

Measuring Corporate Performance

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- 1 Calculate and interpret the market value and market value added of a public corporation.
- 2 Calculate and interpret key measures of financial performance, including economic value added (EVA) and rates of return on capital, assets, and equity.
- 3 Calculate and interpret key measures of operating efficiency, leverage, and liquidity.
- 4 Show how profitability depends on the efficient use of assets and on profits as a fraction of sales.
- 5 Understand how a company's sustainable growth depends on both its payout policy and its return to equity.
- 6 Compare a company's financial standing with its competitors and its own position in previous years.



When managers need to judge a firm's performance, they start with some key financial ratios.

In Chapter 1 we introduced the basic objective of corporate finance: Maximize the current *value* of shareholders' investment in the firm. For public corporations, this value is set in the stock market. It equals market price per share multiplied by the number of shares outstanding. Of course, the fluctuations in market value partly reflect events that are outside the financial manager's control. Nevertheless, good financial managers always strive to *add value* by superior investment and financing decisions.

How can we judge whether managers are doing a good job at adding value or where there may be scope for improvement? We need measures of value added. We also need measures that help explain where the value added comes from. For example, value added depends on profitability, so we need measures of profitability. Profitability depends in turn on profit margins and on how efficiently the firm

uses its assets. We will describe the standard measures of profitability and efficiency in this chapter.

Value also depends on sound financing. Value is destroyed if the firm is financed recklessly and can't pay its debts. Value is also destroyed if the firm does not maintain adequate liquidity and therefore has difficulty finding the cash to pay its bills. Therefore, we will describe the measures that financial managers and investors use to assess debt policy and liquidity.

These financial measures are mostly *financial ratios* calculated from the firm's income statement and balance sheet. Therefore, we will have to take care to remember the limitations of these accounting data.

You have probably heard stories of whizzes who can take a company's accounts apart in minutes, calculate a list of financial ratios, and divine the company's future. Such people are like abominable snowmen: often spoken of but

never truly seen. Financial ratios are no substitute for a crystal ball. They are just a convenient way to summarize financial data and to assess

and compare financial performance. The ratios help you to ask the right questions, but they seldom answer them.

4.1 Value and Value Added

How Financial Ratios Help to Understand Value Added

The good news about financial ratios is that they are usually easy to calculate. The bad news is that there are so many of them. To make it worse, the ratios are often presented in long lists that seem to require memorization first and understanding maybe later.

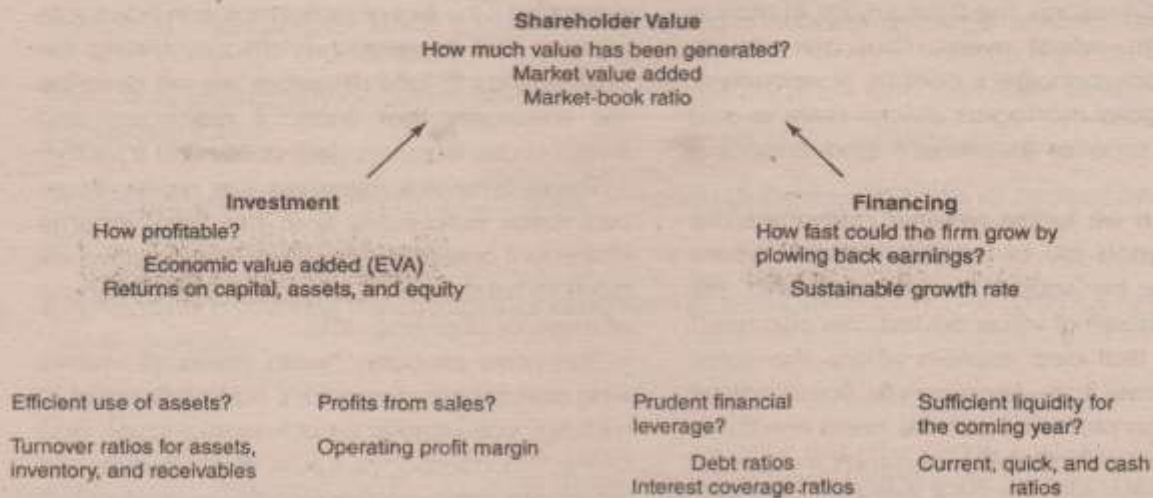
We can mitigate the bad news by taking a moment to preview what the ratios are measuring and how the ratios connect to the ultimate objective of value added for shareholders.

Shareholder value depends on good investment decisions. The financial manager evaluates investment decisions by asking several questions, including: How profitable are the investments relative to the cost of capital? How should profitability be measured? What does profitability depend on? (We will see that it depends on efficient use of assets and on the bottom-line profits on each dollar of sales.)

Shareholder value also depends on good financing decisions. Again, there are obvious questions: Is the available financing sufficient? The firm cannot grow unless financing is available. Is the financing strategy prudent? The financial manager should not put the firm's assets and operations at risk by operating at a dangerously high debt ratio, for example. Does the firm have sufficient liquidity (a cushion of cash or assets that can be readily sold for cash)? The firm has to be able to pay its bills and respond to unexpected setbacks.

Figure 4.1 summarizes these questions in somewhat more detail. The boxes on the left are for investment, the boxes on the right for financing. In each box we have posed a question and given examples of financial ratios or other measures that the financial manager can use to answer the question. For example, the bottom box on the far left of Figure 4.1 asks about efficient use of assets. Three financial ratios that measure asset efficiency are turnover ratios for assets, inventory, and accounts receivable.

FIGURE 4.1 An organization chart for financial ratios. The figure shows how common financial ratios and other measures relate to shareholder value.



The two bottom boxes on the right ask whether financial leverage (the amount of debt financing) is prudent and whether the firm has enough liquidity for the coming year. The ratios for tracking financial leverage include debt ratios, such as the ratio of debt to equity, and interest coverage ratios. The ratios for liquidity are the current, quick, and cash ratios.

We will explain how to calculate and interpret these and the other ratios in Figure 4.1. For now you can read the figure as an organization chart that locates some important financial ratios and shows how they relate to the objective of shareholder value.

Now we start at the top of the figure. Our first task is to measure value. We will explain market capitalization, market value added, and the market-to-book ratio.

4.2 Measuring Market Value and Market Value Added

Twenty years have passed since your introductory finance class. You are well into your career, and Home Depot is on your mind. Perhaps you are a mutual-fund manager trying to decide whether to allocate \$25 million of new money to Home Depot stock. Perhaps you are a major shareholder pondering a sellout. You could be an investment banker seeking business from Home Depot or a bondholder concerned with Home Depot's credit standing. You could be the treasurer or CFO of Home Depot or of one of its competitors. You want to understand Home Depot's value and financial performance. How would you start?

Home Depot's common stock closed 2009 at a price of \$28.72 per share. There were 1,693 million shares outstanding, so Home Depot's **market capitalization** or "market cap" was $\$28.72 \times 1,693 = \$48,623$ million, or nearly \$50 billion. This is a big number, of course, but Home Depot is a big company. Home Depot's shareholders have, over the years, invested billions in the company. Therefore, you decide to compare Home Depot's market capitalization to the book value of Home Depot's equity. The book value measures shareholders' cumulative investment in the firm.

You turn to Home Depot's income statement and balance sheet, which are reproduced in Tables 4.1 and 4.2.¹ At the end of 2009, the book value of Home Depot's equity was \$19,393 million. Therefore, Home Depot's **market value added**, the difference between the market value of the firm's shares and the amount of money that shareholders have invested in the firm, was $\$48,623 - \$19,393 = \$29,230$ million.

market capitalization
Total market value of equity, equal to share price times number of shares outstanding.

market value added
Market capitalization minus book value of equity.

TABLE 4.1 Income statement for Home Depot, 2009

Net sales	66,176
Cost of goods sold	43,764
Selling, general, & administrative expenses	15,907
Depreciation	1,806
Earnings before interest and income taxes	4,699
Net interest expense	676
Taxable income	4,023
Taxes	1,362
Net income	2,661
Allocation of net income	
Dividends	625
Addition to retained earnings	1,136

Source: Home Depot annual report, 2009.

¹ For convenience the statements are repeated from Chapter 3. We are pretending that you actually had these statements on January 1, 2010. They were not published until March.

TABLE 4.2 Home Depot's Balance Sheet (millions of dollars)

Assets	2009	2008
Current assets		
Cash and cash equivalents	1,421	519
Receivables	964	972
Inventories	10,188	10,673
Other current assets	1,327	1,198
Total current assets	13,900	13,362
Fixed Assets		
Net tangible fixed assets	25,550	26,234
Total intangible fixed assets	1,171	1,134
Total fixed assets	26,721	27,368
Other assets	256	434
Total assets	40,877	41,164
Liabilities and Shareholders' Equity	2009	2008
Current liabilities		
Debt due for repayment	1,020	1,767
Accounts payable	8,185	8,221
Other current liabilities	1,158	1,165
Total current liabilities	10,363	11,153
Long-term debt	8,662	9,667
Other long-term liabilities	2,459	2,567
Total liabilities	21,484	23,387
Shareholders' equity:		
Common stock and other paid-in capital	6,390	6,133
Retained earnings	13,588	12,452
Treasury stock	\$ (585)	(808)
Total shareholders' equity	19,393	17,777
Total liabilities and shareholders' equity	40,877	41,164

Source: Home Depot annual reports.

In other words, Home Depot shareholders have contributed about \$19 billion and ended up with shares worth almost \$49 billion. They have accumulated nearly \$30 billion in market value added.

The consultancy firm EVA Dimensions calculates market value added for a large sample of U.S. companies. Table 4.3 shows a few of the firms from EVA's list. ExxonMobil heads the group. It has created \$148.5 billion of wealth for its shareholders. Xerox is near the bottom of the class: The market value of its shares is \$9.1 billion *less* than the amount of shareholders' money invested in the firm.

TABLE 4.3 Stock-market measures of company performance, July 2010. Companies are ranked by market value added (dollar values in millions).

	Market Value Added	Market-to-Book Ratio		Market Value Added	Market-to-Book Ratio
ExxonMobil	148,502	1.81	Home Depot	26,941	1.78
Walmart	121,364	1.94	Lowe's	9,702	1.37
Google	110,566	7.71	FedEx	9,231	1.51
Coca-Cola	93,745	3.63	Dow Chemical	3,382	1.06
Johnson & Johnson	83,997	2.14	JCPenney	-4,653	0.62
AT&T	27,080	1.11	Xerox	-9,128	0.57

Source: We are grateful to EVA Dimensions for providing these statistics.

market-to-book ratio
Ratio of market value of
equity to book value of
equity.

Exxon is a large firm. Its managers have lots of assets to work with. A small firm could not hope to create so much extra value. Therefore, financial managers and analysts also like to calculate how much value has been added *for each dollar that shareholders have invested*. To do this, they compute the *ratio* of market value to book value. For example, Home Depot's **market-to-book ratio** at the end of 2009 was²

$$\text{Market-to-book ratio} = \frac{\text{market value of equity}}{\text{book value of equity}} = \frac{\$48,623}{\$19,393} = 2.5$$

In other words, Home Depot has multiplied the value of its shareholders' investment 2.5 times.

Table 4.3 also shows market-to-book ratios for mid-2010. Notice that Google has a much higher market-to-book ratio than Exxon. But Exxon's market value added is higher because of its larger scale.

Self-Test 4.1

Shares of Notung Cutlery Corp. closed 2010 at \$75 per share. Notung had 14.5 million shares outstanding. The book value of equity was \$610 million. Compute Notung's market capitalization, market value added, and market-to-book ratio.

The market-value performance measures in Table 4.3 have three drawbacks. First, the market value of the company's shares reflects investors' expectations about *future* performance. Investors pay attention to current profits and investment, of course, but they also avidly forecast investment and growth. Second, market values fluctuate because of many risks and events that are outside the financial manager's control. Thus, market values are noisy measures of how well the corporation's management is performing. Third, you can't look up the market value of privately owned companies whose shares are not traded. Nor can you observe the market value of divisions or plants that are parts of larger companies. You may use market values to satisfy yourself that Home Depot as a whole has performed well, but you can't use them to drill down to compare the performance of the lumber and home

² The market-to-book ratio can also be calculated by dividing stock price by book value per share.

improvement divisions. To do this, you need accounting measures of profitability. We start with economic value added (EVA).

4.3 Economic Value Added and Accounting Rates of Return

When accountants draw up an income statement, they start with revenues and then deduct operating and other costs. But one important cost is *not* included: the cost of the capital the firm employs. Therefore, to see whether the firm has truly created value, we need to measure whether it has earned a profit after deducting *all* costs, including the cost of its capital.

Recall from Chapters 1 and 2 that the cost of capital is the minimum acceptable rate of return on capital investment. It is an *opportunity* cost of capital, because it equals the expected rate of return on opportunities open to investors in financial markets. The firm creates value only if it can earn more than its cost of capital, that is, more than its investors can earn by investing on their own.

The profit after deducting all costs, *including the cost of capital*, is called the company's **economic value added** or EVA. The term "EVA" was coined by Stern Stewart & Co., which did much to develop and promote the concept. EVA is also called *residual income*.

In calculating EVA, it's customary to take account of all the long-term capital contributed by investors in the corporation. That means including bonds and other long-term debt as well as equity capital. Total long-term capital, usually called *total capitalization*, is the sum of long-term debt and shareholders' equity.

At the end of 2008 Home Depot's total capitalization amounted to \$27,444, the sum of \$9,667 of long-term debt and \$17,777 of shareholders' equity. This was the cumulative amount that had been invested by Home Depot's debt and equity investors. Home Depot's cost of capital was about 7.5%.³ So we can convert the cost of capital into dollars by multiplying total capitalization by 7.5%: $.075 \times \$27,444 \text{ million} = \$2,058 \text{ million}$. To satisfy its debt and equity investors, Home Depot needed to earn total income of \$2,058 million.

Now we can compare this figure with the income that Home Depot actually generated for its debt and equity investors. In 2009 debt investors received interest income

economic value added (EVA)
After-tax operating income minus a charge for the cost of capital employed. Also called *residual income*.

TABLE 4.4 EVA and ROC, July 2010. Companies are ranked by EVA (dollar values in millions)

	1. Operating Income*	2. Cost of Capital, %	3. Total Capitalization	4. EVA = 1 - (2 × 3)	ROC, % = 1 ÷ 3
ExxonMobil	28,641	5.8	182,424	17,506	15.7
Walmart	15,396	5.2	129,374	8,639	11.9
Johnson & Johnson	11,952	7.1	73,778	6,638	16.2
Coca-Cola	7,093	5.5	35,643	4,943	19.9
Google	6,577	12.0	16,483	4,788	39.9
FedEx	952	6.4	17,954	-241	5.3
JCPenney	465	6.5	12,234	-330	3.8
Dow Chemical	2,638	5.7	56,129	-526	4.7
Xerox	712	9.6	21,326	-1,091	3.3
AT&T	16,779	8.2	250,440	-3,760	6.7

*Net income plus after-tax interest.

Note: EVAs do not compute exactly because of rounding in the cost of capital.

Source: We are grateful to EVA Dimensions for providing these statistics.

³ This is an after-tax weighted-average cost of capital, or WACC. A company's WACC depends on the risk of its business. The WACC is almost the same as the opportunity cost of capital, but with the cost of debt calculated after tax. We will explain WACC and how to calculate it in Chapter 13.

of \$676 million. The after-tax equivalent, using Home Depot's 35% tax rate, is $(1 - .35) \times 676 = \$439$ million.⁴ Net income to shareholders was \$2,661 million. Therefore, Home Depot's after-tax interest and net income totaled $\$439 + 2,661 = \$3,100$ million. If you deduct the dollar cost of capital from this figure, you can see that the company earned $\$3,100 - 2,058 = \$1,042$ million *more* than investors required. This was Home Depot's EVA or residual income:

$$\begin{aligned} \text{EVA} &= \text{after-tax interest} + \text{net income} - (\text{cost of capital} \times \text{total capitalization}) \\ &= 439 + 2,661 - 2,058 = \$1,042 \text{ million} \end{aligned}$$

The sum of Home Depot's net income and after-tax interest is its after-tax *operating income*. This is what Home Depot would earn if it had no debt and could not take interest as a tax-deductible expense. After-tax operating income is what the company would earn if it were all-equity financed. In that case it would have no (after-tax) interest expense and all operating income would go to shareholders.

Thus EVA also equals:

$$\begin{aligned} \text{EVA} &= \text{after-tax operating income} - (\text{cost of capital} \times \text{total capitalization}) \\ &= 3,100 - 2,058 = \$1,042 \text{ million} \end{aligned}$$

Of course Home Depot and its competitors do use debt financing. Nevertheless, EVA comparisons are more useful if focused on operating income, which is not affected by interest tax deductions.

Table 4.4 shows estimates of EVA for our sample of large companies. ExxonMobil again heads the list. It earned over \$17 billion more than was needed to cover its cost of capital. By contrast, AT&T was a laggard. Although it earned an accounting profit of over \$16 billion, this figure was calculated *before* deducting the cost of capital. *After* deducting the cost of capital, AT&T made an EVA loss of about \$3.8 billion.

Notice how the cost of capital differs across the 10 firms in Table 4.4. The variation is due to differences in business risk. Relatively safe companies like Walmart and Coca-Cola tend to have low costs of capital. Riskier companies like Xerox and especially Google have high costs of capital.

EVA, or residual income, is a better measure of a company's performance than is accounting income. Accounting income is calculated after deducting all costs except the cost of capital. By contrast, EVA recognizes that companies need to cover their opportunity costs before they add value.

EVA makes the cost of capital *visible* to operating managers. There is a clear target: Earn *at least* the cost of capital on assets employed. A plant or divisional manager can improve EVA by reducing assets. Evaluating performance by EVA pushes managers to flush out and dispose of underutilized assets. Therefore, a growing number of firms now calculate EVA and tie managers' compensation to it.

Self-Test 4.2

Roman Holidays, Inc., had operating income of \$30 million on a start-of-year total capitalization of \$188 million. Its cost of capital was 11.5%. What was its EVA?

⁴ Why do we take interest after tax? Remember from Chapter 3 that when a firm pays interest, it reduces its taxable income and therefore its tax bill. This tax saving, or *tax shield*, will vary across firms depending on the amounts of debt financing. But we want to focus here on operating results. To put all firms on a common basis, we subtract the interest tax shield from reported income, or, equivalently, we look at after-tax interest payments. By ignoring the tax shield, we calculate each firm's income as if it had no debt outstanding and shareholders got the (pretax) interest. To be consistent, the cost of capital is defined as an after-tax weighted-average cost of capital (WACC). We will have more to say about these issues in Chapters 13 and 16.

Accounting Rates of Return

EVA measures how many dollars a business is earning after deducting the cost of capital. Other things equal, the more assets the manager has to work with, the greater the opportunity to generate a large EVA. The manager of a small division may be highly competent, but if that division has few assets, she is unlikely to rank high in the EVA stakes. Therefore, when comparing managers, it can be helpful to measure the firm's profits *per dollar of assets*. Three common measures are the return on capital (ROC), the return on equity (ROE), and the return on assets (ROA). These are called *book rates of return*, because they are based on accounting information.

Return on Capital (ROC) The return on capital is equal to after-tax operating income divided by total capitalization. In 2009 Home Depot's operating income was \$3,100 million. It started the year with total capitalization (long-term debt plus shareholders' equity) of \$27,444 million. Therefore its **return on capital (ROC)** was⁵

$$\text{ROC} = \frac{\text{after-tax operating income}}{\text{total capitalization}} = \frac{3,100}{27,444} = .113, \text{ or } 11.3\%$$

ROC is one prominent accounting or book rate of return. A book rate of return can be computed in different ways. For example, when we divided Home Depot's operating income by its total capitalization at the start of 2009, we ignored the company's additional financing and investment during that year. If the additional investment contributed a significant part of the year's operating income, it's better to divide by the average of the total capitalization at the beginning and end of the year.⁶ Home Depot's ROC for 2009 would decrease slightly to

$$\text{ROC} = \frac{\text{after-tax operating income}}{\text{average total capitalization}} = \frac{3,100}{(27,444 + 28,055)/2} = .112, \text{ or } 11.2\%$$

As we noted earlier, Home Depot's cost of capital was about 7.5%. This was the return that investors could have expected to earn at the start of 2009 if they invested their money in other companies or securities with the same risk as Home Depot's business. So in 2009 the company earned $11.2 - 7.5 = 3.7\%$ more than investors required.

Think again about how Home Depot creates value for its shareholders. It can either invest in new assets or pay out cash to the shareholders, who can then invest the money for themselves in financial markets. When Home Depot invests in a new store or warehouse, it deprives shareholders of the opportunity to invest on their own. The return that shareholders are giving up by keeping their money in the company is the opportunity cost of capital. If Home Depot earns more than the cost of capital, it makes its shareholders better off: It is earning a higher return than they could obtain for themselves. If it earns less than the cost of capital, it makes its investors worse off: They could earn a higher return simply by investing on their own in financial markets. So shareholders want the company to invest only in projects for which the return on capital is at least as great as the cost of capital.

The last column in Table 4.4 shows ROC for our sample of well-known companies. Notice that Google's return on capital was 39.9%, nearly 28 percentage points above its cost of capital. Although Google had a higher return on capital than ExxonMobil, it had a lower EVA. This was partly because it was more risky than Exxon and so had a higher cost of capital, but also because it had far fewer dollars invested than Exxon.

⁵ The numerator of Home Depot's ROC is again its after-tax operating income, calculated by adding back after-tax interest to net income. More often than not, financial analysts forget that interest is tax-deductible and use pretax interest to calculate operating income. This complicates comparisons of ROC for companies that use different fractions of debt financing. It also muddies comparisons of ROC with the after-tax weighted-average cost of capital (WACC). We cover WACC in Chapter 13.

⁶ Averages are used when a flow figure that builds up over the course of the year (here, income) is compared with a snapshot figure of assets or liabilities (here, capital). Sometimes it's convenient to use a snapshot figure at the end of the year, although this procedure is not strictly correct.

return on capital (ROC)
After-tax operating
income as a percentage
of long-term capital.

return on assets (ROA)
After-tax operating
income as a percentage
of total assets.

The five companies in Table 4.4 with negative EVAs all have ROCs less than their cost of capital. The spread between ROC and the cost of capital is really the same thing as EVA but expressed as a percentage return rather than in dollars.

Return on Assets (ROA) Return on assets (ROA) measures after-tax operating income as a fraction of the firm's *total* assets. Total assets (which equal total liabilities plus shareholders' equity) are greater than total capitalization because total capitalization does not include current liabilities. For Home Depot, ROA was

$$\text{Return on assets} = \frac{\text{after-tax operating income}}{\text{total assets}} = \frac{3,100}{41,164} = .075, \text{ or } 7.5\%$$

Using average total assets, ROA was slightly higher at 7.6%:

$$\text{ROA} = \frac{\text{after-tax operating income}}{\text{average total assets}} = \frac{3,100}{(41,164 + 40,877)/2} = .076, \text{ or } 7.6\%$$

For both ROA and ROC, we use after-tax operating income, which is calculated by adding after-tax interest to net income. We are again asking how profitable the company would have been if it were all-equity financed. This what-if calculation is helpful when comparing the profitability of firms with different capital structures. The tax deduction for interest is often ignored, however, and operating income is calculated using pretax interest. Some financial analysts take *no* account of interest payments and measure ROA as net income for shareholders divided by total assets. This calculation is *really*—we were about to say “stupid,” but don't want to offend anyone. This calculation ignores entirely the income that the firm's assets have generated for debt investors.

Self-Test 4.3

What is the difference between after-tax operating income and net income to shareholders? How is after-tax operating income calculated? Why is it useful in calculating EVA, ROC, and ROA?

return on equity (ROE)
Net income as a
percentage of
shareholders' equity.

Return on Equity (ROE) We measure the **return on equity (ROE)** as the income to shareholders per dollar that they have invested. Home Depot had net income of \$2,661 million in 2009 and shareholders' equity of \$17,777 million at the start of the year. So Home Depot's ROE was

$$\text{Return on equity} = \text{ROE} = \frac{\text{net income}}{\text{equity}} = \frac{2,661}{17,777} = .150, \text{ or } 15.0\%$$

Using average equity, ROE was

$$\text{ROE} = \frac{\text{net income}}{\text{average equity}} = \frac{2,661}{(17,777 + 19,393)/2} = .143, \text{ or } 14.3\%$$

Self-Test 4.4

Explain the *differences* between ROE, ROC, and ROA.

Problems with EVA and Accounting Rates of Return

Rates of return and economic value added have some obvious attractions as measures of performance. Unlike market-value-based measures, they show current performance and are not affected by all the other things that move stock market prices. Also, they can be calculated for an entire company or for a particular plant or division. However,

remember that both EVA and accounting rates of return are based on book (balance sheet) values for assets. Debt and equity are also book values. As we noted in the last chapter, accountants do not show every asset on the balance sheet, yet our calculations take accounting data at face value. For example, we ignored the fact that Home Depot has invested large sums in marketing in order to establish its brand name. This brand name is an important asset, but its value is not shown on the balance sheet. If it were shown, the book values of assets, capital, and equity would increase, and Home Depot would not appear to earn such high returns.

EVA Dimensions, which produced the figures in Tables 4.3 and 4.4, does make a number of adjustments to the accounting data. However, it is impossible to include the value of all assets or to judge how rapidly they depreciate. For example, did Google really earn a return on capital of 39.9%? It's difficult to say, because its investment over the years in search engines and other software is not shown in the balance sheet and cannot be measured exactly.

Remember also that the balance sheet does not show the current market values of the firm's assets. The assets in a company's books are valued at their original cost less any depreciation. Older assets may be grossly undervalued in today's market conditions and prices. So a high return on assets indicates that the business has performed well by making profitable investments in the past, but it does not necessarily mean that you could buy the same assets today at their reported book values. Conversely a low return suggests some poor decisions in the past, but it does not always mean that today the assets could be employed better elsewhere.

4.4 Measuring Efficiency

We began our analysis of Home Depot by calculating how much value that company has added for its shareholders and how much profit the company is earning after deducting the cost of the capital that it employs. We examined its rates of return on equity, capital, and total assets, which were all impressively high. Our next task is to probe a little deeper to understand the reasons for Home Depot's success. What factors contribute to this firm's overall profitability? One is the efficiency with which it uses its many types of assets.

Asset Turnover Ratio The asset turnover, or sales-to-assets, ratio shows how much sales are generated by each dollar of total assets, and therefore it measures how hard the firm's assets are working. For Home Depot, each dollar of assets produced \$1.608 of sales:

$$\text{Asset turnover} = \frac{\text{sales}}{\text{total assets at start of year}} = \frac{66,176}{41,164} = 1.608$$

Like some of our profitability ratios, the sales-to-assets ratio compares a flow measure (sales over the entire year) to a snapshot measure (assets on one day). Therefore, financial managers and analysts often calculate the ratio of sales over the entire year to the *average* level of assets over the same period. In this case,

$$\text{Asset turnover} = \frac{\text{sales}}{\text{average total assets}} = \frac{66,176}{(40,877 + 41,164)/2} = 1.613$$

The asset turnover ratio measures how efficiently the business is using its entire asset base. But you also might be interested in how hard *particular types* of assets are being put to use. Below are a couple of examples.

Inventory Turnover Efficient firms don't tie up more capital than they need in raw materials and finished goods. They hold only a relatively small level of inventories of raw materials and finished goods, and they turn over those inventories rapidly.

The balance sheet shows the cost of inventories rather than the amount that the finished goods will eventually sell for. So it is usual to compare the level of inventories with the cost of goods sold rather than with sales. In Home Depot's case,

$$\text{Inventory turnover} = \frac{\text{cost of goods sold}}{\text{inventory at start of year}} = \frac{43,764}{10,673} = 4.1$$

Another way to express this measure is to look at how many days of output are represented by inventories. This is equal to the level of inventories divided by the daily cost of goods sold:

$$\text{Average days in inventory} = \frac{\text{inventory at start of year}}{\text{daily cost of goods sold}} = \frac{10,673}{43,764/365} = 89 \text{ days}$$

You could say that on average Home Depot has sufficient inventories to maintain operations for 89 days.

In Chapter 20 we will see that many firms have managed to increase their inventory turnover in recent years. Toyota has been the pioneer in this endeavor. Its *just-in-time* inventory system ensures that auto parts are delivered exactly when they are needed. Toyota now keeps only about one month's supply of parts and finished cars in inventory and turns over its inventory about 12 times a year.

Receivables Turnover Receivables are sales for which you have not yet been paid. The receivables turnover ratio measures the firm's sales as a multiple of its receivables. For Home Depot,

$$\text{Receivables turnover} = \frac{\text{sales}}{\text{receivables at start of year}} = \frac{66,176}{972} = 68$$

If customers are quick to pay, unpaid bills will be a relatively small proportion of sales and the receivables turnover will be high. Therefore, a high ratio often indicates an efficient credit department that is quick to follow up on late payers. Sometimes, however, a high ratio may indicate that the firm has an unduly restrictive credit policy and offers credit only to customers who can be relied on to pay promptly.⁷

Another way to measure the efficiency of the credit operation is by calculating the average length of time for customers to pay their bills. The faster the firm turns over its receivables, the shorter the collection period. Home Depot's customers pay their bills in about 5.4 days:

$$\text{Average collection period} = \frac{\text{receivables at start of year}}{\text{average daily sales}} = \frac{972}{66,176/365} = 5.4 \text{ days}$$

Self-Test 4.5

The average collection period measures the number of days it takes Home Depot to collect its bills. But Home Depot also delays paying its own bills. Use the information in Tables 4.1 and 4.2 to calculate the average number of days that it takes Home Depot to pay its bills.

The receivables turnover ratio and the inventory turnover ratio may help to highlight particular areas of inefficiency, but they are not the only possible indicators. For example, a retail chain might compare its sales per square foot with those of its competitors, an airline might look at revenues per passenger-mile, and a law firm might

⁷ Where possible, it makes sense to look only at *credit* sales. Otherwise, a high receivables turnover ratio (or, equivalently, a low average collection period) might simply indicate that a small proportion of sales are made on credit. For example, if a retail customer pays cash for a purchase at Home Depot, that transaction will have a collection period of zero, regardless of any policies of the firm's credit department.

look at revenues per partner. A little thought and common sense should suggest which measures are likely to produce the most helpful insights into your company's efficiency.

4.5 Analyzing the Return on Assets: The Du Pont System

We have seen that every dollar of Home Depot's assets generates \$1.61 of sales. But Home Depot's success depends not only on the efficiency with which it uses its assets to generate sales but also on how profitable those sales are. This is measured by Home Depot's profit margin.

Profit Margin The profit margin measures the proportion of sales that finds its way into profits. It is sometimes defined as

$$\text{Profit margin} = \frac{\text{net income}}{\text{sales}} = \frac{2,661}{66,176} = .040, \text{ or } 4.0\%$$

This definition can be misleading. When companies are partly financed by debt, a portion of the revenue produced by sales must be paid as interest to the firm's lenders. So profits from the firm's operations are divided between the debtholders and the shareholders. We would not want to say that a firm is less profitable than its rivals simply because it employs debt finance and pays out part of its income as interest. Therefore, when we are calculating the profit margin, it makes sense to add back the after-tax debt interest to net income. This leads us again to after-tax operating income and to the **operating profit margin**:

operating profit margin
After-tax operating
income as a
percentage of sales.

$$\begin{aligned} \text{Operating profit margin} &= \frac{\text{after-tax operating income}}{\text{sales}} \\ &= \frac{2,661 + (1 - .35) \times 676}{66,176} = .047, \text{ or } 4.7\% \end{aligned}$$

The Du Pont System

We calculated earlier that Home Depot has earned a return of 7.5% on its assets. The following equation shows that this return depends on two factors—the sales that Home Depot generates from its assets (asset turnover) and the profit that it earns on each dollar of sales (operating profit margin):

$$\begin{aligned} \text{Return on assets} &= \frac{\text{after-tax operating income}}{\text{assets}} && (4.1) \\ &= \frac{\text{sales}}{\text{assets}} \times \frac{\text{after-tax operating income}}{\text{sales}} \\ &\quad \uparrow \qquad \qquad \qquad \uparrow \\ &\quad \text{asset turnover} \quad \text{operating profit margin} \end{aligned}$$

Du Pont formula
ROA equals the product
of asset turnover and
operating profit margin.

This breakdown of ROA into the product of turnover and margin is often called the **Du Pont formula**, after the chemical company that popularized the procedure. In Home Depot's case the formula gives the following breakdown of ROA:

$$\begin{aligned} \text{ROA} &= \text{asset turnover} \times \text{operating profit margin} \\ &= 1.61 \times .047 = .075 \end{aligned}$$

The Du Pont formula is a useful way to think about a company's strategy. For example, a retailer may strive for high turnover at the expense of a low profit margin

(a "Walmart strategy"), or it may seek a high profit margin even if that results in low turnover (a "Bloomingdales strategy"). You would naturally prefer both high profit margin and high turnover, but life isn't that easy. A high-price and high-margin strategy will typically result in lower sales per dollar of assets, so firms must make trade-offs between these goals. The Du Pont formula can help sort out which strategy the firm is pursuing.

All firms would like to earn a higher return on their assets, but their ability to do so is limited by competition. The Du Pont formula helps to identify the constraints that firms face. Fast-food chains, which have high asset turnover, tend to operate on low margins. Classy hotels have relatively low turnover ratios but tend to compensate with higher margins.

EXAMPLE 4.1**Turnover versus Margin**

Firms often seek to improve their profit margins by acquiring a supplier. The idea is to capture the supplier's profit, as well as their own. Unfortunately, unless they have some special skill in running the new business, they are likely to find that any gain in profit margin is offset by a decline in asset turnover.

A few numbers may help to illustrate this point. Table 4.5 shows the sales, profits, and assets of Admiral Motors and its components supplier, Diana Corporation. Both earn a 10% return on assets, though Admiral has a lower operating profit margin (20% versus Diana's 25%). Since all of Diana's output goes to Admiral, Admiral's management reasons that it would be better to merge the two companies. That way, the merged company would capture the profit margin on both the auto components and the assembled car.

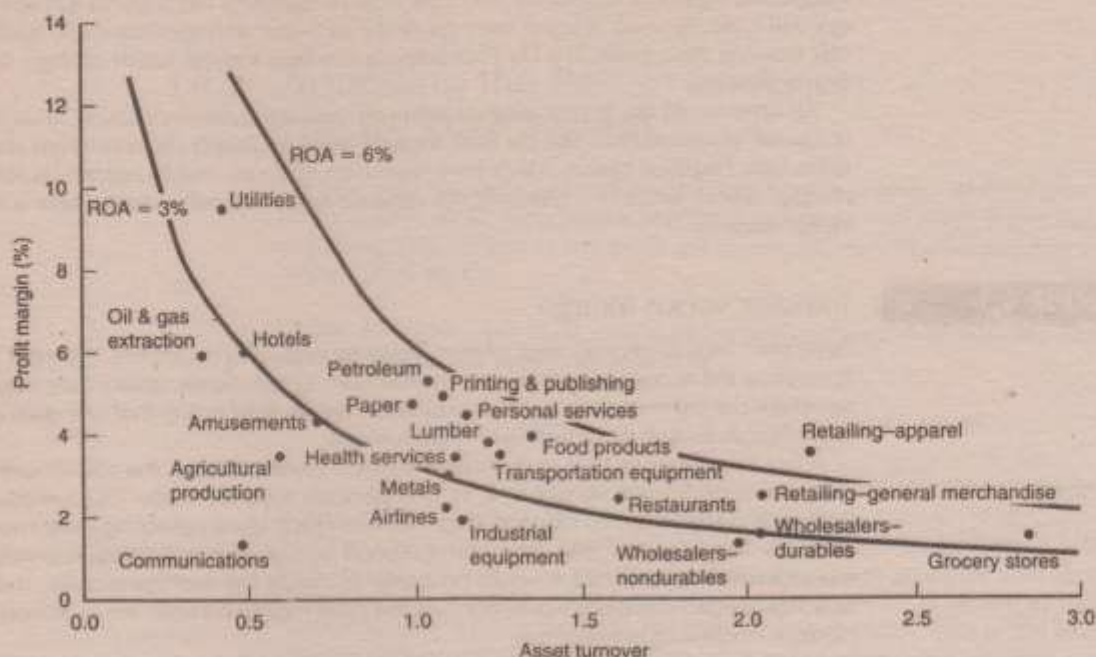
The bottom row of the following table shows the effect of the merger. The merged firm does indeed earn the combined profits. Total sales remain at \$20 million, however, because all the components produced by Diana are used within the company. With higher profits and unchanged sales, the profit margin increases. Unfortunately, the asset turnover is reduced by the merger since the merged firm has more assets. This exactly offsets the benefit of the higher profit margin. The return on assets is unchanged.

Figure 4.2 shows evidence of the trade-off between turnover and profit margin. You can see that industries with high average turnover ratios, for example, grocery stores, tend to have lower average profit margins. Conversely, high margins are typically associated with low turnover. The classic examples here are electric or water utilities, which have enormous capital requirements and therefore low asset turnover ratios. However, they have extremely low marginal costs for each unit of additional output and therefore earn high markups. The two curved lines in the figure trace out the combinations of profit margin and turnover that result in an ROA of either 3% or 6%. Despite the enormous dispersion across industries in both margin and turnover, that variation tends to be offsetting, so for most industries the return on assets lies between 3% and 6%.

TABLE 4.5 Merging with suppliers or customers will generally increase the profit margin, but this will be offset by a reduction in asset turnover.

	Millions of Dollars					
	Sales	Profits	Assets	Asset Turnover	Profit Margin	ROA
Admiral Motors	\$20	\$4	\$40	.50	20%	10%
Diana Corp.	8	2	20	.40	25	10
Diana Motors (the merged firm)	20	6	60	.33	30	10

FIGURE 4.2 Median ROA, profit margin, and asset turnover for 23 industries, 1990-2004



Source: Thomas I. Selling and Clyde P. Stickney, "The Effects of Business Environments and Strategy on a Firm's Rate of Return on Assets." Copyright 1989, CFA Institute. Reproduced and republished from *Financial Analysts Journal*, January-February 1989, pp. 43-52, with permission from the CFA Institute. All rights reserved. Updates courtesy of Professors James Wahlen, Stephen Baginski and Mark Bradshaw.

Self-Test 4.6

The Du Pont formula (Equation 4.1) seems to suggest that companies with higher asset turnover ratios generally will have high ROAs. Why may this not be so?

4.6 Measuring Financial Leverage

As Figure 4.1 indicates, shareholder value depends not only on good investment decisions and profitable operations but also on sound financing decisions. We look first at measures of financial leverage and then at measures of liquidity.

When a firm borrows money, it promises to make a series of interest payments and then to repay the amount that it has borrowed. If profits rise, the debtholders continue to receive only the fixed interest payment, so all the gains go to the shareholders. Of course, the reverse happens if profits fall. In this case shareholders bear most of the pain. If times are sufficiently hard, a firm that has borrowed heavily may not be able to pay its debts. The firm is then bankrupt, and shareholders lose most or all of their entire investment.

Because debt increases returns to shareholders in good times and reduces them in bad times, it is said to create *financial leverage*. Leverage ratios measure how much financial leverage the firm has taken on. CFOs keep an eye on leverage ratios to ensure that lenders are happy to continue to take on the firm's debt.

Debt Ratio Financial leverage is usually measured by the ratio of long-term debt to total long-term capital (that is, to total capitalization). Here long-term debt should include not just bonds or other borrowing but also financing from long-term leases.⁸ For Home Depot,

$$\text{Long-term debt ratio} = \frac{\text{long-term debt}}{\text{long-term debt} + \text{equity}} = \frac{8,662}{8,662 + 19,393} = .31, \text{ or } 31\%$$

This means that 31 cents of every dollar of long-term capital is in the form of debt. Leverage may also be measured by the debt-equity ratio. For Home Depot,

$$\text{Long-term debt-equity ratio} = \frac{\text{long-term debt}}{\text{equity}} = \frac{8,662}{19,393} = .45, \text{ or } 45\%$$

The difference between these two ratios is moderate for Home Depot, 31% versus 45%. But the debt-equity ratio climbs dramatically for highly leveraged companies. A company financed two-thirds with debt and one-third with equity has a long-term debt ratio of 67% (2/3) and a debt-equity ratio of 2. Sometimes you see projects such as oil pipelines financed with 90% debt and 10% equity. In that case the debt-equity ratio is 90/10 = 9.

The long-term debt ratio for the average U.S. manufacturing company is about 30%, but some companies deliberately operate at much higher debt levels. For example, in Chapter 21 we will look at leveraged buyouts (LBOs). Firms that are acquired in a leveraged buyout usually issue large amounts of debt. When LBOs first became popular in the 1990s, these companies had average debt ratios of about 90%. Many of them flourished and paid back their debtholders in full; others were not so fortunate.

Notice that debt ratios make use of book (accounting) values rather than market values.⁹ In principle, lenders should be more interested in the *market value* of the company, which reflects the actual value of the company's assets and the actual cash flows those assets will produce. If the market value of the company covers its debts, then lenders should get their money back. Thus you would expect to see the debt ratio computed using the market values of debt and equity. Yet book debt ratios are used almost universally.

Does use of book rather than market leverage ratios matter much? Perhaps not; after all, the market value of the firm includes the value of intangible assets generated by research and development, advertising, staff training, and so on. These assets are not easy to sell, and if the company falls on hard times, their value may disappear altogether. Thus, when banks demand that a borrower keep within a maximum debt ratio, they usually define that ratio in terms of book values and they ignore the intangible assets that are not shown on the balance sheet.

Notice also that these measures of leverage ignore short-term debt. That probably makes sense if the short-term debt is temporary or is matched by similar holdings of cash, but if the company is a regular short-term borrower, it may be preferable to widen the definition of debt to include all liabilities. In this case,

$$\text{Total debt ratio} = \frac{\text{total liabilities}}{\text{total assets}} = \frac{21,484}{40,877} = .53, \text{ or } 53\%$$

Therefore, Home Depot is financed 53% with long- and short-term debt and 47% with equity.¹⁰ We could also say that its ratio of total debt to equity is 21,484/19,393 = 1.11.

Managers sometimes refer loosely to a company's debt ratio, but we have just seen that the debt ratio may be measured in several different ways. For example, Home Depot has a debt ratio of .31 (the long-term debt ratio) and also .53 (the total debt

⁸ A finance lease is a long-term rental agreement that commits the firm to make regular payments. This commitment is just like the obligation to make payments on an outstanding loan.

⁹ In the case of leased assets, accountants estimate the value of the lease commitments. In the case of long-term debt, they simply show the face value, which can be very different from market value.

¹⁰ In this case, the 53% of debt includes other liabilities, including accounts payable and other current liabilities.

ratio). This is not the first time we have come across several ways to define a financial ratio. There is no law stating how a ratio should be defined. So be warned: Do not use a ratio without understanding how it has been calculated.

Times Interest Earned Ratio Another measure of financial leverage is the extent to which interest obligations are covered by earnings. Banks prefer to lend to firms with earnings that cover interest payments with room to spare. *Interest coverage* is measured by the ratio of earnings before interest and taxes (EBIT) to interest payments. For Home Depot,

$$\text{Times interest earned} = \frac{\text{EBIT}}{\text{interest payments}} = \frac{4,699}{676} = 7.0$$

By this measure, Home Depot is conservatively financed. Sometimes lenders are content with coverage ratios as low as 2 or 3.

The regular interest payment is a hurdle that companies must keep jumping if they are to avoid default. The coverage ratio measures how much clear air there is between hurdle and hurdler. The ratio is only part of the story, however. For example, it doesn't tell us whether Home Depot is generating enough cash to repay its debt as it becomes due.

Cash Coverage Ratio As we explained in Chapter 3, depreciation is not a cash expense. Depreciation is deducted when calculating the firm's earnings, even though no cash goes out the door. Suppose we add back depreciation to EBIT in order to calculate operating cash flow. We then calculate a *cash coverage ratio*.¹¹ For Home Depot,

$$\text{Cash coverage ratio} = \frac{\text{EBIT} + \text{depreciation}}{\text{interest payments}} = \frac{4,699 + 1,806}{676} = 9.6$$

Self-Test 4.7

A firm repays \$10 million face value of outstanding debt and issues \$10 million of new debt with a lower rate of interest. What happens to its long-term debt ratio? What happens to its times interest earned and cash coverage ratios?

Leverage and the Return on Equity

When the firm raises cash by borrowing, it must make interest payments to its lenders. This reduces net profits. On the other hand, if a firm borrows instead of issuing equity, it has fewer equityholders to share the remaining profits. Which effect dominates? An extended version of the Du Pont formula helps us answer this question. It breaks down the return on equity (ROE) into four parts:

$$\text{ROE} = \frac{\text{net income}}{\text{equity}} = \frac{\text{assets}}{\text{equity}} \times \frac{\text{sales}}{\text{assets}} \times \frac{\text{after-tax operating income}}{\text{sales}} \times \frac{\text{net income}}{\text{after-tax operating income}}$$

↑
↑
↑
↑
leverage ratio
asset turnover
operating profit margin
“debt burden”

(4.2)

¹¹ Depreciation of intangible assets is called *amortization* and is therefore also added back to EBIT. This gives EBIT + depreciation + amortization = EBITDA. EBITDA coverage ratios are common. You may also encounter still other ratios, in addition to the standard ratios covered here. You will see some examples in Table 4.8 on page 101.

Notice that the product of the two middle terms in Equation 4.2 is the return on assets. It depends on the firm's production and marketing skills and is unaffected by the firm's financing mix.¹² However, the first and fourth terms do depend on the debt-equity mix. The first term, assets/equity, which we call the *leverage ratio*, can be expressed as (equity + liabilities)/equity, which equals 1 + total-debt-to-equity ratio. The last term, which we call the "debt burden," measures the proportion by which interest expense reduces profits.

Suppose that the firm is financed entirely by equity. In this case, both the leverage ratio and the debt burden are equal to 1, and the return on equity is identical to the return on assets. If the firm borrows, however, the leverage ratio is greater than 1 (assets are greater than equity) and the debt burden is less than 1 (part of the profits is absorbed by interest). Thus leverage can either increase or reduce return on equity. In fact, we will see in Chapter 16 that leverage increases ROE when the firm's return on assets is higher than the interest rate it pays on its debt. Since Home Depot's return on capital exceeds the interest rate on its debt, return on equity is higher than return on capital.

Self-Test 4.8

- Sappy Syrup has a profit margin below the industry average, but its ROA equals the industry average. How is this possible?
- Sappy Syrup's ROA equals the industry average, but its ROE exceeds the industry average. How is this possible?

4.7 Measuring Liquidity

liquidity
Access to cash or assets that can be turned into cash on short notice.

If you are extending credit to a customer or making a short-term bank loan, you are interested in more than the borrower's financial leverage. You want to know whether the company can lay its hands on the cash to repay you. That is why credit analysts and bankers look at several measures of **liquidity**. Liquid assets can be converted into cash quickly and cheaply.

Think, for example, what you would do to meet a large unexpected bill. You might have some money in the bank or some investments that are easily sold, but you would not find it so easy to turn your old sweaters into cash. Companies, likewise, own assets with different degrees of liquidity. For example, accounts receivable and inventories of finished goods are generally quite liquid. As inventories are sold off and customers pay their bills, money flows into the firm. At the other extreme, real estate may be quite *illiquid*. It can be hard to find a buyer, negotiate a fair price, and close a deal at short notice.

Managers have another reason to focus on liquid assets: Their book (balance sheet) values are usually reliable. The book value of a catalytic cracker may be a poor guide to its true value, but at least you know what cash in the bank is worth.

Liquidity ratios also have some *less* desirable characteristics. Because short-term assets and liabilities are easily changed, measures of liquidity can rapidly become outdated. You might not know what the catalytic cracker is worth, but you can be fairly sure that it won't disappear overnight. Cash in the bank can disappear in seconds.

Also, assets that seem liquid sometimes have a nasty habit of becoming illiquid. This happened during the subprime mortgage crisis in 2008. Some financial institutions had set up funds known as *structured investment vehicles (SIVs)* that issued short-term debt backed by residential mortgages. As mortgage default rates began to climb, the market in this debt dried up and dealers became very reluctant to quote a price.

¹² Again, we use after-tax operating income, which is the sum of net income and after-tax interest.

Bankers and other short-term lenders applaud firms that have plenty of liquid assets. They know that when they are due to be repaid, the firm will be able to get its hands on the cash. But more liquidity is not always a good thing. For example, efficient firms do not leave excess cash in their bank accounts. They don't allow customers to postpone paying their bills, and they don't leave stocks of raw materials and finished goods littering the warehouse floor. In other words, high levels of liquidity may indicate sloppy use of capital. Here, EVA can highlight the problem, because it penalizes managers who keep more liquid assets than they really need.

Net Working Capital to Total Assets Ratio Current assets include cash, marketable securities, inventories, and accounts receivable. Current assets are mostly liquid. The difference between current assets and current liabilities is known as *net working capital*. It roughly measures the company's potential net reservoir of cash. Since current assets usually exceed current liabilities, net working capital is usually positive. For Home Depot,

$$\text{Net working capital} = 13,900 - 10,363 = \$3,537 \text{ million}$$

Home Depot's net working capital was 9% of total assets:

$$\frac{\text{Net working capital}}{\text{Total assets}} = \frac{3,537}{40,877} = .09, \text{ or } 9\%$$

Current Ratio The current ratio is just the ratio of current assets to current liabilities:

$$\text{Current ratio} = \frac{\text{current assets}}{\text{current liabilities}} = \frac{13,900}{10,363} = 1.34$$

Home Depot has \$1.34 in current assets for every dollar in current liabilities.

Changes in the current ratio can be misleading. For example, suppose that a company borrows a large sum from the bank and invests it in marketable securities. Current liabilities rise and so do current assets. If nothing else changes, net working capital is unaffected but the current ratio changes. For this reason it is sometimes preferable to net short-term investments against short-term debt when calculating the current ratio.

Quick (Acid-Test) Ratio Some current assets are closer to cash than others. If trouble comes, inventory may not sell at anything above fire-sale prices. (Trouble typically comes *because* the firm can't sell its inventory of finished products for more than production cost.) Thus managers often exclude inventories and other less liquid components of current assets when comparing current assets to current liabilities. They focus instead on cash, marketable securities, and bills that customers have not yet paid. This results in the quick ratio:

$$\text{Quick ratio} = \frac{\text{cash} + \text{marketable securities} + \text{receivables}}{\text{current liabilities}} = \frac{1,421 + 964}{10,363} = .23$$

Cash Ratio A company's most liquid assets are its holdings of cash and marketable securities. That is why analysts also look at the cash ratio:

$$\text{Cash ratio} = \frac{\text{cash} + \text{marketable securities}}{\text{current liabilities}} = \frac{1,421}{10,363} = .14$$

A low cash ratio may not matter if the firm can borrow on short notice. Who cares whether the firm has actually borrowed from the bank or whether it has a guaranteed

line of credit that lets it borrow whenever it chooses? None of the standard measures of liquidity takes the firm's "reserve borrowing power" into account.

Self-Test 4.9

- A firm has \$1.2 million in current assets and \$1 million in current liabilities. If it uses \$.5 million of cash to pay off some of its accounts payable, what will happen to the current ratio? What happens to net working capital?
- A firm uses cash on hand to pay for additional inventories. What will happen to the current ratio? To the quick ratio?

4.8 Calculating Sustainable Growth

Home Depot's leverage and liquidity ratios are checks on whether its financing policies are safe and sound. But what about the *amount* of financing that is available for investment and growth? To put it another way, how fast could Home Depot grow? Would its growth be limited by the availability of financing?

The answer to the last question is in principle no. In well-functioning financial markets, a company's growth is limited not by financing opportunities but by limits to good investment opportunities and by limits to other resources, including trained management and staff. If the company has investment projects that add value, it should be able to issue stock, if necessary, to finance them.

But the window to issue stock may not always be open. For example, a financial manager who believes that investors are unduly pessimistic will be reluctant to issue stock at what he or she sees as a depressed price. Therefore, financial managers and analysts are interested in knowing how fast the firm can grow if it relies only on internal financing, keeping the long-term debt ratio constant. They calculate the firm's *sustainable growth rate*.

Mature companies grow mainly by reinvesting earnings. How rapidly they grow depends on the proportion of earnings that is kept in the business and the profits that the company can earn on the new capital.

In 2009 Home Depot earned \$2,661 and paid \$1,525 in dividends. The proportion of earnings paid out as dividends was, therefore,

$$\text{Payout ratio} = \frac{1,525}{2,661} = .57, \text{ or } 57\%$$

The remaining 43% of earnings was reinvested and "plowed back" into the business and added to the firm's equity capital.¹³ Thus,

$$\text{Plowback ratio} = 1 - \text{payout ratio} = 1 - .57 = .43$$

Home Depot's return on equity (ROE) was 15%. If it continues to reinvest 43% of its earnings and to earn 15% on this money, both its earnings and its book equity will increase by $.43 \times .15 = .065$, or 6.5% a year:

$$\begin{aligned} \text{Sustainable growth rate} &= \frac{\text{earnings} - \text{dividends}}{\text{equity}} \\ &= \frac{\text{earnings} - \text{dividends}}{\text{earnings}} \times \frac{\text{earnings}}{\text{equity}} \\ &= \text{plowback ratio} \times \text{ROE} \\ &= .43 \times .15 = .065, \text{ or } 6.5\% \end{aligned}$$

¹³ We assume that payout to shareholders comes as cash dividends only. Companies also pay out cash by repurchasing stock. Strictly speaking, the payout ratio should be defined as the ratio of dividends and repurchases to net income. We discuss repurchases in Chapter 17.

sustainable growth rate
The firm's growth rate if it plows back a constant fraction of earnings, maintains a constant return on equity, and keeps its debt ratio constant.

This measure is often known as the **sustainable rate of growth**.

The sustainable growth rate assumes that the firm's long-term debt ratio is held constant. Home Depot could grow its assets at a faster rate by borrowing more and more, but that growth strategy would not be sustainable in the long run.

Home Depot's sustainable growth rate is moderate. But sometimes the formula for sustainable growth will result in crazy values, for example, sustainable growth rates above 30% or even 40%. No company could expect to maintain growth rates like these forever. Often, in such cases, firms are selling products at an early stage of their life-cycle. Competition in these new markets is scarce, return on equity is high, and, with ample opportunities for profitable reinvestment, firms respond with very high plowback ratios. For example, the ROE for computer software firms in 2010 was more than double that of electric utilities. And most software companies paid no dividends at all, but instead plowed *all* their earnings back into the firm.¹⁴ But eventually, as the industry matures, price competition will increase, ROE will decline, and with fewer profitable opportunities for reinvestment, firms will plow back less of their earnings. As ROE and the plowback ratio both decline, growth also must slow.

4.9 Interpreting Financial Ratios

We have shown how to calculate some common summary measures of Home Depot's performance and financial condition. These are summarized in Table 4.6.¹⁵

Now that you have calculated these measures, you need some way to judge whether they are high or low. In some cases there may be a natural benchmark. For example, if a firm has negative value added or a return on capital less than the cost of that capital, it is not creating wealth for its shareholders.

But what about some of our other measures? There is no right level for, say, the asset turnover or profit margin, and if there were, it would almost certainly vary from industry to industry and company to company. For example, you would not expect a soft-drink manufacturer to have the same profit margin as a jeweller or the same leverage as a finance company. All financial ratios must be interpreted in the context of industry norms.

Table 4.7 presents some financial ratios for a sample of industry groups. Notice the large variation across industries. Some of these differences, particularly in profitability measures, may arise from chance; in 2009 the sun shone more kindly on some industries than others. But other differences may reflect more fundamental factors. For example, notice the comparatively high debt ratios of food product companies. In comparison, computer and electronic companies tend to borrow far less, and these differences are true in both good times and bad. We pointed out earlier that some businesses are able to generate a high level of sales from relatively few assets. Differences in turnover ratios also tend to be relatively stable. For example, you can see that the asset turnover ratio for beverage and tobacco firms is more than double that for food product companies. But competition ensures that beverage and tobacco firms earn a correspondingly lower margin on their sales. The net effect is that the return on assets in the two industries is broadly similar.

¹⁴ These data are based on the firms in the Value Line Investment Survey industry group.

¹⁵ If you would like to see how we calculated these ratios or to calculate your own, you can use the live Excel spreadsheet available on our Web site at www.mhhe.com/hmm7e.

TABLE 4.6 Summary of Home Depot's performance measures

Performance Measures			
Market value added (\$ millions)	market value of equity	book value of equity	29,230
Market-to-book ratio	market value of equity	book value of equity	2.5
Profitability Measures			
Return on assets (ROA)	after-tax operating income/total assets		7.5%
Return on capital (ROC)	after-tax operating income/(long-term debt + equity)		11.3%
Return on equity (ROE)	net income/equity		15.0%
EVA* (\$ millions)	after-tax operating income	cost of capital × capital	1,042
Efficiency Measures			
Operating profit margin	after-tax operating income/sales		4.7%
Asset turnover	sales/total assets at start of year		1.61
Fixed-asset turnover	sales/fixed assets at start of year		2.42
Receivables turnover	sales/receivables at start of year		68.1
Average collection period (days)	receivables at start of year/daily sales		5.36
Inventory turnover	cost of goods sold/inventory at start of year		4.10
Days in inventory	inventories at start of year/daily cost of goods sold		89.0
Leverage Measures			
Long-term debt ratio	long-term debt/(long-term debt + equity)		30.9%
Long-term debt-equity ratio	long-term debt/equity		44.7%
Total debt ratio	total liabilities/total assets		52.6%
Times interest earned	EBIT/interest payments		6.95
Cash coverage ratio	(EBIT + depreciation)/interest payments		9.62
Liquidity Measures			
Net working capital to assets	net working capital/total assets		0.09
Current ratio	current assets/current liabilities		1.34
Quick ratio	(cash + marketable securities + receivables)/current liabilities		0.23
Cash ratio	(cash + marketable securities)/current liabilities		0.14
Growth Measures			
Payout ratio	dividends/earnings		0.57
Sustainable growth	(1 - payout ratio) × ROE		6.5%

*Authors' calculation.



You can find this spreadsheet at
www.mhhe.com/bmis7e.

TABLE 4.7 Financial ratios for major industry groups, 2009

	LT Debt Assets	Interest Coverage	Current Ratio	Quick Ratio	Asset Turnover	Profit Margin (%)	Return on Assets (%)	Return on Equity (%)	Payout Ratio
All Manufacturing	0.22	2.58	1.43	1.03	0.77	5.19	4.02	12.94	0.43
Food Products	0.28	3.74	1.40	0.84	1.19	7.99	9.52	18.09	0.47
Clothing	0.21	9.60	1.39	0.54	2.01	6.99	14.04	22.48	0.09
Beverage & Tobacco	0.27	3.95	1.15	0.52	2.82	3.20	9.04	-4.43	-0.54
Chemicals	0.26	2.62	1.36	1.04	0.48	9.04	4.34	22.12	0.36
Drugs	0.24	3.19	1.56	1.28	0.38	11.00	4.20	26.08	0.29
Machinery	0.18	2.83	1.32	0.90	0.70	6.15	4.33	8.55	0.66
Electrical	0.12	4.30	1.10	0.72	0.59	8.02	4.75	9.55	0.54
Motor Vehicles	0.20	-0.24	0.99	0.77	0.98	-0.42	-0.41	25.25	-0.24
Computer and Electronic	0.16	3.26	1.94	1.64	0.59	4.32	2.91	16.29	0.08
Paper	0.32	2.68	1.27	0.90	0.89	7.96	7.09	13.38	0.47

Source: Authors' calculations using data from U.S. Department of Commerce, *Quarterly Financial Report for Manufacturing, Mining and Trade Corporations*, March 2010. Available at http://www.census.gov/econ/qfr/current/qfr_pub.pdf.

Self-Test 4.10

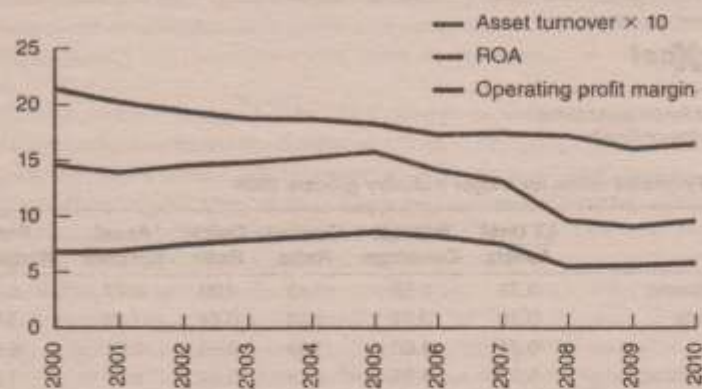
Even within an industry, there can be a considerable difference in the type of business that companies do, and this shows up in their financial ratios. Here are some data on assets, sales, and income for two companies. Calculate for each company the asset turnover, the operating profit margin, and the return on assets. In each case the values are expressed as a percentage of sales. One of these two companies is Walmart. The other is Tiffany. Which one is which? Explain.

	Company A	Company B
Sales	100	100
Assets	40.0	87.3
Net income - after-tax interest	4.0	11.1

When looking for benchmarks to evaluate performance, it usually makes sense to limit the comparison to the firm's major competitors. Table 4.8 sets out some key performance measures for Home Depot and Lowe's. The two companies are similar in many respects. For example, their liquidity measures are nearly identical. However, Home Depot's ROA is higher, due to its slightly higher asset turnover ratio as well as its better operating profit margin. Home Depot relies far more heavily on debt than Lowe's. This shows up in both its higher leverage ratios as well as its lower coverage ratios. This greater indebtedness could be a problem in an economic downturn. Despite its higher ROA and ROE, Home Depot actually has a lower sustainable growth rate than Lowe's. This is because it pays out a far larger share of earnings as dividends. This means more dividends today, but with lower reinvestment in the firm, future earnings and dividends may grow more slowly.¹⁶

It may also be helpful to compare Home Depot's financial ratios with its own equivalent figures in earlier years. For example, you can see in Figure 4.3 that Home Depot's return on assets declined from nearly 16% in 2005 to below 10% in 2008.

FIGURE 4.3 Home Depot financial ratios over time



Note: We pointed out earlier in the chapter that there is more than one way to calculate several ratios. Value Line's figures do not precisely match the values in Table 4.6.

Source: Value Line Investment Survey, April 2, 2010.

¹⁶ One apparently large and puzzling discrepancy between the two firms is in receivables turnover or, equivalently, average collection period. With its dramatically higher receivables turnover and lower collection period, Lowe's appears to be far more efficient in collecting its bills. But this is actually an illusion: Lowe's tends to sell its accounts receivable to other parties, and thus maintains lower receivables on its balance sheet. The lesson? Ratios can tip us off to differences in strategy as well as to emerging business strengths or problems, but you will generally have to probe further to fully understand the implications of the numbers.

TABLE 4.8 Selected financial measures for Home Depot and Lowe's, 2009

	Home Depot	Lowe's
Performance Measures		
Market value added (\$ millions)	29,230	16,181
Market-to-book ratio	2.5	1.85
Profitability Measures		
Return on assets (ROA)	7.5%	8.0%
Return on capital (ROC)	11.3%	8.5%
Return on equity (ROE)	15.0%	9.9%
EVA* (\$ millions)	1,042	145
Operating profit margin	4.7%	4.2%
Efficiency Measures		
Asset turnover	1.61	1.45
Fixed-asset turnover	2.42	2.06
Receivables turnover	68.1	219.6
Average collection period (days)	5.36	1.66
Inventory turnover	4.10	3.75
Days in inventory	89.0	97.4
Leverage Measures		
Long-term debt ratio	30.9%	19.2%
Long-term debt-equity ratio	44.7%	23.7%
Total debt ratio	52.6%	42.2%
Times interest earned	6.95	10.84
Cash coverage ratio	9.62	16.47
Liquidity Measures		
Net working capital to assets	0.09	0.07
Current ratio	1.34	1.32
Quick ratio	0.23	0.17
Cash ratio	0.14	0.14
Growth Measures		
Payout ratio	0.57	0.22
Sustainable growth	6.5%	7.7%

*Authors' calculation.

before finally stabilizing. We know that $ROA = \text{asset turnover} \times \text{operating profit margin}$. So what accounted for the fall in ROA? Figure 4.3 shows that the culprit was the decline in profit margin from 8.6% in 2005 to 5.7% in 2008. Perhaps Home Depot was forced to deal with greater price pressure from its competitors in those years. Here is where it may be useful to look at the experience of its different divisions.

This concludes our canter through Home Depot's financial statements.

4.10 The Role of Financial Ratios—and a Final Note on Transparency

Whenever two managers get together to talk business and finance, it's a good bet that they will refer to financial ratios. Let's drop in on two conversations.

Conversation 1 The CEO was musing out loud: "How are we going to finance this expansion? Would the banks be happy to lend us the \$30 million that we need?"

"I've been looking into that," the financial manager replies. "Our current debt ratio is .3. If we borrow the full cost of the project, the ratio would be about .45. When we took out our last loan from the bank, we agreed that we would not allow our debt ratio to get above .5. So if we borrow to finance this project, we wouldn't have much leeway to respond to possible emergencies. Also, the rating agencies currently give our bonds

TABLE 4.9 Financial ratios and default risk by rating class, long-term debt

	Three-Year (2002-2004) Medians						
	AAA	AA	A	BBB	BB	B	CCC
EBIT interest coverage multiple	23.8	19.5	8.0	4.7	2.5	1.2	0.4
EBITDA interest coverage multiple	25.5	24.6	10.2	6.5	3.5	1.9	0.9
Funds from operations/total debt (%)	203.3	79.9	48.0	35.9	22.4	11.5	5.0
Free operating cash flow/total debt (%)	127.6	44.5	25.0	17.3	8.3	2.8	(2.1)
Total debt/EBITDA multiple	0.4	0.9	1.6	2.2	3.5	5.3	7.9
Return on capital (%)	27.6	27.0	17.5	13.4	11.3	8.7	3.2
Total debt/(total debt + equity) (%)	12.4	28.3	37.5	42.5	53.7	75.9	113.5

Note: EBITDA is earnings before interest, taxes, depreciation, and amortization. Standard & Poor's and Moody's, the two largest credit rating agencies, use slightly different labels for rating classes. For example, S&P's BBB rating is equivalent to Moody's Baa, BB is equivalent to Ba, and so on.
Source: *Corporate Rating Criteria*, Standard & Poor's, 2006.

an investment-grade rating. They too look at a company's leverage when they rate its bonds. I have a table here (Table 4.9), which shows that when firms are highly leveraged, their bonds receive a lower rating. I don't know whether the rating agencies would downgrade our bonds if our debt ratio increased to .45, but they might. That wouldn't please our existing bondholders, and it could raise the cost of any new borrowing."

"We also need to think about our interest cover, which is beginning to look a bit thin. Debt interest is currently covered three times, and if we borrowed the entire \$30 million, interest cover would fall to about two times. Sure, we expect to earn additional profits on the new investment, but it could be several years before they come through. If we run into a recession in the meantime, we could find ourselves short of cash."

"Sounds to me as if we should be thinking about a possible equity issue," concluded the CEO.

Conversation 2 The CEO was not in the best of moods after his humiliating defeat at the company golf tournament by the manager of the packaging division: "I see our stock was down again yesterday," he growled. "It's now selling below book value, and the stock price is only six times earnings. I work my socks off for this company; you would think that our stockholders would show a little more gratitude."

"I think I can understand a little of our shareholders' worries," the financial manager replies. "Just look at our return on assets." It's only 6%, well below the cost of capital. Sure we are making a profit, but that profit does not cover the cost of the funds that investors provide. Our economic value added is actually negative. Of course, this doesn't necessarily mean that the assets could be used better elsewhere, but we should certainly be looking carefully at whether any of our divisions should be sold off or the assets redeployed.

"In some ways we're in good shape. We have very little short-term debt, and our current assets are three times our current liabilities. But that's not altogether good news because it also suggests that we may have more working capital than we need. I've been looking at our main competitors. They turn over their inventory 12 times a year compared with our figure of just 8 times. Also, their customers take an average of 45 days to pay their bills. Ours take 67. If we could just match their performance on these two measures, we would release \$300 million that could be paid out to shareholders."

"Perhaps we could talk more about this tomorrow," said the CEO. "In the meantime I intend to have a word with the production manager about our inventory levels and with the credit manager about our collections policy. You've also got me thinking about whether we should sell off our packaging division. I've always worried about the divisional manager there. Spends too much time practicing his backswing and not enough worrying about his return on assets."

Transparency

Throughout this chapter we have assumed that financial statements are trustworthy. We assumed that accountants are following generally accepted accounting principles (GAAP) and not endorsing misleading numbers. We assumed that managers are not making up good "facts" for the financial statements or covering up bad ones. When these assumptions are correct, we say that the firm is *transparent*, because outsiders can assess its value and performance.

Unfortunately, dishonest managers with creamy compensation packages may seek to hide the truth from investors. When the truth comes out, there can be big trouble. Think back to the Enron scandal. Enron was in many ways an empty shell. Its stock price was supported more by investors' enthusiasm than by profitable operating businesses. The company inflated its apparent performance by borrowing aggressively through so-called *special-purpose entities (SPEs)* and hiding these debts. Much of the SPE borrowing was improperly excluded from Enron's financial statements.

The bad news started to leak out in the last months of 2001. In October, Enron announced a \$1 billion write-off of its water and broadband business. In November, it recognized its SPE debt retroactively, which increased its acknowledged indebtedness by \$658 million and reduced its claims of past earnings by \$591 million. Its public debt was downgraded to junk status, and on December 2 it filed for bankruptcy.

Enron demonstrated the importance of transparency. If Enron had been more transparent to outsiders—that is, if they could have assessed its true profitability and prospects—its problems would have shown up right away in a falling stock price. That in turn would have generated extra scrutiny from security analysts, bond rating agencies, lenders, and investors.

With transparency, corporate troubles generally lead to corrective action. But the top management of a troubled and *opaque* company may be able to maintain its stock price and postpone the discipline of the market. Market discipline caught up with Enron only a month or two before bankruptcy.

Enron was only one in a series of accounting scandals that came to light in 2001 and 2002. A major goal of the Sarbanes-Oxley Act (SOX) is to increase transparency and ensure that companies and their accountants provide directors, lenders, and shareholders with the information they need to monitor progress. Among other things, the act set up the Public Company Accounting Oversight Board to oversee auditors; it bans accounting firms from offering their services to companies whose accounts they audit; it prohibits any individual from heading a firm's audit for more than 5 years; and it requires that the board's audit committee consist of directors who are independent of the company's management. Sarbanes-Oxley also requires that management (1) certify that the financial statements present a fair view of the firm's financial position and (2) demonstrate that the firm has adequate controls and procedures for financial reporting.

All this comes at a price. The costs of SOX and the burdens of meeting detailed regulations are pushing some corporations to return to private (versus public) ownership. Some observers also believe that these added regulatory demands have hurt the international competitiveness of U.S. financial markets.

Despite periodic accounting breakdowns, transparency in the United States and other developed economies is usually pretty good. Nevertheless, it pays to be careful and critical even in these countries. Take extra care in developing economies, where accounting standards are often lax.

SUMMARY

How do you measure whether a public corporation has delivered value for its shareholders? (LO1)

For a public corporation, this is relatively easy. Start with **market capitalization**, which equals price per share times the number of shares outstanding. The difference between market capitalization and the book value of equity measures the **market value added** by the firm's investments and operations. The book value of equity is the cumulative investment

(including reinvested earnings) by shareholders in the company. The ratio of market value to book value is another way of expressing value added.

For private corporations, financial managers and analysts have to turn to other performance measures, because stock prices are not available.

What measures are used to assess financial performance? (LO2)

Financial managers and analysts track **return on equity (ROE)**, which is the ratio of net income to shareholders' equity. But net income is calculated after interest expense, so ROE depends on the debt ratio. The **return on capital (ROC)** and the **return on assets (ROA)** are better measures of operating performance. These are the ratios of after-tax operating income to total capitalization (long-term debt plus shareholders' equity) and to total assets. ROC should be compared with the company's cost of capital. **EVA (economic value added or residual income)** deducts the cost of capital from operating income. If EVA is positive, then the firm's current operations are adding value for shareholders.

What are the standard measures of profitability, efficiency, leverage, and liquidity? (LO3)

Financial managers and analysts have to condense the enormous volume of information in a company's financial statements. They rely on a handful of ratios to summarize financial performance, operating efficiency, and financial strength. Look back at Table 4.6, which summarizes the most important ratios. Remember that the ratios sometimes appear under different names and may be calculated differently.

Profitability ratios measure return on investment. Leverage ratios measure how much the firm has borrowed and its obligations to pay interest. Efficiency ratios measure how intensively the firm uses its assets. Liquidity ratios measure how easily the firm can obtain cash.

Financial ratios crop up repeatedly in financial discussions and contracts. Banks and bondholders usually demand limits on debt ratios or interest coverage.

What determines the return on assets and equity? (LO4)

The **Du Pont system** links financial ratios together to explain the return on assets and equity. Return on assets is the product of asset turnover and operating profit margin. Return on equity is the product of the leverage ratio, asset turnover, operating profit margin, and debt burden.

What is sustainable growth? (LO5)

Sustainable growth is the rate at which the firm can grow without issuing shares or changing its debt ratio. Firms that reinvest more of their earnings can sustain faster growth. The sustainable growth rate is the product of the plowback ratio and return on equity (ROE). (The plowback ratio equals 1 minus the dividend payout ratio.) Of course, this growth rate is really sustainable only if ROE and plowback are maintained at current levels.

What are some potential pitfalls in financial statement analysis? (LO6)

Financial statement analysis will rarely be useful if done mechanically. Financial ratios do not provide final answers, although they should prompt the right questions. In addition, accounting entries do not always reflect current market values, and in rare cases accounting is not transparent, because unscrupulous managers make up good news and hide bad news in financial statements.

You will need a benchmark to assess a company's financial condition. Therefore, we usually compare financial ratios to the company's ratios in earlier years and to ratios of other firms in the same business.

LISTING OF EQUATIONS

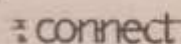
$$\begin{aligned}
 4.1 \quad \text{Return on assets} &= \frac{\text{after-tax operating income}}{\text{assets}} \\
 &= \frac{\text{sales}}{\text{assets}} \times \frac{\text{after-tax operating income}}{\text{sales}} \\
 &\quad \uparrow \qquad \qquad \qquad \uparrow \\
 &\quad \text{asset turnover} \qquad \text{operating profit margin}
 \end{aligned}$$

4.2

$$\text{ROE} = \frac{\text{net income}}{\text{equity}} = \frac{\text{assets}}{\text{equity}} \times \frac{\text{sales}}{\text{assets}} \times \frac{\text{after-tax operating income}}{\text{sales}} \times \frac{\text{net income}}{\text{after-tax operating income}}$$

↑ ↑ ↑ ↑
 leverage asset operating "debt burden"
 ratio turnover profit margin

QUESTIONS



1. **Calculating Ratios.** Here are simplified financial statements of Phone Corporation from a recent year. (LO3)

QUIZ

INCOME STATEMENT (Figures in millions of dollars)	
Net sales	13,193
Cost of goods sold	4,060
Other expenses	4,049
Depreciation	2,518
Earnings before interest and taxes (EBIT)	2,566
Interest expense	685
Income before tax	1,881
Taxes (at 35%)	652
Net income	1,223
Dividends	856

BALANCE SHEET (Figures in millions of dollars)		
	End of Year	Start of Year
Assets		
Cash and marketable securities	89	158
Receivables	2,382	2,490
Inventories	187	238
Other current assets	867	932
Total current assets	3,525	3,818
Net property, plant, and equipment	19,973	19,915
Other long-term assets	4,216	3,770
Total assets	27,714	27,503
Liabilities and shareholders' equity		
Payables	2,564	3,040
Short-term debt	1,419	1,573
Other current liabilities	811	787
Total current liabilities	4,794	5,400
Long-term debt and leases	7,018	6,833
Other long-term liabilities	6,178	6,349
Shareholders' equity	9,724	9,121
Total liabilities and shareholders' equity	27,714	27,503

Calculate the following financial ratios:

- Long-term debt ratio
- Total debt ratio
- Times interest earned

- d. Cash coverage ratio
 - e. Current ratio
 - f. Quick ratio
 - g. Operating profit margin
 - h. Inventory turnover
 - i. Days in inventory
 - j. Average collection period
 - k. Return on equity
 - l. Return on assets
 - m. Return on capital
 - n. Payout ratio
2. **Market value.** Phone Corp.'s stock price was \$84 at the end of the year. There were 205 million shares outstanding. What was the company's market capitalization and market value added? What was its market-to-book ratio? (LO1)
 3. **EVA.** Phone Corp.'s cost of capital was 8.2%, the same as AT&T's cost of capital in Table 4.4. What was Phone Corp.'s economic value added? (LO2)
 4. **Measuring Firm Performance.** (LO2)
 - a. What would happen to Home Depot's economic value added if its cost of capital were 8% rather than the 7.5% value we assumed?
 - b. Would this have any impact on its accounting profits?
 - c. Which do you think is a better measure of the firm's performance?
 5. **Measuring Firm Performance.** Suppose the broad stock market falls 5% in one day and Home Depot's stock price also falls by 5%. (LO1)
 - a. What will happen to our assessment of market value added?
 - b. Should this decline affect our assessment of the performance of Home Depot's managers?
 - c. Would you feel differently about Home Depot's managers if the stock market were unchanged and Home Depot's stock fell by 5%?
 6. **Sustainable Growth.** In Table 4.8, we report Home Depot's sustainable growth rate as 6.5%. (LO5)
 - a. What would the sustainable growth rate be if Home Depot's plowback ratio rose to the same value as Lowe's?
 - b. What would the sustainable growth rate be if Home Depot's return on equity were only 14%?
 7. **Du Pont Analysis.** Use the data for Phone Corp. from Quiz Question 1 to confirm that $ROA = \text{asset turnover} \times \text{operating profit margin}$. (LO4)
 8. **Du Pont Analysis.** Use the data for Phone Corp. from Quiz Question 1 to demonstrate that $ROE = \text{leverage ratio} \times \text{asset turnover ratio} \times \text{operating profit margin} \times \text{debt burden}$. (LO4)

PRACTICE PROBLEMS

9. **Asset Turnover.** In each case, choose the firm that you expect to have a higher asset turnover ratio. (LO3)
 - a. Economics Consulting Group or Home Depot.
 - b. Catalog Shopping Network or Neiman Marcus.
 - c. Electric Utility Co. or Standard Supermarkets.
10. **Economic Value Added.** EVA will be positive whenever ROC is greater than the cost of capital. Explain why this is so. (LO2)
11. **Defining Ratios.** There are no universally accepted definitions of financial ratios, but some of the following ratios make no sense at all. Substitute correct definitions. (LO3)
 - a. Debt-equity ratio =
$$\frac{\text{long-term debt}}{\text{long-term debt} + \text{equity}}$$
 - b. Return on equity =
$$\frac{\text{net income}}{\text{average equity}}$$
 - c. Operating profit margin =
$$\frac{\text{after-tax operating income}}{\text{sales}}$$

- d. Inventory turnover = $\frac{\text{total sales}}{\text{average inventory}}$
- e. Current ratio = $\frac{\text{current liabilities}}{\text{current assets}}$
- f. Average collection period = $\frac{\text{sales}}{\text{average receivables}/365}$
- g. Quick ratio = $\frac{\text{cash} + \text{marketable securities} + \text{receivables}}{\text{current liabilities}}$
12. **Current Liabilities.** Suppose that at year-end Home Depot had unused lines of credit which would have allowed it to borrow a further \$300 million. Suppose also that it used this line of credit to borrow \$300 million and invested the proceeds in marketable securities. Would the company have appeared to be (a) more or less liquid, (b) more or less highly leveraged? Calculate the appropriate ratios. (LO3)
 13. **Current Ratio.** How would the following actions affect a firm's current ratio? (LO3)
 - a. Inventory is sold at cost.
 - b. The firm takes out a bank loan to pay its accounts due.
 - c. A customer pays its accounts receivable.
 - d. The firm uses cash to purchase additional inventories.
 14. **Liquidity Ratios.** A firm uses \$1 million in cash to purchase inventories. What will happen to its current ratio? Its quick ratio? (LO3)
 15. **Receivables.** Chik's Chickens has average accounts receivable of \$6,333. Sales for the year were \$9,800. What is its average collection period? (LO3)
 16. **Inventory.** Salad Daze maintains an inventory of produce worth \$400. Its total bill for produce over the course of the year was \$73,000. How old on average is the lettuce it serves its customers? (LO3)
 17. **Inventory Turnover.** If a firm's inventory level of \$10,000 represents 30 days' sales, what is the annual cost of goods sold? What is the inventory turnover ratio? (LO3)
 18. **Leverage Ratios.** Lever Age pays an 8% rate of interest on \$10 million of outstanding debt with face value \$10 million. The firm's EBIT was \$1 million. (LO3)
 - a. What is times interest earned?
 - b. If depreciation is \$200,000, what is cash coverage?
 - c. If the firm must retire \$300,000 of debt for the sinking fund each year, what is its "fixed-payment cash-coverage ratio" (the ratio of cash flow to interest plus other fixed debt payments)?
 19. **Du Pont Analysis.** Keller Cosmetics maintains an operating profit margin of 5% and asset turnover ratio of 3. (LO4)
 - a. What is its ROA?
 - b. If its debt-equity ratio is 1, its interest payments and taxes are each \$8,000, and EBIT is \$20,000, what is its ROE?
 20. **Du Pont Analysis.** Torrid Romance Publishers has total receivables of \$3,000, which represents 20 days' sales. Total assets are \$75,000. The firm's operating profit margin is 5%. Find the firm's ROA and asset turnover ratio. (LO4)
 21. **Leverage.** A firm has a long-term debt-equity ratio of .4. Shareholders' equity is \$1 million. Current assets are \$200,000, and the current ratio is 2. The only current liabilities are notes payable. What is the total debt ratio? (LO3)
 22. **Leverage Ratios.** A firm has a debt-to-equity ratio of .5 and a market-to-book ratio of 2. What is the ratio of the book value of debt to the market value of equity? (LO3)
 23. **Times Interest Earned.** In the past year, TVG had revenues of \$3 million, cost of goods sold of \$2.5 million, and depreciation expense of \$200,000. The firm has a single issue of debt outstanding with book value of \$1 million on which it pays an interest rate of 8%. What is the firm's times interest earned ratio? (LO3)
 24. **Du Pont Analysis.** CFA Corp. has a debt-equity ratio that is lower than the industry average, but its cash coverage ratio is also lower than the industry average. What might explain this seeming contradiction? (LO3)
 25. **Leverage.** Suppose that a firm has both floating-rate and fixed-rate debt outstanding. What effect will a decline in market interest rates have on the firm's times interest earned ratio? On

- the market-value debt-to-equity ratio? On the basis of these answers, would you say that leverage has increased or decreased? (LO3)
26. **Interpreting Ratios.** In each of the following cases, explain briefly which of the two companies is likely to be characterized by the higher ratio: (LO3)
- Debt-equity ratio: a shipping company or a computer software company.
 - Payout ratio: United Foods Inc. or Computer Graphics Inc.
 - Ratio of sales to assets: an integrated pulp and paper manufacturer or a paper mill.
 - Average collection period: Regional Electric Power Company or Z-Mart Discount Outlets.
27. **Using Financial Ratios.** For each category of financial ratios discussed in this chapter, give some examples of who would be likely to examine these ratios and why. (LO6)

CHALLENGE PROBLEMS

28. **Financial Statements.** As you can see, someone has spilled ink over some of the entries in the balance sheet and income statement of Transylvania Railroad. Can you use the following information to work out the missing entries? (LO3)

Excel

Templates can be found at
www.mhhe.com/bmm7e.

Long-term debt ratio	0.4
Times interest earned	8.0
Current ratio	1.4
Quick ratio	1.0
Cash ratio	0.2
Inventory turnover	5.0
Average collection period	73 days

INCOME STATEMENT (Figures in millions of dollars)	
Net sales	●●●
Cost of goods sold	●●●
Selling, general, and administrative expenses	10
Depreciation	20
Earnings before interest and taxes (EBIT)	●●●
Interest expense	●●●
Income before tax	●●●
Tax (35% of income before tax)	●●●
Net income	●●●

BALANCE SHEET (Figures in millions of dollars)		
	This Year	Last Year
Assets		
Cash and marketable securities	●●●	20
Receivables	●●●	34
Inventories	●●●	26
Total current assets	●●●	80
Net property, plant, and equipment	●●●	25
Total assets	●●●	105
Liabilities and shareholders' equity		
Accounts payable	25	20
Notes payable	30	35
Total current liabilities	●●●	55
Long-term debt	●●●	20
Shareholders' equity	●●●	30
Total liabilities and shareholders' equity	115	105

excel

Templates can be found at
www.mhhe.com/tmm7e.

29. **Interpreting Financial Ratios. (LO3)**
- Turn back to Table 4.7. For the sample of industries in that table, plot operating profit margin again asset turnover in a scatter diagram. What is the apparent relationship between these two variables? Does this make sense to you?
 - Now plot a scatter diagram of the current ratio versus quick ratio. Do these two measures of liquidity tend to move together? Would you conclude that once you know one of these ratios, there is little to be gained by calculating the other?
30. Company X does not raise any new finance during the year, but it generates a lot of earnings during the year, which are immediately reinvested. If you were calculating X's return on capital, would it make more sense to use capital at the start of the year or an average of the starting and ending capital? Would your answer change if X made a large issue of debt early in the year? Illustrate your answer with simple examples. (LO2)

WEB EXERCISE

- Log on to finance.yahoo.com to find the latest simplified financial statements for Home Depot. Recalculate HD's financial ratios. What have been the main changes from those shown in these tables? If you owned some of HD's debt, would these changes make you feel more or less happy?

SOLUTIONS TO SELF-TEST QUESTIONS

- Market capitalization is $\$75 \times 14.5$ million = \$1,087.5 million. Market value added is $\$1,087.5 - \$610 = \$477.5$ million. Market to book is $1,087.5/610 = 1.78$. You can also calculate book value per share at $\$610/14.5 = \42.07 , and use price per share to calculate market to book: $\$75/\$42.07 = 1.78$.
- The cost of capital in dollars is $.115 \times \$188$ million = \$21.62 million. EVA is $\$30 - \$21.62 = \$8.38$ million.
- After-tax operating income is calculated before interest expense. Net income is calculated after interest expense. Financial managers usually start with net income, so they add back after-tax interest to get after-tax operating income. After-tax operating income measures the profitability of the firm's investment and operations. If properly calculated, it is not affected by financing.
- ROE measures return to equity as net income divided by the book value of equity. ROC and ROA measure the return to all investors, including interest paid as well as net income to shareholders. ROC measures return versus long-term debt and equity. ROA measures return versus total assets.
- Average daily expenses are $(43,764 + 15,907)/365 = \163.5 million. Accounts payable at the start of the year are \$8,221 million. The average payment delay is therefore $8,221/163.5 = 50.3$ days.
- In industries with rapid asset turnover, competition forces prices down, reducing profit margins.
- Nothing will happen to the long-term debt ratio computed using book values, since the face values of the old and new debt are equal. However, times interest earned and cash coverage will increase since the firm will reduce its interest expense.
- The firm must compensate for its below-average profit margin with an above-average turnover ratio. Remember that ROA is the *product* of operating margin \times turnover.
 - If ROA equals the industry average but ROE exceeds the industry average, the firm must have above-average leverage. As long as ROA exceeds the borrowing rate, leverage will increase ROE.
- The current ratio starts at $1.2/1.0 = 1.2$. The transaction will reduce current assets to \$.7 million and current liabilities to \$.5 million. The current ratio increases to $.7/.5 = 1.4$. Net working capital is unaffected: Current assets and current liabilities fall by equal amounts.
 - The current ratio is unaffected, since the firm merely exchanges one current asset (cash) for another (inventories). However, the quick ratio will fall since inventories are not included among the most liquid assets.

4.11

	Company A	Company B
1. Asset turnover	2.5	1.15
2. Operating profit margin, %	4.0	11.1
3. Return on assets, % (= 1 × 2)	10.0	12.7

Company A is Walmart; it generates a high volume of sales from its assets, but earns a relatively low profit margin on these sales. The reverse is true of Tiffany (company B). The two companies differ enormously in their asset turnover and profit margin, but much less in their return on assets.

MINICASE

Burchetts Green had enjoyed the bank training course, but it was good to be starting his first real job in the corporate lending group. Earlier that morning the boss had handed him a set of financial statements for The Hobby Horse Company, Inc. (HH). "Hobby Horse," she said, "has a \$45 million loan from us due at the end of September, and it is likely to ask us to roll it over. The company seems to have run into some rough weather recently, and I have asked Furze Platt to go down there this afternoon and see what is happening. It might do you good to go along with her. Before you go, take a look at these financial statements and see what you think the problems are. Here's a chance for you to use some of that stuff they taught you in the training course."

Mr. Green was familiar with the HH story. Founded in 1990, it had rapidly built up a chain of discount stores selling materials for crafts and hobbies. However, last year a number of new store openings coinciding with a poor Christmas season had pushed the company into loss. Management had halted all new construction and put 15 of its existing stores up for sale.

Mr. Green decided to start with the 6-year summary of HH's balance sheet and income statement (Table 4.10). Then he turned to examine in more detail the latest position (Tables 4.11 and 4.12).

What appear to be the problem areas in HH? Do the financial ratios suggest questions that Ms. Platt and Mr. Green need to address?

TABLE 4.10 Financial highlights for The Hobby Horse Company, Inc., year ending March 31

	2011	2010	2009	2008	2007	2006
Net sales	3,351	3,314	2,845	2,796	2,493	2,160
EBIT	-9	312	256	243	212	156
Interest	37	63	65	58	48	46
Taxes	3	60	46	43	39	34
Net profit	-49	189	145	142	125	76
Earnings per share	-0.15	0.55	0.44	0.42	0.37	0.25
Current assets	669	469	491	435	392	423
Net fixed assets	923	790	753	680	610	536
Total assets	1,592	1,249	1,244	1,115	1,002	959
Current liabilities	680	365	348	302	276	320
Long-term debt	236	159	297	311	319	315
Stockholders' equity	676	725	599	502	407	324
Number of stores	240	221	211	184	170	157
Employees	13,057	11,835	9,810	9,790	9,075	7,825

TABLE 4.11

INCOME STATEMENT FOR THE HOBBY HORSE COMPANY, INC., FOR YEAR ENDING MARCH 31, 2011	
(All items in millions of dollars)	
Net sales	3,351
Cost of goods sold	1,990
Selling, general, and administrative expenses	1,211
Depreciation expense	159
Earnings before interest and taxes (EBIT)	-9
Net interest expense	37
Taxable income	-46
Income taxes	3
Net income	-49
Allocation of net income	
Addition to retained earnings	-49
Dividends	0

Note: Column sums subject to rounding error.

TABLE 4.12

CONSOLIDATED BALANCE SHEET FOR THE HOBBY HORSE COMPANY, INC.		
(Figures in millions of dollars)		
Assets	Mar. 31, 2011	Mar. 31, 2010
Current assets		
Cash and marketable securities	14	72
Receivables	176	194
Inventories	479	203
Total current assets	669	469
Fixed assets		
Property, plant, and equipment (net of depreciation)	1,077	910
Less accumulated depreciation	154	130
Net fixed assets	923	780
Total assets	1,592	1,249
Liabilities and Shareholders' Equity	Mar. 31, 2011	Mar. 31, 2010
Current liabilities		
Debt due for repayment	484	222
Accounts payable	94	58
Other current liabilities	102	85
Total current liabilities	680	365
Long-term debt	236	159
Stockholders' equity		
Common stock and other paid-in capital	155	155
Retained earnings	521	570
Total stockholders' equity	676	725
Total liabilities and stockholders' equity	1,592	1,249

Note: Column sums subject to rounding error.