which means low risk and high growth—have high M/B ratios. For Allied, we first find its book value per share:

$$\begin{aligned}\text{Book value per share} &= \frac{\text{Common equity}}{\text{Shares outstanding}} \\ &= \frac{\$940}{50} = \$18.80\end{aligned}$$

We then divide the market price per share by the book value per share to get the **market/book (M/B) Ratio**, which for Allied is 1.2×:

$$\begin{aligned}\text{Market/Book (M/B) ratio} &= \frac{\text{Market price per share}}{\text{Book value per share}} \\ &= \frac{\$23.06}{\$18.80} = 1.2 \times \\ \text{Industry average} &= 1.7 \times\end{aligned}$$

#### Market/Book (M/B) Ratio

The ratio of a stock's market price to its book value.

Investors are willing to pay less for a dollar of Allied's book value than for one of an average food processing company. This is consistent with our other findings. M/B ratios typically exceed 1.0, which means that investors are willing to pay more for stocks than the accounting book values of the stocks. This situation occurs primarily because asset values, as reported by accountants on corporate balance sheets, do not reflect either inflation or goodwill. Assets purchased years ago at pre-inflation prices are carried at their original costs even though inflation might have caused their actual values to rise substantially; and successful companies' values rise above their historical costs, whereas unsuccessful ones have low M/B ratios.<sup>16</sup> This point is demonstrated by Google and Bank of America: In March 2015, Google's M/B ratio was 3.61× while Bank of America's was only 0.76×. Google's stockholders now have \$3.61 in market value per \$1.00 of equity, whereas Bank of America's stockholders have only \$0.76 for each dollar they invested.

#### SelfTest



Describe two ratios that relate a firm's stock price to its earnings and book value per share and write their equations.

In what sense do these market value ratios reflect investors' opinions about a stock's risk and expected future growth?

What does the price/earnings (P/E) ratio show? If one firm's P/E ratio is lower than that of another firm, what factors might explain the difference?

How is book value per share calculated? Explain how inflation and R&D programs might cause book values to deviate from market values.

<sup>16</sup>The second point is known as *survivor bias*. Successful companies survive and are reflected in the averages, whereas unsuccessful companies vanish, and their low numbers are not reflected in the averages.

## 4-7 Tying the Ratios Together: The DuPont Equation

### DuPont Equation

A formula that shows that the rate of return on equity can be found as the product of profit margin, total assets turnover, and the equity multiplier. It shows the relationships among asset management, debt management, and profitability ratios.

We have discussed many ratios, so it would be useful to see how they work together to determine the ROE. For this, we use the DuPont equation, a formula developed by the chemical giant's financial staff in the 1920s. It is shown here for Allied and the food processing industry:

	ROA	× Equity multiplier	
ROE =	= Profit margin × Total assets turnover	× Equity multiplier	
	$\frac{\text{Net income}}{\text{Sales}}$	$\times \frac{\text{Sales}}{\text{Total assets}}$	$\times \frac{\text{Total assets}}{\text{Total common equity}}$
	= $\frac{\$117.5}{\$3,000}$	$\times \frac{\$3,000}{\$2,000}$	$\times \frac{\$2,000}{\$940}$
	= 3.92%	× 1.5 times	× 2.13 times = 12.5%
Industry	= 5.0%	× 1.8 times	× 1.67 times = 15.0%

- The first term, the profit margin, tells us how much the firm earns on its sales. This ratio depends primarily on costs and sales prices—if a firm can command a premium price and hold down its costs, its profit margin will be high, which will help its ROE.
- The second term is the total assets turnover. It is a “multiplier” that tells us how many times the profit margin is earned each year—Allied earned 3.92% on each dollar of sales, and its assets were turned over 1.5 times each year; so its return on assets was  $3.92\% \times 1.5 = 5.9\%$ . Note, though, that this entire 5.9% belongs to the common stockholders—the bondholders earned a return in the form of interest, and that interest was deducted before we calculated net income to stockholders. So the whole 5.9% return on assets belongs to the stockholders. Therefore, the return on assets must be adjusted upward to obtain the return on equity.
- That brings us to the third term, the equity multiplier, which is the adjustment factor. Allied's assets are 2.13 times its equity, so we must multiply the 5.9% return on assets by the 2.13× equity multiplier to arrive at its ROE of 12.5%.<sup>17</sup>

Note that ROE as calculated using the DuPont equation is identical to Allied's ROE, 12.5%, which we calculated earlier. What's the point of going through all of the steps required to implement the DuPont equation to find ROE? The answer is that the DuPont equation helps us see *why* Allied's ROE is only 12.5% versus 15.0% for the industry. First, its profit margin is below average, which indicates that its costs are not being controlled as well as they should be and that it cannot charge premium prices. In addition, because it uses more debt than most companies, its high interest charges also reduce its profit margin. Second, its total assets turnover is below the industry average, which indicates that it has more assets than it needs. Finally, because its equity multiplier is relatively high, its heavy use of debt offsets to some extent its low profit margin and turnover. However, the high debt ratio exposes Allied to above-average bankruptcy risk; so it might want to cut back on its financial leverage. But if it reduced its debt to the same level as the average firm in

<sup>17</sup>The equity multiplier relates to the firm's use of debt. The industry equity multiplier can be obtained by using the industry ROE and ROA. The equity multiplier = Total assets divided by common equity.  $\text{ROE} = \text{Net income} / \text{Common equity}$  and  $\text{ROA} = \text{Net income} / \text{Total assets}$ . So,  $\text{ROE} \div \text{ROA} = \text{Equity multiplier}$  as shown below:

$$\frac{\text{ROE}}{\text{ROA}} = \frac{\text{NI}}{\text{Equity}} \div \frac{\text{NI}}{\text{Assets}} = \frac{\text{NI}}{\text{Equity}} \times \frac{\text{Assets}}{\text{NI}} = \frac{\text{Assets}}{\text{Equity}} = \text{Equity multiplier.}$$

## MICROSOFT EXCEL: A TRULY ESSENTIAL TOOL

Microsoft Excel is an essential tool for anyone dealing with business issues—not just finance and accounting professionals but also lawyers, marketers, auto sales managers, government employees, and many others. Indeed, anyone who works with numbers will be more efficient and productive if they know the basics of Excel, so it's a necessity for anyone who hopes to hold a managerial position.

As you go through this book, you will see that Excel is used in four main ways:

1. *As a financial calculator.* Excel can add, subtract, multiply, and divide, and it can retain results from one operation for use in subsequent operations. For example, we created the financial statements in Chapter 3 with Excel, and we use it to analyze those statements in the current chapter. We could have done this with a calculator or pencil and paper, but it was a lot easier with Excel. As we will see throughout the text, Excel also has a large number of built-in financial functions that can be used to simply calculate the answers to a wide range of financial problems. For example, using Excel, it is straightforward to calculate the return on an investment, the price of a bond, or the value of a project.

2. *To modify the work when things change.* Suppose your boss asked you to create the statements in Chapter 3, but when you finished she said, "Thanks, but the accounting department just informed us that inventories in 2016 were overstated by \$100 million, which means that total assets were also overstated. To make the balance sheet balance, we must reduce retained earnings, common equity, and total claims against assets. Please make those adjustments and give me a revised set of statements before the board meeting tomorrow morning."

If you were working with a calculator, you'd be looking at an all-nighter, but with Excel you could make just one change—

reduce 2016 inventories by \$100 million—and Excel would instantly revise the statements. If your company had two people working on problems like this, who would get promoted and who would get a pink slip?

3. *Sensitivity analysis.* We use ratios to analyze financial statements and assess how well a company is managed, and if weaknesses are detected management can make changes to improve the situation. For example, Allied's return on equity (ROE), a key determinant of its stock price, is below the industry average. ROE depends on a number of factors, including the level of inventories, and using Excel one can see how ROE would change if inventories were increased or decreased. Then, management can investigate alternative inventory policies to see how they would impact profits and the ROE. In theory, one could do this analysis with a calculator, but this would be inefficient, and in a competitive world efficiency is essential to survival.

4. *Risk assessments.* Sensitivity analysis can be used to assess the risk inherent in different policies. For example, *forecasted* returns on equity are generally higher if a firm increases its debt, but the more debt the firm carries, the worse the effects of an economic downturn. We can use Excel to quantify the effects of changing economic conditions with different amounts of debt, and thus the probability that the firm will go bankrupt in a recession. Many firms learned about this during the 2007–2009 recession, so the survivors are now more interested than ever in risk models.

This listing gives you an idea of what Excel can do and why it is important in business today. We illustrate it throughout the book, and you should make an effort to understand how to use it. The Excel chapter models can be found on the text's website, [www.cengagebrain.com](http://www.cengagebrain.com). You will find an understanding of Excel very helpful when you begin interviewing for a job.<sup>18</sup>

its industry without any other changes, its ROE would decline significantly, to  $3.92\% \times 1.5 \times 1.67 = 9.8\%$ .<sup>19</sup>

Allied's management can use the DuPont equation to help identify ways to improve its performance. Focusing on the profit margin, its marketing people can study the effects of raising sales prices or of introducing new products with higher margins. Its cost accountants can study various expense items and, working with engineers, purchasing agents, and other operating personnel, seek ways to cut costs.

<sup>18</sup>It is often impractical for professors to test students on their ability to integrate Excel into financial management, so some students conclude that knowing more about Excel won't help them on tests and thus they ignore it. That's unfortunate, and we can only say that there's more to school than grades alone, and in the long run knowing something about Excel is one of the most valuable tools you can learn in school.

<sup>19</sup>The ROE reduction would actually be somewhat less because if debt were lowered, interest payments would also decline, which would raise Allied's profit margin. Allied's analysts determined that the net effect of a reduction in debt would still be a significant reduction in ROE.

The credit manager can investigate ways to speed up collections, which would reduce accounts receivable and therefore improve the quality of the total assets turnover ratio. And the financial staff can analyze the effects of alternative debt policies, showing how changes in leverage would affect both the expected ROE and the risk of bankruptcy.

As a result of this analysis, Ellen Jackson, Allied's chief executive officer (CEO), undertook a series of moves that are expected to cut operating costs by more than 20%. Jackson and Allied's other executives have a strong incentive to improve the firm's financial performance—their compensation depends on how well the company operates.

### SelfTest



Write the equation for the DuPont equation.

What is the equity multiplier, and why is it used?

How can management use the DuPont equation to analyze ways of improving the firm's performance?

## 4-8 Potential Misuses of ROE

Although ROE is an important measure of performance, we know that managers should strive to maximize shareholder wealth. If a firm takes steps that improve its ROE, does that mean that shareholder wealth will also be increased? The answer is “not necessarily.” Indeed, three problems are likely to arise if a firm relies too heavily on ROE to measure performance.

First, ROE does not consider risk. Shareholders care about ROE, but they also care about risk. To illustrate, consider two divisions within the same firm. Division S has stable cash flows and a predictable 15% ROE. Division R has a 16% expected ROE, but its cash flows are quite risky; so the expected ROE may not materialize. If managers were compensated solely on the basis of ROE and if the expected ROEs were actually achieved during the coming year, Division R's manager would receive a higher bonus than S's, even though S might actually be creating more value for shareholders as a result of its lower risk. Similarly, financial leverage can increase expected ROE, but more leverage means higher risk; so raising ROE through the use of leverage may not be good.

Second, ROE does not consider the amount of invested capital. To illustrate, consider a company that is choosing between two mutually exclusive projects. Project A calls for investing \$50,000 at an expected ROE of 50%, while Project B calls for investing \$1,000,000 at a 45% ROE. The projects are equally risky, and the company's cost of capital is 10%. Project A has the higher ROE, but it is much smaller. Project B should be chosen because it would add more to shareholder wealth.

Third, a focus on ROE can cause managers to turn down profitable projects. For example, suppose you manage a division of a large firm and the firm determines bonuses solely on the basis of ROE. You project that your division's ROE for the year will be an impressive 45%. Now you have an opportunity to invest in a large, low-risk project with an estimated ROE of 35%, which is well above the firm's 10% cost of capital. Even though this project is extremely profitable, you might still be reluctant to undertake it because it would reduce your division's average ROE and therefore your year-end bonus.

## ECONOMIC VALUE ADDED (EVA) VERSUS NET INCOME

As we mentioned in Chapter 3, economic value added (EVA) is a measure of how much management has added to shareholders' wealth during the year. To better understand the idea behind EVA, let's look at Allied's 2016 numbers (in millions). Allied's total invested capital consists of \$110 of notes payable, \$750 of long-term debt, and \$940 of common equity, totaling \$1,800. Debt represents 47.78% of this total, and common equity is 52.22% of this total. Later in the text we discuss how to calculate the cost of Allied's capital; but for now, to simplify things, we estimate its capital cost at 10%. Thus, the firm's total dollar cost of capital (which includes both debt and common equity) per year is  $0.10 \times \$1,800 = \$180$ .

Now let's look at Allied's income statement. Its operating income, EBIT, is \$283.8; and its interest expense is \$88.0. Therefore, its taxable income is  $\$283.8 - \$88.0 = \$195.8$ . Taxes equal 40% of taxable income, or  $0.4(\$195.8) = \$78.3$ ; so the firm's net income is \$117.5. Its return on equity, ROE, is  $\$117.5 / \$940 = 12.5\%$ .

Given this data, we can now calculate Allied's EVA. The basic formula for EVA (as discussed in Chapter 3) is as follows:

$$\begin{aligned} \text{EVA} &= \text{EBIT}(1 - T) - \left( \frac{\text{Total}}{\text{invested capital}} \right) \times \left( \frac{\text{After-tax}}{\text{cost of capital}} \right) \\ &= \$283.8(1 - 0.40) - (\$1,800)(0.10) \\ &= \$170.3 - \$180 \\ &= -\$9.7 \end{aligned}$$

This negative EVA indicates that Allied's shareholders actually earned \$9.7 million less than they could have earned elsewhere by investing in other stocks with the same risk as Allied. To see where this -\$9.7 comes from, let's trace what happened to the money:

- The firm generated \$283.8 of operating income.
- \$78.3 went to the government to pay taxes, leaving \$205.5 available for investors—stockholders and bondholders.
- \$88.0 went to the bondholders in the form of interest payments, thus leaving \$117.5 for the stockholders.

• However, Allied's shareholders must also earn a return on the equity capital they have invested in the firm, because they could have invested in other companies of comparable risk. We call this the cost of Allied's equity.

• Once Allied's shareholders are "paid" their return, the firm comes up \$9.7 million short—that's the economic value management added, and it is negative. In a sense, Allied's management created *negative* wealth because it provided shareholders with a lower return than they could have earned on alternative investments with the same risk as Allied's stock.

• In practice, it is often necessary to make several adjustments to arrive at a "better" measure of EVA. The adjustments deal with non-operating assets, leased assets, depreciation, and other accounting details that we leave for discussion in advanced finance courses.

### The Connection between ROE and EVA

EVA is different from traditional accounting profit because EVA reflects the cost of equity as well as the cost of debt. Indeed, using the previous example, we could also express EVA as net income minus the dollar cost of equity:

$$\text{EVA} = \text{Net income} - (\text{Equity} \times \text{Cost of equity})$$

This expression above could be rewritten as follows:

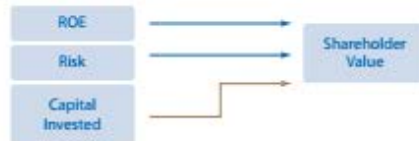
$$\text{EVA} = (\text{Equity}) (\text{Net income/Equity} - \text{Cost of equity})$$

which can be rewritten as:

$$\text{EVA} = \text{Equity} (\text{ROE} - \text{Cost of equity})$$

This last expression implies that EVA depends on three factors: rate of return, as reflected in ROE; risk, which affects the cost of equity; and size, which is measured by the equity employed. Recall that earlier in this chapter, we said that shareholder value depends on risk, return, and capital invested. This final equation illustrates that point.

These three examples suggest that a project's ROE must be combined with its size and risk to determine its effect on shareholder value, as we illustrate in the diagram below:



We will discuss this in more depth when we consider capital budgeting, where we look in detail at how projects are selected so as to maximize stock prices and consequently shareholder value.

### SelfTest



If a firm takes steps that increase its expected future ROE, does this necessarily mean that the stock price will also increase? Explain.

## 4-9 Using Financial Ratios to Assess Performance

Although financial ratios help us evaluate financial statements, it is often hard to evaluate a company by just looking at the ratios. For example, if you see that a company has a current ratio of 1.2, it is hard to know if that is good or bad, unless you put the ratio in its proper perspective. Allied's management could look at industry averages; it could compare itself to specific companies or "benchmarks"; and it can analyze the trends in each ratio. We look at all three approaches in this section.

### 4-9A COMPARISON TO INDUSTRY AVERAGE

As we have done for Allied, one way to assess performance is to compare the company's key ratios to the industry averages. Table 4.2 provides a summary of the ratios we have discussed in this chapter. This table is useful as a quick reference, and the calculated ratios and accompanying comments give a good sense of Allied's strengths and weaknesses relative to the average food processing company. To give you a further sense of some "real-world" ratios, Table 4.3 provides a list of ratios for a number of different industries in March 2015.

### 4-9B BENCHMARKING

Ratio analysis involves comparisons with industry average figures, but Allied and many other firms also compare themselves with a subset of top competitors in their industry. This is called **benchmarking**, and the companies used for the comparison are called benchmark companies. Allied's management benchmarks against Campbell Soup, a leading manufacturer of canned soups; Tyson Foods, a processor of chicken, beef, and pork products; J&J Snack Foods, a manufacturer of nutritional snack foods; ConAgra Foods, a packaged food company that supplies frozen potatoes and other vegetables to commercial customers; Flowers Foods, a producer of bakery and snack-food goods; Hershey Foods, a producer of chocolates and non-chocolate confectionary products; and Kellogg Company, a manufacturer of ready-to-eat cereals and convenience foods. Ratios are calculated for each company, then listed in descending order as shown below for the profit margin (the firms' latest 12 months' results reported by *MSN Money* ([money.msn.com](http://money.msn.com)) as of March 17, 2015):

#### Benchmarking

The process of comparing a particular company with a subset of top competitors in its industry.

Company	Profit Margin
Hershey Foods	11.41%
Campbell Soup	9.17
J&J Snack Foods	7.61
Flowers Foods	4.69
Kellogg Company	4.33
Allied Food Products	3.92
Tyson Foods	2.32
ConAgra Foods	2.28

Allied Food Products: Summary of Financial Ratios (Millions of Dollars) TABLE 4.2

Ratio	Formula	Calculation	Ratio	Industry Average	Comment
<b>Liquidity</b>					
Current	$\frac{\text{Current assets}}{\text{Current liabilities}}$	$\frac{\$1,000}{\$310}$	= 3.2×	4.2×	Poor
Quick	$\frac{\text{Current assets} - \text{Inventories}}{\text{Current liabilities}}$	$\frac{\$385}{\$310}$	= 1.2×	2.2×	Poor
<b>Asset Management</b>					
Inventory turnover	$\frac{\text{Sales}}{\text{Inventories}}$	$\frac{\$3,000}{\$615}$	= 4.9×	10.9×	Poor
Days sales outstanding (DSO)	$\frac{\text{Receivables}}{\text{Annual sales}/365}$	$\frac{\$375}{\$8,2192}$	= 46 days	36 days	Poor
Fixed assets turnover	$\frac{\text{Sales}}{\text{Net fixed assets}}$	$\frac{\$3,000}{\$1,000}$	= 3.0×	2.8×	OK
Total assets turnover	$\frac{\text{Sales}}{\text{Total assets}}$	$\frac{\$3,000}{\$2,000}$	= 1.5×	1.8×	Somewhat low
<b>Debt Management</b>					
Total debt to total capital	$\frac{\text{Total debt}}{\text{Total capital}}$	$\frac{\$860}{\$1,800}$	= 47.8%	36.4%	High (risky)
Times-interest-earned (TIE)	$\frac{\text{Earnings before interest and taxes (EBIT)}}{\text{Interest charges}}$	$\frac{\$283.8}{\$88}$	= 3.2×	6.0×	Low (risky)
<b>Profitability</b>					
Operating margin	$\frac{\text{Operating income (EBIT)}}{\text{Sales}}$	$\frac{\$283.8}{\$3,000}$	= 9.5%	10.0%	Low
Profit margin	$\frac{\text{Net income}}{\text{Sales}}$	$\frac{\$117.5}{\$3,000}$	= 3.9%	5.0%	Poor
Return on total assets (ROA)	$\frac{\text{Net income}}{\text{Total assets}}$	$\frac{\$117.5}{\$2,000}$	= 5.9%	9.0%	Poor
Return on common equity (ROE)	$\frac{\text{Net income}}{\text{Common equity}}$	$\frac{\$117.5}{\$940}$	= 12.5%	15.0%	Poor
Return on invested capital (ROIC)	$\frac{\text{EBIT}(1 - T)}{\text{Total invested capital}}$	$\frac{\$170.3}{\$1,800}$	= 9.5%	10.8%	Poor
Basic earning power (BEP)	$\frac{\text{Earnings before interest and taxes (EBIT)}}{\text{Total assets}}$	$\frac{\$283.8}{\$2,000}$	= 14.2%	18.0%	Poor
<b>Market Value</b>					
Price/Earnings (P/E)	$\frac{\text{Price per share}}{\text{Earnings per share}}$	$\frac{\$23.06}{\$2.35}$	= 9.8×	11.3×	Low
Market/Book (M/B)	$\frac{\text{Market price per share}}{\text{Book value per share}}$	$\frac{\$23.06}{\$18.80}$	= 1.2×	1.7×	Low

The benchmarking setup makes it easy for Allied's management to see exactly where it stands relative to the competition. As the data show, Allied is near the bottom of its benchmark group relative to its profit margin, so it has lots of room for improvement. Other ratios are analyzed similarly.

Comparative ratios are available from a number of sources, including both Yahoo! Finance and MSN Money. Useful ratios are also compiled by Value Line, Dun and Bradstreet (D&B), and the Risk Management Association, which is the national association of bank loan officers. Also, financial statement data for thousands of publicly owned corporations are available on other Internet sites, and as brokerage houses, banks, and other financial institutions have access to these data, security analysts can and do generate comparative ratios tailored to their specific needs.

Each of the data-supplying organizations uses a somewhat different set of ratios designed for its own purposes. For example, D&B deals mainly with small firms,

TABLE 4.3 Key Financial Ratios for Selected Industries<sup>a</sup>

Industry Name	Current Ratio	Inventory Turnover <sup>b</sup>	Total Assets Turnover	LT Debt/LT Capital <sup>c</sup>	Net Profit Margin	Return on Assets	Return on Equity
Aerospace/defense	1.25	3.04	0.87	40.48%	7.76%	6.75%	27.38%
Apparel stores	1.64	4.83	1.94	40.12	7.66	14.88	40.65
Auto manufacturing—major	1.21	10.67	0.69	43.18	5.84	4.02	12.94
Beverage (soft drink)	1.06	7.35	0.66	45.95	12.37	8.17	25.15
Electronics—diversified	2.58	4.70	0.52	21.88	17.44	9.09	15.39
Food wholesalers	2.63	14.23	3.03	55.56	1.84	5.59	15.68
Grocery stores	0.83	14.46	3.48	53.92	1.68	5.85	22.73
Health services—specialized	1.69	9.59	0.95	89.22	4.99	4.76	66.14
Lodging	0.97	10.71	0.66	76.58	6.85	4.50	29.12
Newspapers	0.91	123.92	0.42	35.06	4.66	1.94	4.07
Paper and paper products	1.56	6.95	0.91	62.69	3.22	2.92	12.86
Railroad	1.22	9.23	0.43	37.50	20.86	8.95	22.33
Restaurant	1.31	28.76	0.97	53.70	14.92	14.45	36.01
Retail (department stores)	1.34	2.88	1.38	51.92	3.68	5.06	19.40
Scientific and technical instruments	1.41	5.72	0.51	38.65	10.03	5.13	10.56
Sporting goods	0.73	21.78	0.47	29.08	13.08	6.12	10.73
Steel and iron	1.99	5.44	0.33	40.48	-8.43	-2.80	-8.34
Tobacco (cigarettes)	1.00	1.65	0.69	131.55	25.37	17.54	-184.32

Notes:

<sup>a</sup>The ratios presented are averages for each industry. Ratios for the individual companies are also available.<sup>b</sup>The inventory turnover ratio in this table is calculated as the company's latest 12 months of cost of sales divided by the average of its inventory for the last quarter and the comparable year earlier quarter.<sup>c</sup>LT debt/LT capital is calculated as LT debt/(LT debt + Equity) by using MSN's Debt/Equity ratio as follows:

$$\frac{D/E}{(1 + D/E)}$$

Source: Data obtained from MSN Money, Key Ratios (money.msn.com), March 17, 2015.

many of which are proprietorships, and it sells its services primarily to banks and other lenders. Therefore, D&B is concerned largely with the creditor's viewpoint, and its ratios emphasize current assets and liabilities, not market value ratios. So, when you select a comparative data source, you should be sure that your emphasis is similar to that of the agency whose ratios you plan to use. Additionally, there are often definitional differences in the ratios presented by different sources, so before using a source, be sure to verify the exact definitions of the ratios to ensure consistency with your own work.

#### 4-9C TREND ANALYSIS

##### Trend Analysis

An analysis of a firm's financial ratios over time; used to estimate the likelihood of improvement or deterioration in its financial condition.

As a final comparison, Allied compares its ratios to its own past levels. It is important to analyze trends in ratios as well as their absolute levels, for trends give clues as to whether a firm's financial condition is likely to improve or to deteriorate. To do a **trend analysis**, simply plot a ratio over time, as shown in Figure 4.1. This graph shows that Allied's ROE has been declining since 2013 even though the industry average has been relatively stable. All the other ratios could be analyzed similarly, and such an analysis can be quite useful in gaining insights as to why the ROE behaved as it did.



FIGURE 4.1 Rate of Return on Common Equity, 2012–2016



### Self Test



Why might railroads have such low total assets turnovers and food wholesalers and grocery stores such high turnovers?

If competition causes all companies to have similar ROEs in the long run, would companies with high turnovers tend to have high or low profit margins? Explain your answer.

Why are comparative ratio analyses useful?

How does one do a trend analysis?

What important information does a trend analysis provide?

## 4-10 Uses and Limitations of Ratios

As noted earlier, ratio analysis is used by three main groups: (1) *managers*, who use ratios to help analyze, control, and thus improve their firms' operations; (2) *credit analysts*, including bank loan officers and bond rating analysts, who analyze ratios to help judge a company's ability to repay its debts; and (3) *stock analysts*, who are interested in a company's efficiency, risk, and growth prospects. In later chapters, we will look more closely at the basic factors that underlie each ratio. Note, though, that while ratio analysis can provide useful information concerning a company's operations and financial condition, it does have limitations. Some potential problems are listed here:

1. Many firms have divisions that operate in different industries; and for such companies, it is difficult to develop a meaningful set of industry averages. Therefore, ratio analysis is more useful for narrowly focused firms than for multidivisional ones.
2. Most firms want to be better than average, so merely attaining average performance is not necessarily good. As a target for high-level performance, it is best to focus on the industry leaders' ratios. Benchmarking helps in this regard.



To find information about a company quickly, link to [reuters.com/finance](http://reuters.com/finance). Here you can find company profiles and snapshots, and stock price quotes, as well as share information, key ratios, and comparative ratios.

**“Window Dressing”  
Techniques**

Techniques employed by firms to make their financial statements look better than they really are.

3. Inflation has distorted many firms’ balance sheets—book values are often different from market values. Market values would be more appropriate for most purposes, but we cannot generally get market value figures because assets such as used machinery are not traded in the marketplace. Further, inflation affects asset values, depreciation charges, inventory costs, and thus profits. Therefore, a ratio analysis for one firm over time or a comparative analysis of firms of different ages must be interpreted with care and judgment.
4. Seasonal factors can also distort a ratio analysis. For example, the inventory turnover ratio for a food processor will be radically different if the balance sheet figure used for inventory is the one just before, versus just after, the close of the canning season. This problem can be mitigated by using monthly averages for inventory (and receivables) when calculating turnover ratios.
5. Firms can employ “window dressing” techniques to improve their financial statements. To illustrate, people tend to think that larger hedge funds got large because their high returns attracted many investors. However, we learned in 2007 that some funds simply borrowed and invested money to increase their apparent size. One fund, Wharton Asset Management, reported \$2 billion “under management,” but it had actually attracted less than \$100 million of investors’ capital.
6. Different accounting practices can distort comparisons. As noted earlier, inventory valuation and depreciation methods can affect financial statements and thus distort comparisons among firms. Also, if one firm leases much of its productive equipment, its fixed assets turnover may be artificially high because leased assets often do not appear on the balance sheet. At the same time, the liability associated with the lease may not appear as debt, keeping the debt ratio low, even though failure to make lease payments can bankrupt the firm. Therefore, leasing can artificially improve both turnover and the debt ratios. The accounting profession has taken steps to reduce this problem, but it still can cause distortions.
7. It is difficult to generalize about whether a particular ratio is “good” or “bad.” For example, a high current ratio may indicate a strong liquidity position, which is good, but it can also indicate excessive cash, which is bad because excess cash in the bank is a nonearning asset. Similarly, a high fixed assets turnover ratio may indicate that the firm uses its assets efficiently, but it could also indicate that the firm is short of cash and cannot afford to make needed fixed asset investments.
8. Firms often have some ratios that look “good” and others that look “bad,” making it difficult to tell whether the company is, on balance, strong or weak. To deal with this problem, banks and other lending organizations often use statistical procedures to analyze the *net effects* of a set of ratios and to classify firms according to their probability of getting into financial trouble.<sup>20</sup>

We see then that ratio analysis is useful, but analysts should be aware of the problems just listed and make adjustments as necessary. Ratio analysis conducted in a mechanical, unthinking manner is dangerous; but used intelligently and with good judgment, it can provide useful insights into firms’ operations. Your judgment

<sup>20</sup>The technique used is discriminant analysis. The seminal work on this subject was undertaken by Edward I. Altman, “Financial Ratios, Discriminant Analysis, and the Prediction of Corporate Bankruptcy,” *Journal of Finance*, vol. 23, no. 4 (September 1968), pp. 589–609.

## LOOKING FOR WARNING SIGNS WITHIN THE FINANCIAL STATEMENTS

Financial scandals have spurred a renewed interest in financial accounting, and analysts now scour companies' financial statements to see if trouble is lurking. This renewed interest has led to a list of red flags to consider when reviewing a company's financial statements. For example, after conferring with New York University Accounting Professor Baruch Lev, *Fortune* magazine's Shawn Tully identified the following warning signs:

- Year after year a company reports restructuring charges and/or write-downs. This practice raises concerns because companies can use write-downs to mask operating expenses, which results in overstated earnings.
- A company's earnings have been propped up through a series of acquisitions. Acquisitions can increase earnings if the acquiring company has a higher P/E ratio than the acquired firm, but such "growth" cannot be sustained over the long run.
- A company depreciates its assets more slowly than the industry average. Lower depreciation boosts current earnings, but again this cannot be sustained because eventually depreciation must be recognized.
- A company routinely has high earnings but low cash flow. As Tully points out, this warning sign would have exposed Enron's problems. In the second quarter of 2001 (a few months before its problems began to unfold), Enron

reported earnings of \$423 million versus a cash flow of minus \$527 million.

Along similar lines, after consulting with various professionals, Ellen Simon of the *Newark Star Ledger* came up with her list of red flags:

- You wouldn't buy the stock at today's price.
- You don't really understand the company's financial statements.
- The company is in a business that lends itself to "creative accounting."
- The company keeps taking nonrecurring charges.
- Accounts receivable and inventory are increasing faster than sales revenues.
- The company's insiders are selling their stock.
- The company is making aggressive acquisitions, especially in unrelated fields.

There is some overlap between these two lists. Also, none of these items automatically means there is something wrong with the company—instead, the items should be viewed as warning signs that cause you to take a closer look at the company's performance before making an investment.

in interpreting ratios is bound to be weak at this point, but it will improve as you go through the remainder of the book.

### Self Test



- List three types of users of ratio analysis. Would the different users emphasize the same or different types of ratios? Explain.
- List several potential difficulties with ratio analysis.

### 4-11 Looking Beyond the Numbers

Working through this chapter should increase your ability to understand and interpret financial statements. This is critically important for anyone making business decisions or forecasting stock prices. However, sound financial analysis involves more than just numbers—good analysis requires that certain qualitative factors also be considered. These factors, as summarized by the American Association of Individual Investors (AAII), include the following:



Students might want to refer to AAIL's educational website at [aail.com](http://aail.com). The site provides information on investing basics, financial planning, and portfolio management, so that individuals can manage their own assets more effectively.

1. Are the company's revenues tied to one key customer? If so, the company's performance may decline dramatically if that customer goes elsewhere. On the other hand, if the customer has no alternative to the company's products, this might actually stabilize sales.
2. To what extent are the company's revenues tied to one key product? Firms that focus on a single product are often efficient, but a lack of diversification also increases risk because having revenues from several products stabilizes profits and cash flows in a volatile world.
3. To what extent does the company rely on a single supplier? Depending on a single supplier may lead to an unanticipated shortage and a hit to sales and profits.
4. What percentage of the company's business is generated overseas? Companies with a large percentage of overseas business are often able to realize higher growth and larger profit margins. However, overseas operations may expose the firm to political risks and exchange rate problems.
5. How much competition does the firm face? Increases in competition tend to lower prices and profit margins; so when forecasting future performance, it is important to assess the likely actions of current competitors and the entry of new ones.
6. Is it necessary for the company to continually invest in research and development? If so, its future prospects will depend critically on the success of new products in the pipeline. For example, investors in a pharmaceutical company want to know whether the company has a strong pipeline of potential blockbuster drugs and whether those products are doing well in the required tests.
7. Are changes in laws and regulations likely to have important implications for the firm? For example, when the future of electric utilities is forecasted, it is crucial to factor in the effects of proposed regulations affecting the use of coal, nuclear, and gas-fired plants.

As a good illustration of the need to look beyond the numbers, consider the recent rise of Netflix. In early 2013, its stock price was right around \$100 a share. Two years later in late February 2015, its shares were trading at \$483. Although Netflix's financial statements have improved over time, the rapid improvement in the company's stock price is mostly due to dramatic positive shifts in the market's expectations regarding its future prospects. Investors have been impressed with the company's ability to successfully take advantage of changing technology, as an increased number of households have used Netflix to access movies directly through streaming video. Netflix has also greatly benefited from the creation of its own content, most notably its *House of Cards* and *Orange Is the New Black* series; both have been incredibly well received. At the same time, Netflix's future success is far from guaranteed. The company continues to confront (and hopefully take advantage of) ever-changing technology and stiff competition from on-demand offerings from cable companies and from other sources, such as Apple's iTunes. It will be interesting for both consumers and Netflix's shareholders to see how this plays out in the years ahead.

### Self Test



What are some qualitative factors that analysts should consider when evaluating a company's likely future financial performance?



## TYING IT ALL TOGETHER

In the last chapter, we discussed the key financial statements; and in this one, we described how ratios are used to analyze the statements to identify weaknesses that need to be strengthened to maximize the stock price. Ratios are grouped into five categories:

- Liquidity
- Asset management
- Debt management
- Profitability
- Market value

The firm's ratios are compared with averages for its industry and with the leading firms in the industry (benchmarking), and these comparisons are used to help formulate policies that will lead to improved future performance. Similarly, the firm's own ratios can be analyzed over time to see if its financial situation is getting better or worse (trend analysis).

The single most important ratio over which management has control is the ROE—the other ratios are also important, but mainly because they affect the ROE. One tool used to show how ROE is determined is the DuPont equation:  $\text{ROE} = \text{Profit margin} \times \text{Total assets turnover} \times \text{Equity multiplier}$ . If the firm's ROE is below the industry average and that of the benchmark companies, a DuPont analysis can help identify problem areas that should be strengthened. In later chapters, we consider specific actions that can be taken to improve ROE and thus a firm's stock price. One closing note: Although ratio analysis is useful, it must be applied with care and good judgment. Actions taken to improve one ratio can have negative effects on other ratios. For example, it might be possible to improve the ROE by using more debt, but the risk of the additional debt may lead to a decrease in the P/E ratio and thus in the firm's stock price. Quantitative analysis such as ratio analysis can be useful, but thinking through the results is even more important.

### Self-Test Questions and Problems



(Solutions Appear in Appendix A)

ST-1

**KEY TERMS** Define each of the following terms:

- a. Liquid asset
- b. Liquidity ratios: current ratio; quick (acid test) ratio
- c. Asset management ratios: inventory turnover ratio; days sales outstanding (DSO); fixed assets turnover ratio; total assets turnover ratio
- d. Debt management ratios: total debt to total capital; times-interest-earned (TIE) ratio
- e. Profitability ratios: operating margin; profit margin; return on total assets (ROA); return on common equity (ROE); return on invested capital (ROIC); basic earning power (BEP) ratio
- f. Market value ratios: price/earnings (P/E) ratio; market/book (M/B) ratio
- g. DuPont equation; benchmarking; trend analysis
- h. "Window dressing" techniques

ST-2

**TOTAL DEBT TO TOTAL CAPITAL** Last year K. Billingsworth & Co. had earnings per share of \$4 and dividends per share of \$2. Total retained earnings increased by \$12 million during the

year, while book value per share at year-end was \$40. Billingsworth has no preferred stock, and no new common stock was issued during the year. If its year-end total debt was \$120 million, what was the company's year-end total debt to total capital ratio?

**ST-3 RATIO ANALYSIS** The following data apply to A.L. Kaiser & Company (millions of dollars):

Cash and equivalents	\$ 100.00
Fixed assets	283.50
Sales	1,000.00
Net income	50.00
Current liabilities	105.50
Notes payable to bank	20.00
Current ratio	3.00×
DSO <sup>a</sup>	40.55 days
ROE	12.00%

<sup>a</sup>This calculation is based on a 365-day year.

Kaiser has no preferred stock—only common equity, current liabilities, and long-term debt.

- Find Kaiser's (1) accounts receivable, (2) current assets, (3) total assets, (4) ROA, (5) common equity, (6) quick ratio, and (7) long-term debt.
- In part a, you should have found that Kaiser's accounts receivable (A/R) = \$111.1 million. If Kaiser could reduce its DSO from 40.55 days to 30.4 days while holding other things constant, how much cash would it generate? If this cash were used to buy back common stock (at book value), thus reducing common equity, how would this affect (1) the ROE, (2) the ROA, and (3) the total debt/total capital ratio?

## Questions

- Financial ratio analysis is conducted by three main groups of analysts: credit analysts, stock analysts, and managers. What is the primary emphasis of each group, and how would that emphasis affect the ratios on which they focus?
- Why would the inventory turnover ratio be more important for someone analyzing a grocery store chain than an insurance company?
- Over the past year, M.D. Ryngaert & Co. had an increase in its current ratio and a decline in its total assets turnover ratio. However, the company's sales, cash and equivalents, DSO, and fixed assets turnover ratio remained constant. What balance sheet accounts must have changed to produce the indicated changes?
- Profit margins and turnover ratios vary from one industry to another. What differences would you expect to find between the turnover ratios, profit margins, and DuPont equations for a grocery chain and a steel company?
- How does inflation distort ratio analysis comparisons for one company over time (trend analysis) and for different companies that are being compared? Are only balance sheet items or both balance sheet and income statement items affected?
- If a firm's ROE is low and management wants to improve it, explain how using more debt might help.
- Give some examples that illustrate how (a) seasonal factors and (b) different growth rates might distort a comparative ratio analysis. How might these problems be alleviated?
- Why is it sometimes misleading to compare a company's financial ratios with those of other firms that operate in the same industry?
- Suppose you were comparing a discount merchandiser with a high-end merchandiser. Suppose further that both companies had identical ROEs. If you applied the DuPont equation to both firms, would you expect the three components to be the same for each company? If not, explain what balance sheet and income statement items might lead to the component differences.

- 4-10** Refer to an online finance source such as Yahoo! Finance or Google Finance to look up the P/E ratios for Verizon Communications and Walmart. Which company has the higher P/E ratio? What factors could explain this?
- 4-11** Differentiate between ROE and ROIC.
- 4-12** Indicate the effects of the transactions listed in the following table on total current assets, current ratio, and net income. Use (+) to indicate an increase, (-) to indicate a decrease, and (0) to indicate either no effect or an indeterminate effect. Be prepared to state any necessary assumptions and assume an initial current ratio of more than 1.0. (Note: A good accounting background is necessary to answer some of these questions; if yours is not strong, answer the questions you can.)

	Total Current Assets	Current Ratio	Effect on Net Income
a. Cash is acquired through issuance of additional common stock.	—	—	—
b. Merchandise is sold for cash.	—	—	—
c. Federal income tax due for the previous year is paid.	—	—	—
d. A fixed asset is sold for less than book value.	—	—	—
e. A fixed asset is sold for more than book value.	—	—	—
f. Merchandise is sold on credit.	—	—	—
g. Payment is made to trade creditors for previous purchases.	—	—	—
h. A cash dividend is declared and paid.	—	—	—
i. Cash is obtained through short-term bank loans.	—	—	—
j. Short-term notes receivable are sold at a discount.	—	—	—
k. Marketable securities are sold below cost.	—	—	—
l. Advances are made to employees.	—	—	—
m. Current operating expenses are paid.	—	—	—
n. Short-term promissory notes are issued to trade creditors in exchange for past due accounts payable.	—	—	—
o. 10-year notes are issued to pay off accounts payable.	—	—	—
p. A fully depreciated asset is retired.	—	—	—
q. Accounts receivable are collected.	—	—	—
r. Equipment is purchased with short-term notes.	—	—	—
s. Merchandise is purchased on credit.	—	—	—
t. The estimated taxes payable are increased.	—	—	—

## Problems

### Easy Problems 1-6

- 4-1 DAYS SALES OUTSTANDING** Baxley Brothers has a DSO of 23 days, and its annual sales are \$3,650,000. What is its accounts receivable balance? Assume that it uses a 365-day year.
- 4-2 DEBT TO CAPITAL RATIO** Kaye's Kitchenware has a market/book ratio equal to 1. Its stock price is \$12 per share and it has 4.8 million shares outstanding. The firm's total capital is \$110 million and it finances with only debt and common equity. What is its debt-to-capital ratio?
- 4-3 DuPONT ANALYSIS** Henderson's Hardware has an ROA of 11%, a 6% profit margin, and an ROE of 23%. What is its total assets turnover? What is its equity multiplier?
- 4-4 MARKET/BOOK RATIO** Edelman Engines has \$17 billion in total assets. Its balance sheet shows \$1.7 billion in current liabilities, \$10.2 billion in long-term debt, and \$5.1 billion in common equity. It has 300 million shares of common stock outstanding, and its stock price is \$20 per share. What is Edelman's market/book ratio?
- 4-5 PRICE/EARNINGS RATIO** A company has an EPS of \$2.40, a book value per share of \$21.84, and a market/book ratio of 2.7 $\times$ . What is its P/E ratio?
- 4-6 DuPONT AND ROE** A firm has a profit margin of 3% and an equity multiplier of 1.9. Its sales are \$150 million, and it has total assets of \$60 million. What is its ROE?

Intermediate  
Problems  
7-19

**4-7 ROE AND ROIC** Baker Industries's net income is \$24,000, its interest expense is \$5,000, and its tax rate is 40%. Its notes payable equals \$27,000, long-term debt equals \$75,000, and common equity equals \$250,000. The firm finances with only debt and common equity, so it has no preferred stock. What are the firm's ROE and ROIC?

**4-8 DuPONT AND NET INCOME** Precious Metal Mining has \$17 million in sales, its ROE is 17%, and its total assets turnover is  $3.2\times$ . Common equity on the firm's balance sheet is 50% of its total assets. What is its net income?

**4-9 BEP, ROE, AND ROIC** Broward Manufacturing recently reported the following information:

Net income	\$615,000
ROA	10%
Interest expense	\$202,950
Accounts payable and accruals	\$950,000

Broward's tax rate is 30%. Broward finances with only debt and common equity, so it has no preferred stock. 40% of its total invested capital is debt, and 60% of its total invested capital is common equity. Calculate its basic earning power (BEP), its return on equity (ROE), and its return on invested capital (ROIC).

**4-10 M/B AND SHARE PRICE** You are given the following information: Stockholders' equity as reported on the firm's balance sheet = \$6.5 billion, price/earnings ratio = 9, common shares outstanding = 180 million, and market/book ratio = 2.0. Calculate the price of a share of the company's common stock.

**4-11 RATIO CALCULATIONS** Assume the following relationships for the Caulder Corp.:

Sales/Total assets	$1.3\times$
Return on assets (ROA)	4.0%
Return on equity (ROE)	8.0%

Calculate Caulder's profit margin and debt-to-capital ratio assuming the firm uses only debt and common equity, so total assets equal total invested capital.

**4-12 RATIO CALCULATIONS** Thomson Trucking has \$16 billion in assets, and its tax rate is 40%. Its basic earning power (BEP) ratio is 10%, and its return on assets (ROA) is 5%. What is its times-interest-earned (TIE) ratio?

**4-13 TIE AND ROIC RATIOS** The W.C. Pruett Corp. has \$600,000 of interest-bearing debt outstanding, and it pays an annual interest rate of 7%. In addition, it has \$600,000 of common stock on its balance sheet. It finances with only debt and common equity, so it has no preferred stock. Its annual sales are \$2.7 million, its average tax rate is 35%, and its profit margin is 7%. What are its TIE ratio and its return on invested capital (ROIC)?

**4-14 RETURN ON EQUITY** Pacific Packaging's ROE last year was only 5%; but its management has developed a new operating plan that calls for a debt-to-capital ratio of 40%, which will result in annual interest charges of \$561,000. The firm has no plans to use preferred stock and total assets equal total invested capital. Management projects an EBIT of \$1,258,000 on sales of \$17,000,000, and it expects to have a total assets turnover ratio of 2.1. Under these conditions, the tax rate will be 35%. If the changes are made, what will be the company's return on equity?

**4-15 RETURN ON EQUITY AND QUICK RATIO** Lloyd Inc. has sales of \$200,000, a net income of \$15,000, and the following balance sheet:

Cash	\$ 10,000	Accounts payable	\$ 30,000
Receivables	50,000	Notes payable to bank	20,000
Inventories	150,000	Total current liabilities	\$ 50,000
Total current assets	\$210,000	Long-term debt	50,000
Net fixed assets	90,000	Common equity	200,000
Total assets	\$300,000	Total liabilities and equity	\$300,000



The new owner thinks that inventories are excessive and can be lowered to the point where the current ratio is equal to the industry average, 2.5×, without affecting sales or net income. If inventories are sold and not replaced (thus reducing the current ratio to 2.5×); if the funds generated are used to reduce common equity (stock can be repurchased at book value); and if no other changes occur, by how much will the ROE change? What will be the firm's new quick ratio?

- 4-16 RETURN ON EQUITY** Commonwealth Construction (CC) needs \$3 million of assets to get started, and it expects to have a basic earning power ratio of 35%. CC will own no securities, so all of its income will be operating income. If it so chooses, CC can finance up to 30% of its assets with debt, which will have an 8% interest rate. If it chooses to use debt, the firm will finance using only debt and common equity, so no preferred stock will be used. Assuming a 40% tax rate on all taxable income, what is the *difference* between CC's expected ROE if it finances these assets with 30% debt versus its expected ROE if it finances these assets entirely with common stock?
- 4-17 CONCEPTUAL: RETURN ON EQUITY** Which of the following statements is most correct? (Hint: Work Problem 4-16 before answering 4-17, and consider the solution setup for 4-16 as you think about 4-17.)
- If a firm's expected basic earning power (BEP) is constant for all of its assets and exceeds the interest rate on its debt, adding assets and financing them with debt will raise the firm's expected return on common equity (ROE).
  - The higher a firm's tax rate, the lower its BEP ratio, other things held constant.
  - The higher the interest rate on a firm's debt, the lower its BEP ratio, other things held constant.
  - The higher a firm's debt ratio, the lower its BEP ratio, other things held constant.
  - Statement a is false; but statements b, c, and d are true.
- 4-18 TIE RATIO** MPI Incorporated has \$6 billion in assets, and its tax rate is 35%. Its basic earning power (BEP) ratio is 11%, and its return on assets (ROA) is 6%. What is MPI's times-interest-earned (TIE) ratio?
- 4-19 CURRENT RATIO** The Stewart Company has \$2,392,500 in current assets and \$1,076,625 in current liabilities. Its initial inventory level is \$526,350, and it will raise funds as additional notes payable and use them to increase inventory. How much can its short-term debt (notes payable) increase without pushing its current ratio below 2.0?
- 4-20 DSO AND ACCOUNTS RECEIVABLE** Ingraham Inc. currently has \$205,000 in accounts receivable, and its days sales outstanding (DSO) is 71 days. It wants to reduce its DSO to 20 days by pressuring more of its customers to pay their bills on time. If this policy is adopted, the company's average sales will fall by 15%. What will be the level of accounts receivable following the change? Assume a 365-day year.
- 4-21 P/E AND STOCK PRICE** Ferrell Inc. recently reported net income of \$8 million. It has 540,000 shares of common stock, which currently trades at \$21 a share. Ferrell continues to expand and anticipates that 1 year from now, its net income will be \$13.2 million. Over the next year, it also anticipates issuing an additional 81,000 shares of stock so that 1 year from now it will have 621,000 shares of common stock. Assuming Ferrell's price/earnings ratio remains at its current level, what will be its stock price 1 year from now?
- 4-22 BALANCE SHEET ANALYSIS** Complete the balance sheet and sales information using the following financial data:
- Total assets turnover: 1.5×
  - Days sales outstanding: 36.5 days<sup>a</sup>
  - Inventory turnover ratio: 5×
  - Fixed assets turnover: 3.0×
  - Current ratio: 2.0×
  - Gross profit margin on sales:  $(\text{Sales} - \text{Cost of goods sold}) / \text{Sales} = 25\%$

Challenging  
Problems  
20–24

<sup>a</sup>Calculation is based on a 365-day year.

**Balance Sheet**

Cash		Current liabilities	
Accounts receivable	_____	Long-term debt	<u>60,000</u>
Inventories	_____	Common stock	
Fixed assets	_____	Retained earnings	<u>97,500</u>
Total assets	<u>\$300,000</u>	Total liabilities and equity	_____
Sales	_____	Cost of goods sold	_____

**4-23 RATIO ANALYSIS** Data for Barry Computer Co. and its industry averages follow.

- Calculate the indicated ratios for Barry.
- Construct the DuPont equation for both Barry and the industry.
- Outline Barry's strengths and weaknesses as revealed by your analysis.
- Suppose Barry had doubled its sales as well as its inventories, accounts receivable, and common equity during 2016. How would that information affect the validity of your ratio analysis? (Hint: Think about averages and the effects of rapid growth on ratios if averages are not used. No calculations are needed.)

**Barry Computer Company:  
Balance Sheet as of December 31, 2016 (in Thousands)**

Cash	\$ 77,500	Accounts payable	\$129,000
Receivables	336,000	Other current liabilities	117,000
Inventories	<u>241,500</u>	Notes payable to bank	<u>84,000</u>
Total current assets	\$655,000	Total current liabilities	\$330,000
		Long-term debt	256,500
Net fixed assets	<u>292,500</u>	Common equity	<u>361,000</u>
Total assets	<u>\$947,500</u>	Total liabilities and equity	<u>\$947,500</u>

**Barry Computer Company: Income Statement for Year Ended  
December 31, 2016 (in Thousands)**

Sales		\$1,607,500
Cost of goods sold		
Materials	\$717,000	
Labor	453,000	
Heat, light, and power	68,000	
Indirect labor	113,000	
Depreciation	<u>41,500</u>	<u>1,392,500</u>
Gross profit		\$ 215,000
Selling expenses		115,000
General and administrative expenses		<u>30,000</u>
Earnings before interest and taxes (EBIT)		\$ 70,000
Interest expense		<u>24,500</u>
Earnings before taxes (EBT)		\$ 45,500
Federal and state income taxes (40%)		<u>18,200</u>
Net income		<u>\$ 27,300</u>

Ratio	Barry	Industry Average
Current	—	2.0×
Quick	—	1.3×
Days sales outstanding <sup>a</sup>	—	35 days
Inventory turnover	—	6.7×
Total assets turnover	—	3.0×
Profit margin	—	1.2%
ROA	—	3.6%
ROE	—	9.0%
ROIC	—	7.5%
TIE	—	3.0×
Debt/Total capital	—	47.0%

<sup>a</sup>Calculation is based on a 365-day year.

- 4-24 DuPONT ANALYSIS** A firm has been experiencing low profitability in recent years. Perform an analysis of the firm's financial position using the DuPont equation. The firm has no lease payments but has a \$2 million sinking fund payment on its debt. The most recent industry average ratios and the firm's financial statements are as follows:

Industry Average Ratios			
Current ratio	3×	Fixed assets turnover	6×
Debt-to-capital ratio	20%	Total assets turnover	3×
Times interest earned	7×	Profit margin	3%
EBITDA coverage	9×	Return on total assets	9%
Inventory turnover	10×	Return on common equity	12.86%
Days sales outstanding <sup>a</sup>	24 days	Return on invested capital	11.50%

<sup>a</sup>Calculation is based on a 365-day year.

**Balance Sheet as of December 31, 2016 (Millions of Dollars)**

Cash and equivalents	\$ 78	Accounts payable	\$ 45
Accounts receivable	66	Other current liabilities	11
Inventories	159	Notes payable	29
Total current assets	\$303	Total current liabilities	\$ 85
		Long-term debt	50
		Total liabilities	\$135
Gross fixed assets	225	Common stock	114
Less depreciation	78	Retained earnings	201
Net fixed assets	\$147	Total stockholders' equity	\$315
Total assets	\$450	Total liabilities and equity	\$450

**Income Statement for Year Ended December 31, 2016 (Millions of Dollars)**

Net sales	\$795.0
Cost of goods sold	660.0
Gross profit	\$135.0
Selling expenses	73.5
EBITDA	\$ 61.5
Depreciation expense	12.0
Earnings before interest and taxes (EBIT)	\$ 49.5
Interest expense	4.5
Earnings before taxes (EBT)	\$ 45.0
Taxes (40%)	18.0
Net income	\$ 27.0

- Calculate the ratios you think would be useful in this analysis.
- Construct a DuPont equation, and compare the company's ratios to the industry average ratios.
- Do the balance sheet accounts or the income statement figures seem to be primarily responsible for the low profits?
- Which specific accounts seem to be most out of line relative to other firms in the industry?
- If the firm had a pronounced seasonal sales pattern or if it grew rapidly during the year, how might that affect the validity of your ratio analysis? How might you correct for such potential problems?

### Comprehensive/Spreadsheet Problem

**4-25 RATIO ANALYSIS** The Corrigan Corporation's 2015 and 2016 financial statements follow, along with some industry average ratios.

- Assess Corrigan's liquidity position, and determine how it compares with peers and how the liquidity position has changed over time.
- Assess Corrigan's asset management position, and determine how it compares with peers and how its asset management efficiency has changed over time.
- Assess Corrigan's debt management position, and determine how it compares with peers and how its debt management has changed over time.
- Assess Corrigan's profitability ratios, and determine how they compare with peers and how its profitability position has changed over time.
- Assess Corrigan's market value ratios, and determine how its valuation compares with peers and how it has changed over time.
- Calculate Corrigan's ROE as well as the industry average ROE, using the DuPont equation. From this analysis, how does Corrigan's financial position compare with the industry average numbers?
- What do you think would happen to its ratios if the company initiated cost-cutting measures that allowed it to hold lower levels of inventory and substantially decreased the cost of goods sold? No calculations are necessary. Think about which ratios would be affected by changes in these two accounts.

**Corrigan Corporation: Balance Sheets as of December 31**

	2016	2015
Cash	\$ 72,000	\$ 65,000
Accounts receivable	439,000	328,000
Inventories	894,000	813,000
Total current assets	\$1,405,000	\$1,206,000
Land and building	238,000	271,000
Machinery	132,000	133,000
Other fixed assets	61,000	57,000
Total assets	<u>\$1,836,000</u>	<u>\$1,667,000</u>
Accounts payable	\$ 80,000	\$ 72,708
Accrued liabilities	45,010	40,880
Notes payable	476,990	457,912
Total current liabilities	\$ 602,000	\$ 571,500
Long-term debt	404,290	258,898
Common stock	575,000	575,000
Retained earnings	254,710	261,602
Total liabilities and equity	<u>\$1,836,000</u>	<u>\$1,667,000</u>

**Corrigan Corporation: Income Statements for Years Ending December 31**

	2016	2015
Sales	\$4,240,000	\$3,635,000
Cost of goods sold	<u>3,680,000</u>	<u>2,980,000</u>
Gross operating profit	\$ 560,000	\$ 655,000
General administrative and selling expenses	303,320	297,550
Depreciation	<u>159,000</u>	<u>154,500</u>
EBIT	\$ 97,680	\$ 202,950
Interest	<u>67,000</u>	<u>43,000</u>
Earnings before taxes (EBT)	\$ 30,680	\$ 159,950
Taxes (40%)	<u>12,272</u>	<u>63,980</u>
Net income	<u>\$ 18,408</u>	<u>\$ 95,970</u>

**Per-Share Data**

	2016	2015
EPS	\$ 0.80	\$ 4.17
Cash dividends	\$ 1.10	\$ 0.95
Market price (average)	\$12.34	\$23.57
P/E ratio	15.42×	5.65×
Number of shares outstanding	23,000	23,000

**Industry Financial Ratios<sup>a</sup>**

	2016
Current ratio	2.7×
Inventory turnover <sup>b</sup>	7.0×
Days sales outstanding <sup>c</sup>	32.0 days
Fixed assets turnover <sup>b</sup>	13.0×
Total assets turnover <sup>b</sup>	2.6×
Return on assets	9.1%
Return on equity	18.2%
Return on invested capital	14.5%
Profit margin	3.5%
Debt-to-capital ratio	50.0%
P/E ratio	6.0×

<sup>a</sup>Industry average ratios have been constant for the past 4 years.

<sup>b</sup>Based on year-end balance sheet figures.

<sup>c</sup>Calculation is based on a 365-day year.



## INTEGRATED CASE

### D'LEON INC., PART II

**4-26 FINANCIAL STATEMENTS AND TAXES** Part I of this case, presented in Chapter 3, discussed the situation of D'Leon Inc., a regional snack foods producer, after an expansion program. D'Leon had increased plant capacity and undertaken a major marketing campaign in an attempt to "go national." Thus far, sales have not been up to the forecasted level; costs have been higher than were projected; and a large loss occurred in 2016 rather than the expected profit. As a result, its managers, directors, and investors are concerned about the firm's survival.

Donna Jamison was brought in as assistant to Fred Campo, D'Leon's chairman, who had the task of getting the company back into a sound financial position. D'Leon's 2015 and 2016 balance sheets and income statements, together with projections for 2017, are given in Tables IC 4.1 and IC 4.2. In addition, Table IC 4.3 gives the company's 2015 and 2016 financial ratios, together with industry average data. The 2017 projected financial statement data represent Jamison's and Campo's best guess for 2017 results, assuming that some new financing is arranged to get the company "over the hump."

Jamison examined monthly data for 2016 (not given in the case), and she detected an improving pattern during the year. Monthly sales were rising, costs were falling, and large losses in the early months had turned to a small profit by December. Thus, the annual data look somewhat worse than final monthly data. Also, it appears to be taking longer for the advertising program to get the message out, for the new sales offices to generate sales, and for the new manufacturing facilities to operate efficiently. In other words, the lags between spending money and deriving benefits were longer than D'Leon's managers had anticipated. For these reasons, Jamison and Campo see hope for the company—provided it can survive in the short run.

Jamison must prepare an analysis of where the company is now, what it must do to regain its financial health, and what actions should be taken. Your assignment is to help her answer the following questions. Provide clear explanations, not yes or no answers.

- Why are ratios useful? What are the five major categories of ratios?
- Calculate D'Leon's 2017 current and quick ratios based on the projected balance sheet and income statement data. What can you say about the company's liquidity positions in 2015, in 2016, and as projected for 2017? We often think of ratios as being useful (1) to managers to help run the business, (2) to bankers for credit analysis, and (3) to stockholders for stock valuation. Would these different types of analysts have an equal interest in the company's liquidity ratios? Explain your answer.
- Calculate the 2017 inventory turnover, days sales outstanding (DSO), fixed assets turnover, and total assets turnover. How does D'Leon's utilization of assets stack up against other firms in the industry?
- Calculate the 2017 debt-to-capital and times-interest-earned ratios. How does D'Leon compare with the industry with respect to financial leverage? What can you conclude from these ratios?
- Calculate the 2017 operating margin, profit margin, basic earning power (BEP), return on assets (ROA), return on equity (ROE), and return on invested capital (ROIC). What can you say about these ratios?
- Calculate the 2017 price/earnings ratio and market/book ratio. Do these ratios indicate that investors are expected to have a high or low opinion of the company?
- Use the DuPont equation to provide a summary and overview of D'Leon's financial condition as projected for 2017. What are the firm's major strengths and weaknesses?
- Use the following simplified 2017 balance sheet to show, in general terms, how an improvement in the DSO would tend to affect the stock price. For example, if the company could improve its collection procedures and thereby lower its DSO from 45.6 days to the 32-day industry average without affecting sales, how would that change "ripple through" the financial statements (shown in thousands below) and influence the stock price?

Accounts receivable	\$ 878	Current liabilities	\$ 845
Other current assets	1,802	Debt	700
Net fixed assets	817	Equity	1,952
Total assets	<u>\$3,497</u>	Liabilities plus equity	<u>\$3,497</u>

- i. Does it appear that inventories could be adjusted? If so, how should that adjustment affect D'Leon's profitability and stock price?
- j. In 2016, the company paid its suppliers much later than the due dates; also, it was not maintaining financial ratios at levels called for in its bank loan agreements. Therefore, suppliers could cut the company off, and its bank could refuse to renew the loan when it comes due in 90 days. On the basis of data provided, would you, as a credit manager, continue to sell to D'Leon on credit? (You could demand cash on delivery—that is, sell on terms of COD—but that might cause D'Leon to stop buying from your company.) Similarly, if you were the bank loan officer, would you recommend renewing the loan or demanding its repayment? Would your actions be influenced if, in early 2017, D'Leon showed you its 2017 projections along with proof that it was going to raise more than \$1.2 million of new equity?
- k. In hindsight, what should D'Leon have done in 2015?
- l. What are some potential problems and limitations of financial ratio analysis?
- m. What are some qualitative factors that analysts should consider when evaluating a company's likely future financial performance?

Balance Sheets TABLE IC 4.1

	2017E	2016	2015
<b>Assets</b>			
Cash	\$ 85,632	\$ 7,282	\$ 57,600
Accounts receivable	878,000	632,160	351,200
Inventories	1,716,480	1,287,360	715,200
Total current assets	\$2,680,112	\$1,926,802	\$1,124,000
Gross fixed assets	1,197,160	1,202,950	491,000
Less accumulated depreciation	380,120	263,160	146,200
Net fixed assets	\$ 817,040	\$ 939,790	\$ 344,800
Total assets	<u>\$3,497,152</u>	<u>\$2,866,592</u>	<u>\$1,468,800</u>
<b>Liabilities and Equity</b>			
Accounts payable	\$ 436,800	\$ 524,160	\$ 145,600
Accruals	408,000	489,600	136,000
Notes payable	300,000	636,808	200,000
Total current liabilities	\$1,144,800	\$1,650,568	\$ 481,600
Long-term debt	400,000	723,432	323,432
Common stock	1,721,176	460,000	460,000
Retained earnings	231,176	32,592	203,768
Total equity	\$1,952,352	\$ 492,592	\$ 663,768
Total liabilities and equity	<u>\$3,497,152</u>	<u>\$2,866,592</u>	<u>\$1,468,800</u>

Note: E indicates estimated. The 2017 data are forecasts.

TABLE IC 4.2 Income Statements

	2017E	2016	2015
Sales	\$7,035,600	\$6,034,000	\$3,432,000
Cost of goods sold	5,875,992	5,528,000	2,864,000
Other expenses	550,000	519,988	358,672
Total operating costs excluding depreciation and amortization	\$6,425,992	\$ 6,047,988	\$3,222,672
EBITDA	\$ 609,608	(\$ 13,988)	\$ 209,328
Depreciation & amortization	116,960	116,960	18,900
EBIT	\$ 492,648	(\$ 130,948)	\$ 190,428
Interest expense	70,008	136,012	43,828
EBT	\$ 422,640	(\$ 266,960)	\$ 146,600
Taxes (40%)	169,056	(106,784) <sup>a</sup>	58,640
Net income	\$ 253,584	(\$ 160,176)	\$ 87,960
EPS	\$ 1.014	(\$ 1.602)	\$ 0.880
DPS	\$ 0.220	\$ 0.110	\$ 0.220
Book value per share	\$ 7.809	\$ 4.926	\$ 6.638
Stock price	\$ 12.17	\$ 2.25	\$ 8.50
Shares outstanding	250,000	100,000	100,000
Tax rate	40.00%	40.00%	40.00%
Lease payments	\$40,000	\$40,000	\$40,000
Sinking fund payments	0	0	0

Note: E indicates estimated. The 2017 data are forecasts.

<sup>a</sup>The firm had sufficient taxable income in 2014 and 2015 to obtain its full tax refund in 2016.

TABLE IC 4.3 Ratio Analysis

	2017E	2016	2015	Industry Average
Current	1.2×	2.3×	2.7×	2.7×
Quick	0.4×	0.8×	1.0×	1.0×
Inventory turnover	4.7×	4.8×	6.1×	6.1×
Days sales outstanding (DSO) <sup>a</sup>	38.2	37.4	32.0	32.0
Fixed assets turnover	6.4×	10.0×	7.0×	7.0×
Total assets turnover	2.1×	2.3×	2.6×	2.6×
Debt-to-capital ratio	73.4%	44.1%	40.0%	40.0%
TIE	-1.0×	4.3×	6.2×	6.2×
Operating margin	-2.2%	5.5%	7.3%	7.3%
Profit margin	-2.7%	2.6%	3.5%	3.5%
Basic earning power	-4.6%	13.0%	19.1%	19.1%
ROA	-5.6%	6.0%	9.1%	9.1%
ROE	-32.5%	13.3%	18.2%	18.2%
ROIC	-4.2%	9.6%	14.5%	14.5%
Price/earnings	-1.4×	9.7×	14.2×	14.2×
Market/book	0.5×	1.3×	2.4×	2.4×
Book value per share	\$4.93	\$6.64	n.a.	n.a.

Note: E indicates estimated. The 2017 data are forecasts.

<sup>a</sup>Calculation is based on a 365-day year.



## TAKING A CLOSER LOOK



### CONDUCTING A FINANCIAL RATIO ANALYSIS ON HEWLETT PACKARD CO.

**Use online resources to work on this chapter's questions. Please note that website information changes over time, and these changes may limit your ability to answer some of these questions.**

In Chapter 3, we looked at Whole Foods' financial statements. In this chapter, we will use financial Internet websites (specifically, [www.morningstar.com](http://www.morningstar.com) and [www.google.com/finance](http://www.google.com/finance)) to analyze Hewlett Packard Co. Once on either website, you simply enter Hewlett Packard's ticker symbol (HPQ) to obtain the financial information needed.

The text mentions that financial statement analysis has two major components: a trend analysis, where we evaluate changes in key ratios over time, and a peer analysis, where we compare financial ratios with firms that are in the same industry and/or line of business. We will do both of these types of analysis in this problem.

Through the Morningstar website, you can find the firm's financials (Income Statement, Balance Sheet, and Cash Flow) on an annual or quarterly basis for the 5 most recent time periods. In addition, the site contains Key Ratios (Profitability, Growth, Cash Flow, Financial Health, and Efficiency) for 10 years. We will use the Key Ratios on this site to conduct the firm's trend analysis. (At the bottom of the screen you will see that you can click "Glossary" to find definitions for the different ratios. For example, Morningstar's Financial Leverage ratio is the same as the Equity multiplier that we use in the textbook.)

On the Google Finance site, you can find the firm's financial statements for the 4 most recent years or the five most recent quarters and key financial data for related companies for the most recent year or quarter. We will use the related companies' annual data to conduct the firm's peer analysis. Notice that when you go to the "Related Companies" screen, you can "add or remove columns." Click on that phrase, and you can check which peer data items you'd like to show on the computer screen. Also, once you have chosen the data, you can click on a term, and the companies will be ranked in either ascending or descending order for the specific term selected.

### DISCUSSION QUESTIONS

1. Looking at Morningstar's Financial Health ratios, what has happened to Hewlett Packard's liquidity position over the past 10 years?
2. Looking at Morningstar's Financial Health ratios, what has happened to Hewlett Packard's financial leverage position over the past 10 years?
3. Looking at Morningstar's Profitability ratios, what has happened to Hewlett Packard's profit margin (net margin %) over the past 10 years? What has happened to its return on assets (ROA) and return on equity (ROE) over the past 10 years?
4. Identify Google Finance's list of related companies to Hewlett Packard. Which is the largest in terms of market capitalization? Which is the smallest? Where does Hewlett Packard rank (in terms of market capitalization)?
5. From the Google Finance site, look at Hewlett Packard's liquidity position (as measured by its current ratio). How does this ratio compare with those of its peers?
6. From the Google Finance site, look at Hewlett Packard's profitability ratios (as measured by its profit margin, ROA, and ROE). How do these ratios compare with those of its peers?
7. From the Google Finance site, use the DuPont analysis to determine the total assets turnover ratio for each of the peer companies. (Hint:  $ROA = \text{Profit margin} \times \text{Total assets turnover}$ .) Once you've calculated each peer's total assets turnover ratio, then you can use the DuPont analysis to calculate each peer's equity multiplier.
8. From the information gained in question 7 and using the DuPont analysis, what are Hewlett Packard's strengths and weaknesses compared to those of its competitors?