CHAPTER

3

Financial Statements Analysis and Long-Term Planning

In early 2006, shares of stock in food producer Kraft were trading for about $28. At that price, Kraft had a price–earnings ratio, or PE, of 19, meaning that investors were willing to pay $19 for every dollar in income earned by Kraft. At the same time, investors were willing to pay a stunning $482 for each dollar earned by grocer Kroger, but only about $8 and $5 for each dollar earned by Gateway Computers and United States Steel, respectively. And there were stocks like Maytag, which, despite having no earnings (a loss actually), had a stock price of about $19 per share. Meanwhile, the average stock in the Standard and Poor's (S&P) 500 index, which contains 500 of the largest publicly traded companies in the United States, had a PE ratio of about 19, so Kraft was average in this regard.

What do PE ratios tell us and why are they important? To find out, this chapter explores a variety of ratios and their use in financial analysis and planning.

3.1 Financial Statements Analysis

In Chapter 2, we discussed some of the essential concepts of financial statements and cash flows. This chapter continues where our earlier discussion left off. Our goal here is to expand your understanding of the uses (and abuses) of financial statement information.

A good working knowledge of financial statements is desirable simply because such statements, and numbers derived from those statements, are the primary means of communicating financial information both within the firm and outside the firm. In short, much of the language of business finance is rooted in the ideas we discuss in this chapter.

Clearly, one important goal of the accountant is to report financial information to the user in a form useful for decision making. Ironically, the information frequently does not come to the user in such a form. In other words, financial statements don't come with a user's guide. This chapter is a first step in filling this gap.

Standardizing Statements

One obvious thing we might want to do with a company's financial statements is to compare them to those of other, similar companies. We would immediately have a problem, however. It's almost impossible to directly compare the financial statements for two companies because of differences in size.

For example, Ford and GM are obviously serious rivals in the auto market, but GM is much larger (in terms of assets), so it is difficult to compare them directly. For that matter, it's difficult even to compare financial statements from different points in time for the same company if the company's size has changed. The size problem is compounded if we try to

Table 3.1

PRUFROCK CORPORATION
Balance Sheets as of December 31, 2006 and 2007
($ in millions)

Assets	**2006**	**2007**
Current assets		
Cash	$ 84	$ 98
Accounts receivable	165	188
Inventory	393	422
Total	$ 642	$ 708
Fixed assets		
Net plant and equipment	$2,731	$2,880
Total assets	$3,373	$3,588
Liabilities and owners' equity		
Current liabilities		
Accounts payable	$ 312	$ 344
Notes payable	231	196
Total	$ 543	$ 540
Long-term debt	$ 531	$ 457
Owners' equity		
Common stock and paid-in surplus	$ 500	$ 550
Retained earnings	1,799	2,041
Total	$2,299	$2,591
Total liabilities and owners' equity	$3,373	$3,588

compare GM and, say, Toyota. If Toyota's financial statements are denominated in yen, then we have size *and* currency differences.

To start making comparisons, one obvious thing we might try to do is to somehow standardize the financial statements. One common and useful way of doing this is to work with percentages instead of total dollars. The resulting financial statements are called **common-size statements**. We consider these next.

Common-Size Balance Sheets

For easy reference, Prufrock Corporation's 2006 and 2007 balance sheets are provided in Table 3.1. Using these, we construct common-size balance sheets by expressing each item as a percentage of total assets. Prufrock's 2006 and 2007 common-size balance sheets are shown in Table 3.2.

Notice that some of the totals don't check exactly because of rounding errors. Also notice that the total change has to be zero because the beginning and ending numbers must add up to 100 percent.

In this form, financial statements are relatively easy to read and compare. For example, just looking at the two balance sheets for Prufrock, we see that current assets were 19.7 percent of total assets in 2007, up from 19.1 percent in 2006. Current liabilities declined from 16.0 percent to 15.1 percent of total liabilities and equity over that same time. Similarly, total equity rose from 68.1 percent of total liabilities and equity to 72.2 percent.

Overall, Prufrock's liquidity, as measured by current assets compared to current liabilities, increased over the year. Simultaneously, Prufrock's indebtedness diminished as

Table 3.2

PRUFROCK CORPORATION
Common-Size Balance Sheets
December 31, 2006 and 2007

Assets	**2006**	**2007**	**Change**
Current assets			
Cash	2.5%	2.7%	+ .2%
Accounts receivable	4.9	5.2	+ .3
Inventory	11.7	11.8	+ .1
Total	19.1	19.7	+ .6
Fixed assets			
Net plant and equipment	80.9	80.3	− .6
Total assets	100.0%	100.0%	.0%
Liabilities and owners' equity			
Current liabilities			
Accounts payable	9.2%	9.6%	+ .4%
Notes payable	6.8	5.5	−1.3
Total	16.0	15.1	− .9
Long-term debt	15.7	12.7	−3.0
Owners' equity			
Common stock and paid-in surplus	14.8	15.3	+ .5
Retained earnings	53.3	56.9	+3.6
Total	68.1	72.2	+4.1
Total liabilities and owners' equity	100.0%	100.0%	.0%

a percentage of total assets. We might be tempted to conclude that the balance sheet has grown "stronger."

Common-Size Income Statements

A useful way of standardizing the income statement shown in Table 3.3 is to express each item as a percentage of total sales, as illustrated for Prufrock in Table 3.4.

This income statement tells us what happens to each dollar in sales. For Prufrock, interest expense eats up $.061 out of every sales dollar, and taxes take another $.081. When all is said and done, $.157 of each dollar flows through to the bottom line (net income), and that amount is split into $.105 retained in the business and $.052 paid out in dividends.

These percentages are useful in comparisons. For example, a relevant figure is the cost percentage. For Prufrock, $.582 of each $1.00 in sales goes to pay for goods sold. It would be interesting to compute the same percentage for Prufrock's main competitors to see how Prufrock stacks up in terms of cost control.

3.2 Ratio Analysis

Another way of avoiding the problems involved in comparing companies of different sizes is to calculate and compare **financial ratios**. Such ratios are ways of comparing and investigating the relationships between different pieces of financial information. We cover some of the more common ratios next (there are many others we don't discuss here).

Table 3.3

PRUFROCK CORPORATION
2007 Income Statement
($ in millions)

Sales		$2,311
Cost of goods sold		1,344
Depreciation		276
Earnings before interest and taxes		$ 691
Interest paid		141
Taxable income		$ 550
Taxes (34%)		187
Net income		$ 363
Dividends	$121	
Addition to retained earnings	242	

Table 3.4

PRUFROCK CORPORATION
Common-Size Income Statement 2007

Sales		100.0%
Cost of goods sold		58.2
Depreciation		11.9
Earnings before interest and taxes		29.9
Interest paid		6.1
Taxable income		23.8
Taxes (34%)		8.1
Net income		15.7%
Dividends	5.2%	
Addition to retained earnings	10.5	

One problem with ratios is that different people and different sources frequently don't compute them in exactly the same way, and this leads to much confusion. The specific definitions we use here may or may not be the same as ones you have seen or will see elsewhere. If you are using ratios as tools for analysis, you should be careful to document how you calculate each one; and, if you are comparing your numbers to those of another source, be sure you know how their numbers are computed.

We will defer much of our discussion of how ratios are used and some problems that come up with using them until later in the chapter. For now, for each ratio we discuss, several questions come to mind:

1. How is it computed?
2. What is it intended to measure, and why might we be interested?
3. What is the unit of measurement?
4. What might a high or low value be telling us? How might such values be misleading?
5. How could this measure be improved?

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Financial ratios are traditionally grouped into the following categories:

1. Short-term solvency, or liquidity, ratios.
2. Long-term solvency, or financial leverage, ratios.
3. Asset management, or turnover, ratios.
4. Profitability ratios.
5. Market value ratios.

We will consider each of these in turn. In calculating these numbers for Prufrock, we will use the ending balance sheet (2007) figures unless we explicitly say otherwise.

Short-Term Solvency or Liquidity Measures

As the name suggests, short-term solvency ratios as a group are intended to provide information about a firm's liquidity, and these ratios are sometimes called *liquidity measures.* The primary concern is the firm's ability to pay its bills over the short run without undue stress. Consequently, these ratios focus on current assets and current liabilities.

For obvious reasons, liquidity ratios are particularly interesting to short-term creditors. Because financial managers are constantly working with banks and other short-term lenders, an understanding of these ratios is essential.

One advantage of looking at current assets and liabilities is that their book values and market values are likely to be similar. Often (though not always), these assets and liabilities just don't live long enough for the two to get seriously out of step. On the other hand, like any type of near-cash, current assets and liabilities can and do change fairly rapidly, so today's amounts may not be a reliable guide to the future.

Current Ratio One of the best-known and most widely used ratios is the *current ratio.* As you might guess, the current ratio is defined as:

$$\text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}} \tag{3.1}$$

For Prufrock, the 2007 current ratio is:

$$\text{Current ratio} = \frac{\$708}{\$540} = 1.31 \text{ times}$$

Because current assets and liabilities are, in principle, converted to cash over the following 12 months, the current ratio is a measure of short-term liquidity. The unit of measurement is either dollars or times. So, we could say Prufrock has $1.31 in current assets for every $1 in current liabilities, or we could say Prufrock has its current liabilities covered 1.31 times over.

To a creditor, particularly a short-term creditor such as a supplier, the higher the current ratio, the better. To the firm, a high current ratio indicates liquidity, but it also may indicate an inefficient use of cash and other short-term assets. Absent some extraordinary circumstances, we would expect to see a current ratio of at least 1; a current ratio of less than 1 would mean that net working capital (current assets less current liabilities) is negative. This would be unusual in a healthy firm, at least for most types of businesses.

The current ratio, like any ratio, is affected by various types of transactions. For example, suppose the firm borrows over the long term to raise money. The short-run effect would be an increase in cash from the issue proceeds and an increase in long-term debt. Current liabilities would not be affected, so the current ratio would rise.

EXAMPLE 3.1

Current Events Suppose a firm were to pay off some of its suppliers and short-term creditors. What would happen to the current ratio? Suppose a firm buys some inventory. What happens in this case? What happens if a firm sells some merchandise?

The first case is a trick question. What happens is that the current ratio moves away from 1. If it is greater than 1 (the usual case), it will get bigger, but if it is less than 1, it will get smaller. To see this, suppose the firm has $4 in current assets and $2 in current liabilities for a current ratio of 2. If we use $1 in cash to reduce current liabilities, the new current ratio is ($4 − 1)/($2 − 1) = 3. If we reverse the original situation to $2 in current assets and $4 in current liabilities, the change will cause the current ratio to fall to 1/3 from 1/2.

The second case is not quite as tricky. Nothing happens to the current ratio because cash goes down while inventory goes up—total current assets are unaffected.

In the third case, the current ratio would usually rise because inventory is normally shown at cost and the sale would normally be at something greater than cost (the difference is the markup). The increase in either cash or receivables is therefore greater than the decrease in inventory. This increases current assets, and the current ratio rises.

Finally, note that an apparently low current ratio may not be a bad sign for a company with a large reserve of untapped borrowing power.

Quick (or Acid-Test) Ratio Inventory is often the least liquid current asset. It's also the one for which the book values are least reliable as measures of market value because the quality of the inventory isn't considered. Some of the inventory may later turn out to be damaged, obsolete, or lost.

More to the point, relatively large inventories are often a sign of short-term trouble. The firm may have overestimated sales and overbought or overproduced as a result. In this case, the firm may have a substantial portion of its liquidity tied up in slow-moving inventory.

To further evaluate liquidity, the *quick*, or *acid-test*, *ratio* is computed just like the current ratio, except inventory is omitted:

$$\text{Quick ratio} = \frac{\text{Current assets} - \text{Inventory}}{\text{Current liabilities}} \tag{3.2}$$

Notice that using cash to buy inventory does not affect the current ratio, but it reduces the quick ratio. Again, the idea is that inventory is relatively illiquid compared to cash.

For Prufrock, this ratio in 2007 was:

$$\text{Quick ratio} = \frac{\$708 - 422}{\$540} = .53 \text{ times}$$

The quick ratio here tells a somewhat different story than the current ratio because inventory accounts for more than half of Prufrock's current assets. To exaggerate the point, if this inventory consisted of, say, unsold nuclear power plants, then this would be a cause for concern.

To give an example of current versus quick ratios, based on recent financial statements, Wal-Mart and Manpower, Inc., had current ratios of .89 and 1.45, respectively. However, Manpower carries no inventory to speak of, whereas Wal-Mart's current assets are virtually all inventory. As a result, Wal-Mart's quick ratio was only .13, and Manpower's was 1.37, almost the same as its current ratio.

Cash Ratio A very short-term creditor might be interested in the *cash ratio*:

$$\text{Cash ratio} = \frac{\text{Cash}}{\text{Current liabilities}} \tag{3.3}$$

You can verify that this works out to be .18 times for Prufrock.

Long-Term Solvency Measures

Long-term solvency ratios are intended to address the firm's long-run ability to meet its obligations or, more generally, its financial leverage. These ratios are sometimes called *financial leverage ratios* or just *leverage ratios*. We consider three commonly used measures and some variations.

Total Debt Ratio The *total debt ratio* takes into account all debts of all maturities to all creditors. It can be defined in several ways, the easiest of which is this:

$$\begin{aligned}\text{Total debt ratio} &= \frac{\text{Total assets} - \text{Total equity}}{\text{Total assets}} \\ &= \frac{\$3{,}588 - 2{,}591}{\$3{,}588} = .28 \text{ times}\end{aligned} \tag{3.4}$$

In this case, an analyst might say that Prufrock uses 28 percent debt.[1] Whether this is high or low or whether it even makes any difference depends on whether capital structure matters, a subject we discuss in a later chapter.

Prufrock has $.28 in debt for every $1 in assets. Therefore, there is $.72 in equity ($1 – .28) for every $.28 in debt. With this in mind, we can define two useful variations on the total debt ratio, the *debt–equity ratio* and the *equity multiplier*:

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$$\begin{aligned}\text{Debt–equity ratio} &= \text{Total debt/Total equity} \\ &= \$.28/\$.72 = .39 \text{ times}\end{aligned} \tag{3.5}$$

$$\begin{aligned}\text{Equity multiplier} &= \text{Total assets/Total equity} \\ &= \$1/\$.72 = 1.39 \text{ times}\end{aligned} \tag{3.6}$$

The fact that the equity multiplier is 1 plus the debt–equity ratio is not a coincidence:

$$\begin{aligned}\text{Equity multiplier} &= \text{Total assets/Total equity} = \$1/\$.72 = 1.39 \text{ times} \\ &= (\text{Total equity} + \text{Total debt})/\text{Total equity} \\ &= 1 + \text{Debt–equity ratio} = 1.39 \text{ times}\end{aligned}$$

The thing to notice here is that given any one of these three ratios, you can immediately calculate the other two, so they all say exactly the same thing.

Times Interest Earned Another common measure of long-term solvency is the *times interest earned* (TIE) *ratio*. Once again, there are several possible (and common) definitions, but we'll stick with the most traditional:

$$\begin{aligned}\text{Times interest earned ratio} &= \frac{\text{EBIT}}{\text{Interest}} \\ &= \frac{\$691}{\$141} = 4.9 \text{ times}\end{aligned} \tag{3.7}$$

[1] Total equity here includes preferred stock, if there is any. An equivalent numerator in this ratio would be (Current liabilities + Long-term debt).

As the name suggests, this ratio measures how well a company has its interest obligations covered, and it is often called the *interest coverage ratio.* For Prufrock, the interest bill is covered 4.9 times over.

Cash Coverage A problem with the TIE ratio is that it is based on EBIT, which is not really a measure of cash available to pay interest. The reason is that depreciation, a noncash expense, has been deducted out. Because interest is most definitely a cash outflow (to creditors), one way to define the *cash coverage ratio* is:

$$\begin{aligned}\text{Cash coverage ratio} &= \frac{\text{EBIT} + \text{Depreciation}}{\text{Interest}} \\ &= \frac{\$691 + 276}{\$141} = \frac{\$967}{\$141} = 6.9 \text{ times}\end{aligned} \tag{3.8}$$

The numerator here, EBIT plus depreciation, is often abbreviated EBITD (earnings before interest, taxes, and depreciation). It is a basic measure of the firm's ability to generate cash from operations, and it is frequently used as a measure of cash flow available to meet financial obligations.

Asset Management or Turnover Measures

We next turn our attention to the efficiency with which Prufrock uses its assets. The measures in this section are sometimes called *asset management* or *utilization ratios*. The specific ratios we discuss can all be interpreted as measures of turnover. What they are intended to describe is how efficiently, or intensively, a firm uses its assets to generate sales. We first look at two important current assets: inventory and receivables.

Inventory Turnover and Days' Sales in Inventory During the year, Prufrock had a cost of goods sold of $1,344. Inventory at the end of the year was $422. With these numbers, *inventory turnover* can be calculated as:

$$\begin{aligned}\text{Inventory turnover} &= \frac{\text{Cost of goods sold}}{\text{Inventory}} \\ &= \frac{\$1{,}344}{\$422} = 3.2 \text{ times}\end{aligned} \tag{3.9}$$

In a sense, we sold off, or turned over, the entire inventory 3.2 times over the year. As long as we are not running out of stock and thereby forgoing sales, the higher this ratio is, the more efficiently we are managing inventory.

If we know that we turned our inventory over 3.2 times during the year, we can immediately figure out how long it took us to turn it over on average. The result is the average *days' sales in inventory*:

$$\begin{aligned}\text{Days' sales in inventory} &= \frac{365 \text{ days}}{\text{Inventory turnover}} \\ &= \frac{365}{3.2} = 114 \text{ days}\end{aligned} \tag{3.10}$$

This tells us that, roughly speaking, inventory sits 114 days on average before it is sold. Alternatively, assuming we used the most recent inventory and cost figures, it will take about 114 days to work off our current inventory.

For example, in February 2005, General Motors had a 123-day supply of the slow-selling Pontiac G6 and a 122-day supply of the Buick LaCrosse. This means that, at the then-current rate of sales, it would have taken General Motors 123 days to deplete the available supply, whereas a 60-day supply is considered normal in the industry. By the middle of 2005, General Motors had an overall 73-day supply of inventory. The extra 13-day supply meant that General Motors had approximately $5 billion more than normal tied up in inventory—money that could have been used elsewhere. Of course, the days in inventory is much lower for better-selling models. DaimlerChrysler had no such problem with its new (and tough-looking) Chrysler 300C. This popular model flew off dealer lots, and DaimlerChrysler had only 28 days of inventory on hand.

Receivables Turnover and Days' Sales in Receivables Our inventory measures give some indication of how fast we can sell products. We now look at how fast we collect on those sales. The *receivables turnover* is defined in the same way as inventory turnover:

$$\begin{aligned}\text{Receivables turnover} &= \frac{\text{Sales}}{\text{Accounts receivable}} \\ &= \frac{\$2{,}311}{\$188} = 12.3 \text{ times}\end{aligned} \tag{3.11}$$

Loosely speaking, we collected our outstanding credit accounts and lent the money again 12.3 times during the year.[2]

This ratio makes more sense if we convert it to days, so the *days' sales in receivables* is:

$$\begin{aligned}\text{Days' sales in receivables} &= \frac{365 \text{ days}}{\text{Receivables turnover}} \\ &= \frac{365}{12.3} = 30 \text{ days}\end{aligned} \tag{3.12}$$

Therefore, on average, we collect on our credit sales in 30 days. For obvious reasons, this ratio is frequently called the *average collection period* (ACP). Also note that if we are using the most recent figures, we can also say that we have 30 days' worth of sales currently uncollected.

EXAMPLE 3.2

Payables Turnover Here is a variation on the receivables collection period. How long, on average, does it take for Prufrock Corporation to *pay* its bills? To answer, we need to calculate the accounts payable turnover rate using cost of goods sold. We will assume that Prufrock purchases everything on credit.

The cost of goods sold is $1,344, and accounts payable are $344. The turnover is therefore $1,344/$344 = 3.9 times. So, payables turned over about every 365/3.9 = 94 days. On average, then, Prufrock takes 94 days to pay. As a potential creditor, we might take note of this fact.

[2]Here we have implicitly assumed that all sales are credit sales. If they were not, we would simply use total credit sales in these calculations, not total sales.

Total Asset Turnover Moving away from specific accounts like inventory or receivables, we can consider an important "big picture" ratio, the *total asset turnover* ratio. As the name suggests, total asset turnover is:

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$$\text{Total asset turnover} = \frac{\text{Sales}}{\text{Total assets}} = \frac{\$2{,}311}{\$3{,}588} = .64 \text{ times} \quad \textbf{(3.13)}$$

In other words, for every dollar in assets, we generated $.64 in sales.

EXAMPLE 3.3

More Turnover Suppose you find that a particular company generates $.40 in annual sales for every dollar in total assets. How often does this company turn over its total assets?

The total asset turnover here is .40 times per year. It takes 1/.40 = 2.5 years to turn assets over completely.

Profitability Measures

The three measures we discuss in this section are probably the best-known and most widely used of all financial ratios. In one form or another, they are intended to measure how efficiently the firm uses its assets and how efficiently the firm manages its operations. The focus in this group is on the bottom line—net income.

Profit Margin Companies pay a great deal of attention to their *profit margin*:

$$\text{Profit margin} = \frac{\text{Net income}}{\text{Sales}} = \frac{\$363}{\$2{,}311} = 15.7\% \quad \textbf{(3.14)}$$

This tells us that Prufrock, in an accounting sense, generates a little less than 16 cents in profit for every dollar in sales.

All other things being equal, a relatively high profit margin is obviously desirable. This situation corresponds to low expense ratios relative to sales. However, we hasten to add that other things are often not equal.

For example, lowering our sales price will usually increase unit volume but will normally cause profit margins to shrink. Total profit (or, more importantly, operating cash flow) may go up or down, so the fact that margins are smaller isn't necessarily bad. After all, isn't it possible that, as the saying goes, "Our prices are so low that we lose money on everything we sell, but we make it up in volume"?[3]

Profit margins are very different for different industries. Grocery stores have a notoriously low profit margin, generally around 2 percent. In contrast, the profit margin for the pharmaceutical industry is about 18 percent. So, for example, it is not surprising that

[3] No, it's not.

recent profit margins for Albertson's and Pfizer were about 1.2 percent and 15.6 percent, respectively.

Return on Assets *Return on assets* (ROA) is a measure of profit per dollar of assets. It can be defined several ways, but the most common is:

$$\begin{aligned}\text{Return on assets} &= \frac{\text{Net income}}{\text{Total assets}} \\ &= \frac{\$363}{\$3{,}588} = 10.12\%\end{aligned} \tag{3.15}$$

Return on Equity *Return on equity* (ROE) is a measure of how the stockholders fared during the year. Because benefiting shareholders is our goal, ROE is, in an accounting sense, the true bottom-line measure of performance. ROE is usually measured as:

$$\begin{aligned}\text{Return on equity} &= \frac{\text{Net income}}{\text{Total equity}} \\ &= \frac{\$363}{\$2{,}591} = 14\%\end{aligned} \tag{3.16}$$

Therefore, for every dollar in equity, Prufrock generated 14 cents in profit; but, again, this is correct only in accounting terms.

Because ROA and ROE are such commonly cited numbers, we stress that it is important to remember they are accounting rates of return. For this reason, these measures should properly be called *return on book assets* and *return on book equity*. In addition, ROE is sometimes called *return on net worth*. Whatever it's called, it would be inappropriate to compare the result to, for example, an interest rate observed in the financial markets.

The fact that ROE exceeds ROA reflects Prufrock's use of financial leverage. We will examine the relationship between these two measures in the next section.

Market Value Measures

Our final group of measures is based, in part, on information not necessarily contained in financial statements—the market price per share of the stock. Obviously, these measures can be calculated directly only for publicly traded companies.

We assume that Prufrock has 33 million shares outstanding and the stock sold for $88 per share at the end of the year. If we recall that Prufrock's net income was $363 million, then we can calculate that its earnings per share were:

$$\text{EPS} = \frac{\text{Net income}}{\text{Shares outstanding}} = \frac{\$363}{33} = \$11 \tag{3.17}$$

Price–Earnings Ratio The first of our market value measures, the *price–earnings* or PE *ratio* (or multiple), is defined as:

$$\begin{aligned}\text{PE ratio} &= \frac{\text{Price per share}}{\text{Earnings per share}} \\ &= \frac{\$88}{\$11} = 8 \text{ times}\end{aligned} \tag{3.18}$$

In the vernacular, we would say that Prufrock shares sell for eight times earnings, or we might say that Prufrock shares have, or "carry," a PE multiple of 8.

Because the PE ratio measures how much investors are willing to pay per dollar of current earnings, higher PEs are often taken to mean that the firm has significant prospects for future growth. Of course, if a firm had no or almost no earnings, its PE would probably be quite large; so, as always, care is needed in interpreting this ratio.

Market-to-Book Ratio A second commonly quoted measure is the *market-to-book ratio*:

$$\begin{aligned}\text{Market-to-book-ratio} &= \frac{\text{Market value per share}}{\text{Book value per share}} \\ &= \frac{\$88}{\$2{,}591/33} = \frac{\$88}{\$78.5} = 1.12 \text{ times}\end{aligned} \tag{3.19}$$

Notice that book value per share is total equity (not just common stock) divided by the number of shares outstanding.

Book value per share is an accounting number that reflects historical costs. In a loose sense, the market-to-book ratio therefore compares the market value of the firm's investments to their cost. A value less than 1 could mean that the firm has not been successful overall in creating value for its stockholders.

This completes our definition of some common ratios. We could tell you about more of them, but these are enough for now. We'll leave it here and go on to discuss some ways of using these ratios instead of just how to calculate them. Table 3.5 summarizes the ratios we've discussed.

3.3 The Du Pont Identity

As we mentioned in discussing ROA and ROE, the difference between these two profitability measures reflects the use of debt financing or financial leverage. We illustrate the relationship between these measures in this section by investigating a famous way of decomposing ROE into its component parts.

A Closer Look at ROE

To begin, let's recall the definition of ROE:

$$\text{Return on equity} = \frac{\text{Net income}}{\text{Total equity}}$$

If we were so inclined, we could multiply this ratio by Assets/Assets without changing anything:

$$\begin{aligned}\text{Return on equity} &= \frac{\text{Net income}}{\text{Total equity}} = \frac{\text{Net income}}{\text{Total equity}} \times \frac{\text{Assets}}{\text{Assets}} \\ &= \frac{\text{Net income}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Total equity}}\end{aligned}$$

Notice that we have expressed the ROE as the product of two other ratios—ROA and the equity multiplier:

$$\text{ROE} = \text{ROA} \times \text{Equity multiplier} = \text{ROA} \times (1 + \text{Debt–equity ratio})$$

Table 3.5 Common Financial Ratios

I. Short-term solvency, or liquidity, ratios

$$\text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}}$$

$$\text{Quick ratio} = \frac{\text{Current assets} - \text{Inventory}}{\text{Current liabilities}}$$

$$\text{Cash ratio} = \frac{\text{Cash}}{\text{Current liabilities}}$$

II. Long-term solvency, or financial leverage, ratios

$$\text{Total debt ratio} = \frac{\text{Total assets} - \text{Total equity}}{\text{Total assets}}$$

$$\text{Debt–equity ratio} = \text{Total debt/Total equity}$$

$$\text{Equity multiplier} = \text{Total assets/Total equity}$$

$$\text{Times interest earned ratio} = \frac{\text{EBIT}}{\text{Interest}}$$

$$\text{Cash coverage ratio} = \frac{\text{EBIT} + \text{Depreciation}}{\text{Interest}}$$

III. Asset utilization, or turnover, ratios

$$\text{Inventory turnover} = \frac{\text{Cost of goods sold}}{\text{Inventory}}$$

$$\text{Day's sales in inventory} = \frac{\text{365 days}}{\text{Inventory turnover}}$$

$$\text{Receivable turnover} = \frac{\text{Sales}}{\text{Accounts receivable}}$$

$$\text{Days' sales in receivables} = \frac{\text{365 days}}{\text{Receivables turnover}}$$

$$\text{Total asset turnover} = \frac{\text{Sales}}{\text{Total assets}}$$

$$\text{Capital intensity} = \frac{\text{Total assets}}{\text{Sales}}$$

IV. Profitability ratios

$$\text{Profit margin} = \frac{\text{Net income}}{\text{Sales}}$$

$$\text{Return on assets (ROA)} = \frac{\text{Net income}}{\text{Total assets}}$$

$$\text{Return on equity (ROE)} = \frac{\text{Net income}}{\text{Total equity}}$$

$$\text{ROE} = \frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}}$$

V. Market value ratios

$$\text{Price–earnings ratio} = \frac{\text{Price per share}}{\text{Earnings per share}}$$

$$\text{Market-to-book ratio} = \frac{\text{Market value per share}}{\text{Book value per share}}$$

Looking back at Prufrock, for example, we see that the debt–equity ratio was .39 and ROA was 10.12 percent. Our work here implies that Prufrock's ROE, as we previously calculated, is:

$$\text{ROE} = 10.12\% \times 1.39 = 14\%$$

The difference between ROE and ROA can be substantial, particularly for certain businesses. For example based on recent financial statements, Bank of America has an ROA of only 1.44 percent, which is actually fairly typical for a bank. However, banks tend to borrow a lot of money, and, as a result, have relatively large equity multipliers. For Bank of America, ROE is about 17 percent, implying an equity multiplier of 11.8.

We can further decompose ROE by multiplying the top and bottom by total sales:

$$\text{ROE} = \frac{\text{Sales}}{\text{Sales}} \times \frac{\text{Net income}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Total equity}}$$

If we rearrange things a bit, ROE is:

$$\begin{aligned} \text{ROE} &= \underbrace{\frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}}}_{\text{Return on assets}} \times \frac{\text{Assets}}{\text{Total equity}} \\ &= \text{Profit margin} \times \text{Total asset turnover} \times \text{Equity multiplier} \end{aligned} \tag{3.20}$$

What we have now done is to partition ROA into its two component parts, profit margin and total asset turnover. The last expression of the preceding equation is called the **Du Pont identity** after the Du Pont Corporation, which popularized its use.

We can check this relationship for Prufrock by noting that the profit margin was 15.7 percent and the total asset turnover was .64. ROE should thus be:

$$\begin{aligned} \text{ROE} &= \text{Profit margin} \times \text{Total asset turnover} \times \text{Equity multiplier} \\ &= 15.7\% \times .64 \times 1.39 \\ &= 14\% \end{aligned}$$

This 14 percent ROE is exactly what we had before.

The Du Pont identity tells us that ROE is affected by three things:

1. Operating efficiency (as measured by profit margin).
2. Asset use efficiency (as measured by total asset turnover).
3. Financial leverage (as measured by the equity multiplier).

Weakness in either operating or asset use efficiency (or both) will show up in a diminished return on assets, which will translate into a lower ROE.

Considering the Du Pont identity, it appears that the ROE could be leveraged up by increasing the amount of debt in the firm. However, notice that increasing debt also increases interest expense, which reduces profit margins, which acts to reduce ROE. So, ROE could go up or down, depending. More important, the use of debt financing has a number of other effects, and, as we discuss at some length in later chapters, the amount of leverage a firm uses is governed by its capital structure policy.

The decomposition of ROE we've discussed in this section is a convenient way of systematically approaching financial statement analysis. If ROE is unsatisfactory by some measure, then the Du Pont identity tells you where to start looking for the reasons.

General Motors provides a good example of how Du Pont analysis can be useful and also illustrates why care must be taken in interpreting ROE values. In 1989, GM had an ROE of 12.1 percent. By 1993, its ROE had dramatically improved to 44.1 percent. On closer inspection, however, we find that over the same period GM's profit margin declined from 3.4 to 1.8 percent, and ROA declined from 2.4 to 1.3 percent. The decline in ROA was moderated only slightly by an increase in total asset turnover from .71 to .73 over the period.

Given this information, how was it possible for GM's ROE to have climbed so sharply? From our understanding of the Du Pont identity, it must be the case that GM's equity multiplier increased substantially. In fact, what happened was that GM's book equity value was almost wiped out overnight in 1992 by changes in the accounting treatment of pension liabilities. If a company's equity value declines sharply, its equity multiplier rises. In GM's case, the multiplier went from 4.95 in 1989 to 33.62 in 1993. In sum, the dramatic "improvement" in GM's ROE was almost entirely due to an accounting change that affected

Table 3.6

FINANCIAL STATEMENTS FOR DU PONT
12 months ending, April 2005
(All $ are in millions)

Income Statement				**Balance Sheet**	
Sales	$8,912	Current assets		Current liabilities	
CoGS	5,426	Cash	$ 1,084	Accounts payable	$ 1,182
Gross profit	$3,486	Accounts receivable	1,092	Notes payable	28
SG&A expense	1,949	Inventory	1,469	Other	1,377
Depreciation	246	Total	$ 3,646	Total	$ 2,587
EBIT	$1,291				
Interest	232	Fixed assets	$ 6,932	Total long-term debt	$ 5,388
EBT	$1,059				
Taxes	323			Total equity	$ 2,603
Net income	$ 736	Total assets	$10,578	Total liabilities and equity	$10,578

the equity multiplier and doesn't really represent an improvement in financial performance at all.

An Expanded Du Pont Analysis

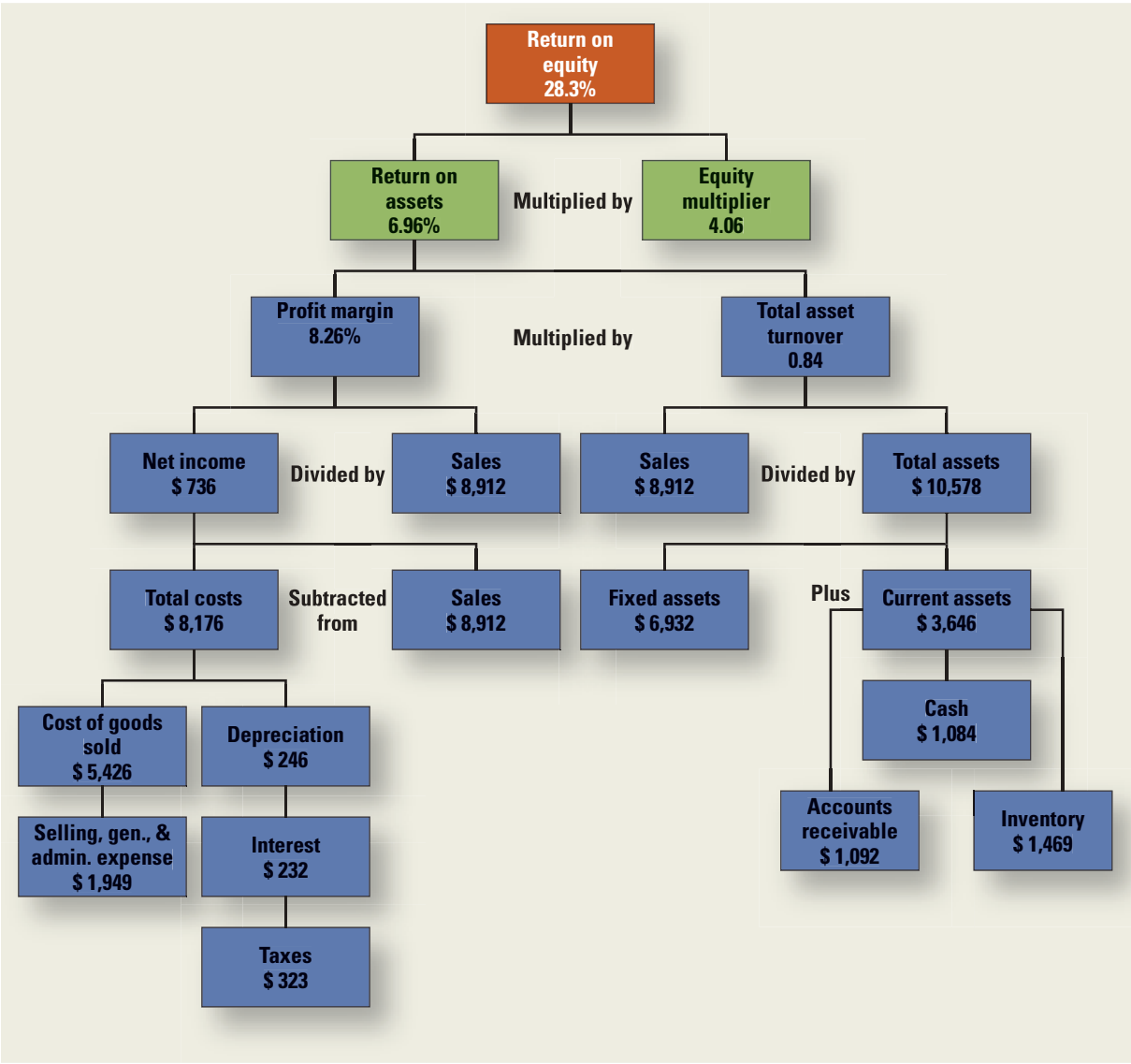
So far, we've seen how the Du Pont equation lets us break down ROE into its basic three components: profit margin, total asset turnover, and financial leverage. We now extend this analysis to take a closer look at how key parts of a firm's operations feed into ROE. To get going, we went to the *S&P Market Insight* Web page (www.mhhe.com/edumarketinsight) and pulled abbreviated financial statements for science and technology giant Du Pont. What we found is summarized in Table 3.6.

Using the information in Table 3.6, Figure 3.1 shows how we can construct an expanded Du Pont analysis for Du Pont and present that analysis in chart form. The advantage of the extended Du Pont chart is that it lets us examine several ratios at once, thereby getting a better overall picture of a company's performance and also allowing us to determine possible items to improve.

Looking at the left side of our Du Pont chart in Figure 3.1, we see items related to profitability. As always, profit margin is calculated as net income divided by sales. But, as our chart emphasizes, net income depends on sales and a variety of costs, such as cost of goods sold (CoGS) and selling, general, and administrative expenses (SG&A expense). Du Pont can increase its ROE by increasing sales and also by reducing one or more of these costs. In other words, if we want to improve profitability, our chart clearly shows the areas on which we should focus.

Turning to the right side of Figure 3.1, we have an analysis of the key factors underlying total asset turnover. Thus, for example, we see that reducing inventory holdings through more efficient management reduces current assets, which reduces total assets, which then improves total asset turnover.

Figure 3.1 Expanded Du Pont Chart for Du Pont



3.4 Using Financial Statement Information

Our next task is to discuss in more detail some practical aspects of financial statement analysis. In particular, we will look at reasons for doing financial statement analysis, how to go about getting benchmark information, and some of the problems that come up in the process.

Choosing a Benchmark

Given that we want to evaluate a division or a firm based on its financial statements, a basic problem immediately comes up. How do we choose a benchmark, or a standard of comparison? We describe some ways of getting started in this section.

Time Trend Analysis One standard we could use is history. Suppose we found that the current ratio for a particular firm is 2.4 based on the most recent financial statement

information. Looking back over the last 10 years, we might find that this ratio had declined fairly steadily over that period.

Based on this, we might wonder if the liquidity position of the firm has deteriorated. It could be, of course, that the firm has made changes that allow it to more efficiently use its current assets, that the nature of the firm's business has changed, or that business practices have changed. If we investigate, we might find any of these possible explanations behind the decline. This is an example of what we mean by management by exception—a deteriorating time trend may not be bad, but it does merit investigation.

Peer Group Analysis The second means of establishing a benchmark is to identify firms similar in the sense that they compete in the same markets, have similar assets, and operate in similar ways. In other words, we need to identify a *peer group*. There are obvious problems with doing this: No two companies are identical. Ultimately, the choice of which companies to use as a basis for comparison is subjective.

One common way of identifying potential peers is based on **Standard Industrial Classification (SIC) codes**. These are four-digit codes established by the U.S. government for statistical reporting purposes. Firms with the same SIC code are frequently assumed to be similar.

The first digit in an SIC code establishes the general type of business. For example, firms engaged in finance, insurance, and real estate have SIC codes beginning with 6. Each additional digit narrows the industry. Companies with SIC codes beginning with 60 are mostly banks and banklike businesses, those with codes beginning with 602 are mostly commercial banks, and SIC code 6025 is assigned to national banks that are members of the Federal Reserve system. Table 3.7 lists selected two-digit codes (the first two digits of the four-digit SIC codes) and the industries they represent.

SIC codes are far from perfect. For example, suppose you were examining financial statements for Wal-Mart, the largest retailer in the United States. The relevant SIC code is 5310, Department Stores. In a quick scan of the nearest financial database, you would find about 20 large, publicly owned corporations with this same SIC code, but you might not be comfortable with some of them. Target would seem to be a reasonable peer, but Neiman-Marcus also carries the same industry code. Are Wal-Mart and Neiman-Marcus really comparable?

As this example illustrates, it is probably not appropriate to blindly use SIC code–based averages. Instead, analysts often identify a set of primary competitors and then compute a set of averages based on just this group. Also, we may be more concerned with a group of the top firms in an industry, not the average firm. Such a group is called an *aspirant group* because we aspire to be like its members. In this case, a financial statement analysis reveals how far we have to go.

Learn more about NAICS at **www.naics.com**.

Beginning in 1997, a new industry classification system was initiated. Specifically, the North American Industry Classification System (NAICS, pronounced "nakes") is intended to replace the older SIC codes, and it will eventually. Currently, however, SIC codes are still widely used.

With these caveats about SIC codes in mind, we can now look at a specific industry. Suppose we are in the retail hardware business. Table 3.8 contains some condensed common-size financial statements for this industry from the Risk Management Association (RMA, formerly known as Robert Morris Associates), one of many sources of such information. Table 3.9 contains selected ratios from the same source.

There is a large amount of information here, most of which is self-explanatory. On the right in Table 3.8, we have current information reported for different groups based on sales. Within each sales group, common-size information is reported. For example, firms with

Table 3.7
Selected Two-Digit SIC Codes

Agriculture, Forestry, and Fishing	Wholesale Trade
01 Agriculture production—crops	50 Wholesale trade—durable goods
08 Forestry	51 Wholesale trade—nondurable goods
09 Fishing, hunting, and trapping	
Mining	**Retail Trade**
10 Metal mining	54 Food stores
12 Bituminous coal and lignite mining	55 Automobile dealers and gas stations
13 Oil and gas extraction	58 Eating and drinking places
Construction	**Finance, Insurance, and Real Estate**
15 Building construction	60 Banking
16 Construction other than building	63 Insurance
17 Construction—special trade contractors	65 Real estate
Manufacturing	**Services**
28 Chemicals and allied products	78 Motion pictures
29 Petroleum refining and related industries	80 Health services
35 Machinery, except electrical	82 Educational services
37 Transportation equipment	
Transportation, Communication, Electric, Gas, and Sanitary Service	
40 Railroad transportation	
45 Transportation by air	
49 Electric, gas, and sanitary services	

sales in the $10 million to $25 million range have cash and equivalents equal to 5 percent of total assets. There are 31 companies in this group, out of 309 in all.

On the left, we have three years' worth of summary historical information for the entire group. For example, operating profit rose from 1.9 percent of sales to 2.5 percent over that time.

Table 3.9 contains some selected ratios, again reported by sales groups on the right and time period on the left. To see how we might use this information, suppose our firm has a current ratio of 2. Based on these ratios, is this value unusual?

Looking at the current ratio for the overall group for the most recent year (third column from the left in Table 3.9), we see that three numbers are reported. The one in the middle, 2.2, is the median, meaning that half of the 309 firms had current ratios that were lower and half had bigger current ratios. The other two numbers are the upper and lower quartiles.

EXAMPLE 3.4

More Ratios Take a look at the most recent numbers reported for Sales/Receivables and EBIT/Interest in Table 3.9. What are the overall median values? What are these ratios?

If you look back at our discussion, you will see that these are the receivables turnover and the times interest earned, or TIE, ratios. The median value for receivables turnover for the entire group is 26.5 times. So, the days in receivables would be 365/26.5 = 14, which is the bold-faced number reported. The median for the TIE is 2.8 times. The number in parentheses indicates that the calculation is meaningful for, and therefore based on, only 269 of the 309 companies. In this case, the reason is that only 269 companies paid any significant amount of interest.

Table 3.8 Selected Financial Statement Information

Retail—Hardware Stores SIC# 5072, 5251 (NAICS 444130)

Comparative Historical Data				Current Data Sorted by Sales					
			Type of Statement						
9	11	17	Unqualified	1	1	2	1	4	8
38	42	54	Reviewed		8	10	16	14	6
88	85	110	Compiled	19	48	18	17	5	3
44	34	52	Tax returns	10	30	5	1	5	1
67	57	76	Other	14	25	13	11	3	10
4/1/00–3/31/01 All 246	4/1/01–3/31/02 All 229	4/1/02–3/31/03 All 309	Number of Statements	58 (4/1–9/30/02) 0–1 MM 44	1–3 MM 112	3–5 MM 48	251 (10/1/02–3/31/03) 5–10 MM 46	10–25 MM 31	25 MM and Over 28
			Assets						
5.9%	6.1%	6.0%	Cash and equivalents	5.3%	7.1%	7.4%	5.0%	5.0%	3.5%
12.2	13.3	13.8	Trade receivables (net)	7.4	11.6	15.3	19.9	20.4	13.5
52.0	48.9	50.5	Inventory	62.4	50.1	47.8	47.3	44.5	50.4
1.3	1.3	1.8	All other current	1.8	1.7	1.7	2.1	.7	2.7
71.4	69.6	72.2	Total current	76.8	70.4	72.2	74.2	70.5	70.1
17.3	17.8	17.0	Fixed assets (net)	14.7	17.4	16.4	16.0	18.3	20.2
1.9	3.1	1.7	Intangibles (net)	1.1	1.6	1.5	2.0	.5	3.5
9.4	9.5	9.2	All other noncurrent	7.3	10.5	9.9	7.8	10.7	6.2
100.0	100.0	100.0	Total	100.0	100.0	100.0	100.0	100.0	100.0
			Liabilities						
8.7	8.0	11.3	Notes payable—short term	11.1	10.1	8.0	13.3	11.1	18.5
3.7	3.8	3.5	Cur. mat.—L/T/D	2.9	3.6	3.5	5.2	2.6	2.0
15.7	15.6	15.5	Trade payables	13.2	14.6	15.8	19.4	15.4	15.3
.2	.2	.2	Income taxes payable	.0	.5	.1	.2	.3	.1
7.1	8.1	7.0	All other current	7.8	7.3	5.8	6.0	7.1	8.2
35.3	35.6	37.4	Total current	35.0	36.0	33.3	44.1	36.5	44.1
19.1	20.6	19.0	Long-term debt	29.0	20.6	17.9	13.6	13.7	13.9
.1	.1	.1	Deferred taxes	.1	.0	.0	.1	.3	.2
4.8	6.3	5.0	All other noncurrent	8.9	4.8	5.4	1.3	3.5	6.4
40.6	37.4	38.5	Net worth	27.0	38.6	43.3	40.9	46.0	35.5
100.0	100.0	100.0	Total liabilities and net worth	100.0	100.0	100.0	100.0	100.0	100.0
			Income Data						
100.0	100.0	100.0	Net sales	100.0	100.0	100.0	100.0	100.0	100.0
35.0	35.3	35.7	Gross profit	39.8	37.3	36.4	32.9	29.9	32.3
33.1	33.1	33.1	Operating expenses	38.3	34.7	33.6	30.1	27.9	29.0
1.9	2.2	2.5	Operating profit	1.5	2.7	2.8	2.8	2.0	3.4
.1	.4	.2	All other expenses (net)	.6	.2	.1	.2	–.3	.7
1.8	1.8	2.3	Profit before taxes	.9	2.5	2.7	2.6	2.3	2.7

MM = $ million.

Interpretation of statement studies figures: RMA cautions that the studies should be regarded only as a general guideline and not as an absolute industry norm. This is due to limited samples within categories, the categorization of companies by their primary Standard Industrial Classification (SIC) number only, and different methods of operations by companies within the same industry. For these reasons, RMA recommends that the figures be used only as general guidelines in addition to other methods of financial analysis.

Table 3.9 Selected Ratios

Retail—Hardware Stores SIC# 5072, 5251 (NAICS 444130)

Comparative Historical Data				Current Data Sorted by Sales						
			Type of Statement							
9	11	17	Unqualified	1	1	2	1	4	8	
38	42	54	Reviewed		8	10	16	14	6	
88	85	110	Compiled	19	48	18	17	5	3	
44	34	52	Tax returns	10	30	5	1	5	1	
67	57	76	Other	14	25	13	11	3	10	
4/1/00–3/31/01 All 246	**4/1/01–3/31/02 All 229**	**4/1/02–3/31/03 All 309**	**Number of Statements**	**58 (4/1–9/30/02) 0–1 MM 44**	**1–3 MM 112**	**251 (10/1/02–3/31/03) 3–5 MM 48**	**5–10 MM 46**	**10–25 MM 31**	**25 MM and Over 28**	
			Ratios							
3.8%	3.7%	3.7%		6.6%	4.0%	3.4%	2.6%	2.8%	2.4%	
2.1	2.2	2.2	Current	2.5	2.5	2.6	1.8	1.7	1.8	
1.5	1.4	1.5		1.4	1.5	1.5	1.8	1.5	1.3	
1.0	1.0	1.1		.9	1.1	1.2	1.0	1.1	.7	
.5	.5	(308) .5	Quick	.4	.5	(47) .6	.5	.7	.5	
.3	.2	.2		.2	.2	.3	.2	.4	.2	
8 43.2	**7** 49.8	**7** 49.8		**4** 91.2	**8** 48.6	**6** 65.0	**11** 33.2	**11** 34.6	**5** 68.4	
14 26.7	**15** 24.5	**14** 26.5	Sales/	**11** 32.1	**12** 29.3	**15** 25.0	**20** 18.4	**26** 14.0	**15** 24.5	
25 14.6	**27** 13.4	**29** 12.4	receivables	**20** 18.4	**25** 14.6	**34** 10.8	**43** 8.4	**39** 9.4	**38** 9.7	
88 4.2	**81** 4.5	**85** 4.3		**137** 2.7	**93** 3.9	**78** 4.7	**70** 5.2	**57** 6.4	**81** 4.5	
120 3.0	**121** 3.0	**120** 3.0	Cost of sales/	**179** 2.0	**121** 3.0	**114** 3.2	**108** 3.4	**83** 4.4	**104** 3.5	
178 2.0	**163** 2.2	**171** 2.1	inventory	**262** 1.4	**172** 2.1	**167** 2.2	**161** 2.3	**120** 3.0	**149** 2.5	
17 21.3	**18** 20.0	**17** 21.3		**0** UND	**17** 22.0	**17** 22.0	**22** 16.3	**15** 23.8	**18** 19.8	
29 12.8	**29** 12.7	**30** 12.3	Cost of sales/	**25** 14.3	**30** 12.3	**29** 12.7	**34** 10.6	**22** 16.4	**30** 12.1	
48 7.7	**46** 7.9	**50** 7.4	payables	**68** 5.4	**43** 8.5	**53** 6.9	**59** 6.2	**41** 8.8	**44** 8.3	
4.2	4.4	4.2		2.6	4.1	4.4	5.4	5.7	5.7	
6.4	6.7	7.0	Sales/	4.0	6.5	6.8	9.1	7.0	10.2	
11.8	12.9	12.3	working capital	10.5	11.2	10.2	14.9	12.4	16.4	
5.0	4.8	8.1		7.7	7.8	8.4	15.1	9.5	8.3	
(225) 2.1	(213) 2.1	(269) 2.8	EBIT/interest	(36) 2.4	(93) 2.5	(43) 4.0	(43) 3.2	(27) 4.1	(27) 3.2	
.7	1.1	1.1		–.7	1.2	1.4	1.0	1.6	1.1	
3.8	4.5	5.5	Net profit + depr.,		5.2	12.4	2.6	6.1	13.4	
(58) 1.7	(53) 2.0	(73) 2.4	dep., amort./cur.		(21) 1.9	(10) 2.0	(15) .6	(14) 2.8	(11) 5.3	
.7	1.1	.5	mat. L/T/D		.7	.1	.0	1.3	.5	
.1	.2	.2		.0	.2	.1	.1	.1	.3	
.4	.4	.4	Fixed/worth	.4	.4	.4	.3	.3	.6	
1.1	1.1	1.0		8.1	1.1	.9	.7	.8	1.2	
.7	.6	.7		.8	.6	.7	.6	.6	1.2	
1.6	1.7	1.5	Debt/worth	2.8	1.6	1.4	1.7	1.0	2.2	
3.8	4.8	3.7		NM	4.2	2.9	2.9	1.9	3.6	
27.7	27.6	29.2	% profit before	46.5	25.3	28.4	31.0	17.6	40.4	
(224) 9.9	(203) 10.4	(277) 11.9	taxes/tangible	(33) 12.3	(98) 11.5	(45) 15.0	(45) 10.9	(30) 9.6	(26) 23.7	
.1	1.6	2.2	net worth	.4	.9	3.3	1.8	.3	2.5	
9.4	9.1	11.5	% profit	10.6	10.5	12.4	12.7	9.2	11.3	
3.6	3.2	4.7	before taxes/	4.9	4.6	4.7	5.4	5.2	4.9	
–1.2	.2	.2	total assets	6.0	.2	1.5	.5	.2	.4	
49.2	40.5	41.1		97.7	42.1	42.7	40.3	55.4	29.1	
21.0	20.4	19.6	Sales/net	21.2	23.1	18.6	20.1	17.6	14.3	
9.4	8.7	9.2	fixed assets	7.1	9.4	9.6	12.2	7.6	9.1	
3.1	3.0	3.1		2.8	3.0	3.2	3.2	3.0	3.3	
2.3	2.4	2.4	Sales/	2.0	2.5	2.4	2.5	2.4	2.3	
1.8	1.8	1.8	total assets	1.1	1.9	1.8	1.7	2.2	1.9	
.7	.7	.7		.8	.7	.7	.7	.8	.8	
(222) 1.1	(200) 1.2	(266) 1.2	% depr., dep.,	(31) 1.2	(102) 1.5	(41) 1.2	(40) 1.0	(29) 1.1	(23) 1.2	
2.0	2.2	2.0	amort./sales	2.4	2.5	1.6	1.3	1.8	1.7	
2.9	2.0	2.3	% officers',	3.7	2.7	2.0	2.1	1.3		
(132) 4.6	(136) 4.0	(168) 4.0	directors', owners'	(21) 5.3	(75) 4.5	(32) 3.8	(22) 3.0	(14) 2.0		
7.0	6.1	7.0	comp/sales	11.6	7.1	6.7	6.2	3.3		
2,771,100M	**2,517,327M**	**3,762,671M**	Net sales ($)	**27,586M**	**204,026M**	**188,955M**	**328,481M**	**469,173M**	**2,544,450M**	
990,644M	**1,153,657M**	**1,607,310M**	Total assets ($)	**18,552M**	**93,100M**	**86,254M**	**158,179M**	**191,739M**	**1,059,486M**	

M = $ thousand; MM = $ million.

So, 25 percent of the firms had a current ratio larger than 3.7 and 25 percent had a current ratio smaller than 1.5. Our value of 2 falls comfortably within these bounds, so it doesn't appear too unusual. This comparison illustrates how knowledge of the range of ratios is important in addition to knowledge of the average. Notice how stable the current ratio has been for the last three years.

There are many sources of ratio information in addition to the one we examine here. For example, www.investor.reuters.com shows a variety of ratios for publicly traded companies. Below we show a screen cut of the profitability ratios (called "Management Effectiveness" on this Web site) for grocery retailer Kroger ("TTM" stands for "trailing twelve months").

Management Effectiveness

Management Effectiveness (%)	Company	Industry	Sector	S&P 500
Return On Assets (TTM)	0.14	5.46	5.91	7.84
Return On Assets - 5 Yr. Avg.	3.54	6.07	4.90	6.22
Return On Investment (TTM)	0.21	8.20	8.48	11.81
Return On Investment - 5 Yr. Avg.	5.01	8.87	7.17	9.84
Return On Equity (TTM)	0.74	16.04	12.65	19.82
Return On Equity - 5 Yr. Avg.	20.13	20.27	11.08	17.60

In looking at numbers such as these, recall our caution about analyzing ratios that you don't calculate yourself: Different sources frequently do their calculations somewhat differently, even if the ratio names are the same.

Problems with Financial Statement Analysis

We continue our chapter on financial statements by discussing some additional problems that can arise in using financial statements. In one way or another, the basic problem with financial statement analysis is that there is no underlying theory to help us identify which quantities to look at and to guide us in establishing benchmarks.

As we discuss in other chapters, there are many cases in which financial theory and economic logic provide guidance in making judgments about value and risk. Little such help exists with financial statements. This is why we can't say which ratios matter the most and what a high or low value might be.

One particularly severe problem is that many firms are conglomerates, owning more or less unrelated lines of business. GE is a well-known example. The consolidated financial statements for such firms don't really fit any neat industry category. More generally, the kind of peer group analysis we have been describing is going to work best when the firms are strictly in the same line of business, the industry is competitive, and there is only one way of operating.

Another problem that is becoming increasingly common is that major competitors and natural peer group members in an industry may be scattered around the globe. The automobile industry is an obvious example. The problem here is that financial statements from outside the United States do not necessarily conform to GAAP. The existence of different standards and procedures makes it difficult to compare financial statements across national borders.

Even companies that are clearly in the same line of business may not be comparable. For example, electric utilities engaged primarily in power generation are all classified in the same group (SIC 4911). This group is often thought to be relatively homogeneous. However, most utilities operate as regulated monopolies, so they don't compete much with each other, at least not historically. Many have stockholders, and many are organized as cooperatives with no stockholders. There are several different ways of generating power, ranging from hydroelectric to nuclear, so the operating activities of these utilities can differ quite a bit. Finally, profitability is strongly affected by the regulatory environment, so utilities in different locations can be similar but show different profits.

Several other general problems frequently crop up. First, different firms use different accounting procedures—for inventory, for example. This makes it difficult to compare statements. Second, different firms end their fiscal years at different times. For firms in seasonal businesses (such as a retailer with a large Christmas season), this can lead to difficulties in comparing balance sheets because of fluctuations in accounts during the year. Finally, for any particular firm, unusual or transient events, such as a one-time profit from an asset sale, may affect financial performance. Such events can give misleading signals as we compare firms.

3.5 Long-Term Financial Planning

Long-term planning is another important use of financial statements. Most financial planning models output pro forma financial statements, where pro forma means "as a matter of form." In our case, this means that financial statements are the form we use to summarize the projected future financial status of a company.

A Simple Financial Planning Model

We can begin our discussion of long-term planning models with a relatively simple example. The Computerfield Corporation's financial statements from the most recent year are shown below and on the next page.

Unless otherwise stated, the financial planners at Computerfield assume that all variables are tied directly to sales and current relationships are optimal. This means that all items will grow at exactly the same rate as sales. This is obviously oversimplified; we use this assumption only to make a point.

COMPUTERFIELD CORPORATION
Financial Statements

Income Statement			**Balance Sheet**		
Sales	$1,000	Assets	$500	Debt	$250
Costs	800			Equity	250
Net income	$ 200	Total	$500	Total	$500

Suppose sales increase by 20 percent, rising from $1,000 to $1,200. Planners would then also forecast a 20 percent increase in costs, from $800 to $800 × 1.2 = $960. The pro forma income statement would thus look like this:

Pro Forma Income Statement	
Sales	$1,200
Costs	960
Net income	$ 240

The assumption that all variables will grow by 20 percent lets us easily construct the pro forma balance sheet as well:

Pro Forma Balance Sheet			
Assets	$600 (+100)	Debt	$300 (+50)
		Equity	300 (+50)
Total	$600 (+100)	Total	$600 (+100)

Notice we have simply increased every item by 20 percent. The numbers in parentheses are the dollar changes for the different items.

Planware provides insight into cash flow forecasting in its "White Papers" section **(www.planware.org)**.

Now we have to reconcile these two pro forma statements. How, for example, can net income be equal to $240 and equity increase by only $50? The answer is that Computerfield must have paid out the difference of $240 – 50 = $190, possibly as a cash dividend. In this case dividends are the "plug" variable.

Suppose Computerfield does not pay out the $190. In this case, the addition to retained earnings is the full $240. Computerfield's equity will thus grow to $250 (the starting amount) plus $240 (net income), or $490, and debt must be retired to keep total assets equal to $600.

With $600 in total assets and $490 in equity, debt will have to be $600 − 490 = $110. Because we started with $250 in debt, Computerfield will have to retire $250 − 110 = $140 in debt. The resulting pro forma balance sheet would look like this:

Pro Forma Balance Sheet			
Assets	$600 (+100)	Debt	$110 (−140)
		Equity	490 (+240)
Total	$600 (+100)	Total	$600 (+100)

In this case, debt is the plug variable used to balance projected total assets and liabilities.

This example shows the interaction between sales growth and financial policy. As sales increase, so do total assets. This occurs because the firm must invest in net working capital and fixed assets to support higher sales levels. Because assets are growing, total liabilities and equity, the right side of the balance sheet, will grow as well.

The thing to notice from our simple example is that the way the liabilities and owners' equity change depends on the firm's financing policy and its dividend policy. The growth in

assets requires that the firm decide on how to finance that growth. This is strictly a managerial decision. Note that in our example the firm needed no outside funds. This won't usually be the case, so we explore a more detailed situation in the next section.

The Percentage of Sales Approach

In the previous section, we described a simple planning model in which every item increased at the same rate as sales. This may be a reasonable assumption for some elements. For others, such as long-term borrowing, it probably is not: The amount of long-term borrowing is set by management, and it does not necessarily relate directly to the level of sales.

In this section, we describe an extended version of our simple model. The basic idea is to separate the income statement and balance sheet accounts into two groups, those that vary directly with sales and those that do not. Given a sales forecast, we will then be able to calculate how much financing the firm will need to support the predicted sales level.

The financial planning model we describe next is based on the **percentage of sales approach**. Our goal here is to develop a quick and practical way of generating pro forma statements. We defer discussion of some "bells and whistles" to a later section.

The Income Statement We start out with the most recent income statement for the Rosengarten Corporation, as shown in Table 3.10. Notice that we have still simplified things by including costs, depreciation, and interest in a single cost figure.

Rosengarten has projected a 25 percent increase in sales for the coming year, so we are anticipating sales of $\$1{,}000 \times 1.25 = \$1{,}250$. To generate a pro forma income statement, we assume that total costs will continue to run at $\$800/1{,}000 = 80$ percent of sales. With this assumption, Rosengarten's pro forma income statement is as shown in Table 3.11. The effect here of assuming that costs are a constant percentage of sales is to assume that the profit margin is constant. To check this, notice that the profit margin was $\$132/1{,}000 =$

Table 3.10

ROSENGARTEN CORPORATION
Income Statement

Sales		$1,000
Costs		800
Taxable income		$ 200
Taxes (34%)		68
Net income		$ 132
Dividends	$44	
Addition to retained earnings	88	

Table 3.11

ROSENGARTEN CORPORATION
Pro Forma Income Statement

Sales (projected)	$1,250
Costs (80% of sales)	1,000
Taxable income	$ 250
Taxes (34%)	85
Net income	$ 165

13.2 percent. In our pro forma statement, the profit margin is \$165/1,250 = 13.2 percent; so it is unchanged.

Next, we need to project the dividend payment. This amount is up to Rosengarten's management. We will assume Rosengarten has a policy of paying out a constant fraction of net income in the form of a cash dividend. For the most recent year, the **dividend payout ratio** was:

$$\begin{aligned}\text{Dividend payout ratio} &= \text{Cash dividends/Net income} \\ &= \$44/132 = 33\ 1/3\% \end{aligned} \quad \textbf{(3.21)}$$

We can also calculate the ratio of the addition to retained earnings to net income:

$$\text{Addition to retained earnings/Net income} = \$88/132 = 66\ 2/3\%$$

This ratio is called the **retention ratio** or **plowback ratio**, and it is equal to 1 minus the dividend payout ratio because everything not paid out is retained. Assuming that the payout ratio is constant, the projected dividends and addition to retained earnings will be:

$$\begin{aligned}\text{Projected dividends paid to shareholders} &= \$165 \times 1/3 = \$\ 55 \\ \text{Projected addition to retained earnings} &= \$165 \times 2/3 = \ \ 110 \\ &\qquad\qquad\qquad\quad \$165\end{aligned}$$

The Balance Sheet To generate a pro forma balance sheet, we start with the most recent statement, as shown in Table 3.12.

On our balance sheet, we assume that some items vary directly with sales and others do not. For those items that vary with sales, we express each as a percentage of sales for the year just completed. When an item does not vary directly with sales, we write "n/a" for "not applicable."

Table 3.12

ROSENGARTEN CORPORATION
Balance Sheet

Assets			Liabilities and Owners' Equity		
	\$	Percentage of Sales		\$	Percentage of Sales
Current assets			Current liabilities		
Cash	\$ 160	16%	Accounts payable	\$ 300	30%
Accounts receivable	440	44	Notes payable	100	n/a
Inventory	600	60	Total	\$ 400	n/a
Total	\$1,200	120	Long-term debt	\$ 800	n/a
Fixed assets			Owners' equity		
Net plant and equipment	\$1,800	180	Common stock and paid-in surplus	\$ 800	n/a
			Retained earnings	1,000	n/a
			Total	\$1,800	n/a
Total assets	\$3,000	300%	Total liabilities and owners' equity	\$3,000	n/a

For example, on the asset side, inventory is equal to 60 percent of sales ($600/1,000) for the year just ended. We assume this percentage applies to the coming year, so for each $1 increase in sales, inventory will rise by $.60. More generally, the ratio of total assets to sales for the year just ended is $3,000/1,000 = 3, or 300 percent.

This ratio of total assets to sales is sometimes called the **capital intensity ratio**. It tells us the amount of assets needed to generate $1 in sales; the higher the ratio is, the more capital intensive is the firm. Notice also that this ratio is just the reciprocal of the total asset turnover ratio we defined previously.

For Rosengarten, assuming that this ratio is constant, it takes $3 in total assets to generate $1 in sales (apparently Rosengarten is in a relatively capital-intensive business). Therefore, if sales are to increase by $100, Rosengarten will have to increase total assets by three times this amount, or $300.

On the liability side of the balance sheet, we show accounts payable varying with sales. The reason is that we expect to place more orders with our suppliers as sales volume increases, so payables will change "spontaneously" with sales. Notes payable, on the other hand, represents short-term debt such as bank borrowing. This will not vary unless we take specific actions to change the amount, so we mark this item as "n/a."

Similarly, we use "n/a" for long-term debt because it won't automatically change with sales. The same is true for common stock and paid-in surplus. The last item on the right side, retained earnings, will vary with sales, but it won't be a simple percentage of sales. Instead, we will explicitly calculate the change in retained earnings based on our projected net income and dividends.

We can now construct a partial pro forma balance sheet for Rosengarten. We do this by using the percentages we have just calculated wherever possible to calculate the projected amounts. For example, net fixed assets are 180 percent of sales; so, with a new sales level of $1,250, the net fixed asset amount will be 1.80 × $1,250 = $2,250, representing an increase of $2,250 – 1,800 = $450 in plant and equipment. It is important to note that for items that don't vary directly with sales, we initially assume no change and simply write in the original amounts. The result is shown in Table 3.13. Notice that the change in retained earnings is equal to the $110 addition to retained earnings we calculated earlier.

Inspecting our pro forma balance sheet, we notice that assets are projected to increase by $750. However, without additional financing, liabilities and equity will increase by only $185, leaving a shortfall of $750 – 185 = $565. We label this amount *external financing needed* (EFN).

Rather than create pro forma statements, if we were so inclined, we could calculate EFN directly as follows:

$$EFN = \frac{\text{Assets}}{\text{Sales}} \times \Delta\text{Sales} - \frac{\text{Spontaneous liabilities}}{\text{Sales}} \times \Delta\text{Sales} - PM \times \text{Projected sales} \times (1 - d) \qquad \textbf{(3.22)}$$

In this expression, "ΔSales" is the projected change in sales (in dollars). In our example projected sales for next year are $1,250, an increase of $250 over the previous year, so ΔSales = $250. By "Spontaneous liabilities," we mean liabilities that naturally move up and down with sales. For Rosengarten, the spontaneous liabilities are the $300 in accounts payable. Finally, *PM* and *d* are the profit margin and dividend payout ratios, which we previously calculated as 13.2 percent and 33 1/3 percent, respectively. Total assets and sales are $3,000

Table 3.13

ROSENGARTEN CORPORATION
Partial Pro Forma Balance Sheet

Assets	Next Year	Change from Current Year
Current assets		
Cash	$ 200	$ 40
Accounts receivable	550	110
Inventory	750	150
Total	$1,500	$300
Fixed assets		
Net plant and equipment	$2,250	$450
Total assets	$3,750	$750

Liabilities and Owners' Equity	Next Year	Change from Current Year
Current liabilities		
Accounts payable	$ 375	$ 75
Notes payable	100	0
Total	$ 475	$ 75
Long-term debt	$ 800	$ 0
Owners' equity		
Common stock and paid-in surplus	$ 800	$ 0
Retained earnings	1,110	110
Total	$1,910	$110
Total liabilities and owners' equity	$3,185	$185
External financing needed	$ 565	$565

and $1,000, respectively, so we have:

$$EFN = \frac{\$3{,}000}{1{,}000} \times \$250 - \frac{\$300}{1{,}000} \times \$250 - .132 \times \$1{,}250 \times \left(1 - \frac{1}{3}\right) = \$565$$

In this calculation, notice that there are three parts. The first part is the projected increase in assets, which is calculated using the capital intensity ratio. The second is the spontaneous increase in liabilities. The third part is the product of profit margin and projected sales, which is projected net income, multiplied by the retention ratio. Thus, the third part is the projected addition to retained earnings.

A Particular Scenario Our financial planning model now reminds us of one of those good news–bad news jokes. The good news is we're projecting a 25 percent increase in sales. The bad news is this isn't going to happen unless Rosengarten can somehow raise $565 in new financing.

This is a good example of how the planning process can point out problems and potential conflicts. If, for example, Rosengarten has a goal of not borrowing any additional funds and not selling any new equity, then a 25 percent increase in sales is probably not feasible.

If we take the need for $565 in new financing as given, we know that Rosengarten has three possible sources: short-term borrowing, long-term borrowing, and new equity. The choice of some combination among these three is up to management; we will illustrate only one of the many possibilities.

Suppose Rosengarten decides to borrow the needed funds. In this case, the firm might choose to borrow some over the short term and some over the long term. For example, current assets increased by $300 whereas current liabilities rose by only $75. Rosengarten could borrow $300 − 75 = $225 in short-term notes payable and leave total net working

Table 3.14

ROSENGARTEN CORPORATION
Pro Forma Balance Sheet

Assets	Next Year	Change from Current Year	Liabilities and Owners' Equity	Next Year	Change from Current Year
Current assets			Current liabilities		
Cash	$ 200	$ 40	Accounts payable	$ 375	$ 75
Accounts receivable	550	110	Notes payable	325	225
Inventory	750	150			
Total	$1,500	$300	Total	$ 700	$300
			Long-term debt	$1,140	$340
Fixed assets			Owners' equity		
Net plant and equipment	$2,250	$450	Common stock and paid-in surplus	$ 800	$ 0
			Retained earnings	1,110	110
			Total	$1,910	$110
			Total liabilities and owners' equity	$3,750	$750
Total assets	$3,750	$750			

capital unchanged. With $565 needed, the remaining $565 – 225 = $340 would have to come from long-term debt. Table 3.14 shows the completed pro forma balance sheet for Rosengarten.

We have used a combination of short- and long-term debt as the plug here, but we emphasize that this is just one possible strategy; it is not necessarily the best one by any means. We could (and should) investigate many other scenarios. The various ratios we discussed earlier come in handy here. For example, with the scenario we have just examined, we would surely want to examine the current ratio and the total debt ratio to see if we were comfortable with the new projected debt levels.

3.6 External Financing and Growth

External financing needed and growth are obviously related. All other things staying the same, the higher the rate of growth in sales or assets, the greater will be the need for external financing. In the previous section, we took a growth rate as given, and then we determined the amount of external financing needed to support that growth. In this section, we turn things around a bit. We will take the firm's financial policy as given and then examine the relationship between that financial policy and the firm's ability to finance new investments and thereby grow.

We emphasize that we are focusing on growth not because growth is an appropriate goal; instead, for our purposes, growth is simply a convenient means of examining the interactions between investment and financing decisions. In effect, we assume that the use of growth as a basis for planning is just a reflection of the very high level of aggregation used in the planning process.

EFN and Growth

The first thing we need to do is establish the relationship between EFN and growth. To do this, we introduce the simplified income statement and balance sheet for the Hoffman

Table 3.15

HOFFMAN COMPANY
Income Statement and Balance Sheet

Income Statement

Sales		$500
Costs		400
Taxable income		$100
Taxes (34%)		34
Net income		$ 66
Dividends	$22	
Addition to retained earnings	44	

Balance Sheet

Assets			Liabilities and Owners' Equity		
	$	Percentage of Sales		$	Percentage of Sales
Current assets	$200	40%	Total debt	$250	n/a
Net fixed assets	300	60	Owners' equity	250	n/a
Total assets	$500	100%	Total liabilities and owners' equity	$500	n/a

Company in Table 3.15. Notice that we have simplified the balance sheet by combining short-term and long-term debt into a single total debt figure. Effectively, we are assuming that none of the current liabilities vary spontaneously with sales. This assumption isn't as restrictive as it sounds. If any current liabilities (such as accounts payable) vary with sales, we can assume that any such accounts have been netted out in current assets. Also, we continue to combine depreciation, interest, and costs on the income statement.

Suppose the Hoffman Company is forecasting next year's sales level at $600, a $100 increase. Notice that the percentage increase in sales is $100/500 = 20 percent. Using the percentage of sales approach and the figures in Table 3.15, we can prepare a pro forma income statement and balance sheet as in Table 3.16. As Table 3.16 illustrates, at a 20 percent growth rate, Hoffman needs $100 in new assets. The projected addition to retained earnings is $52.8, so the external financing needed, EFN, is $100 − 52.8 = $47.2.

Notice that the debt–equity ratio for Hoffman was originally (from Table 3.15) equal to $250/250 = 1.0. We will assume that the Hoffman Company does not wish to sell new equity. In this case, the $47.2 in EFN will have to be borrowed. What will the new debt–equity ratio be? From Table 3.16, we know that total owners' equity is projected at $302.8. The new total debt will be the original $250 plus $47.2 in new borrowing, or $297.2 total. The debt–equity ratio thus falls slightly from 1.0 to $297.2/302.8 = .98.

Table 3.17 shows EFN for several different growth rates. The projected addition to retained earnings and the projected debt–equity ratio for each scenario are also given (you should probably calculate a few of these for practice). In determining the debt–equity ratios, we assumed that any needed funds were borrowed, and we also assumed any surplus funds were used to pay off debt. Thus, for the zero growth case the debt falls by $44, from $250 to $206. In Table 3.17, notice that the increase in assets required is simply equal to the original assets of $500 multiplied by the growth rate. Similarly, the addition to retained earnings is equal to the original $44 plus $44 times the growth rate.

Table 3.16

HOFFMAN COMPANY
Pro Forma Income Statement and Balance Sheet

Income Statement

Sales (projected)		$600.0
Costs (80% of sales)		480.0
Taxable income		$120.0
Taxes (34%)		40.8
Net income		$ 79.2
Dividends	$26.4	
Addition to retained earnings	52.8	

Balance Sheet

Assets	$	Percentage of Sales	Liabilities and Owners' Equity	$	Percentage of Sales
Current assets	$240.0	40%	Total debt	$250.0	n/a
Net fixed assets	360.0	60	Owners' equity	302.8	n/a
Total assets	$600.0	100%	Total liabilities and owners' equity	$552.8	n/a
			External financing needed	$ 47.2	n/a

Table 3.17
Growth and Projected EFN for the Hoffman Company

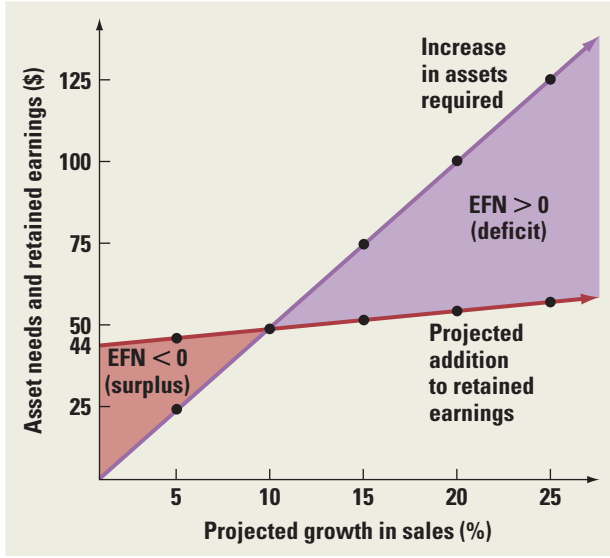
Projected Sales Growth	Increase in Assets Required	Addition to Retained Earnings	External Financing Needed, EFN	Projected Debt–Equity Ratio
0%	$ 0	$44.0	–$44.0	.70
5	25	46.2	–21.2	.77
10	50	48.4	1.6	.84
15	75	50.6	24.4	.91
20	100	52.8	47.2	.98
25	125	55.0	70.0	1.05

Table 3.17 shows that for relatively low growth rates, Hoffman will run a surplus, and its debt–equity ratio will decline. Once the growth rate increases to about 10 percent, however, the surplus becomes a deficit. Furthermore, as the growth rate exceeds approximately 20 percent, the debt–equity ratio passes its original value of 1.0.

Figure 3.2 illustrates the connection between growth in sales and external financing needed in more detail by plotting asset needs and additions to retained earnings from Table 3.17 against the growth rates. As shown, the need for new assets grows at a much faster rate than the addition to retained earnings, so the internal financing provided by the addition to retained earnings rapidly disappears.

As this discussion shows, whether a firm runs a cash surplus or deficit depends on growth. Microsoft is a good example. Its revenue growth in the 1990s was amazing, averaging well over 30 percent per year for the decade. Growth slowed down noticeably over the 2000–2006 period, but, nonetheless, Microsoft's combination of growth and substantial

Figure 3.2
Growth and Related Financing Needed for the Hoffman Company



profit margins led to enormous cash surpluses. In part because Microsoft paid few or no dividends, the cash really piled up; in 2006, Microsoft's cash horde exceeded $38 billion.

Financial Policy and Growth

Based on our discussion just preceding, we see that there is a direct link between growth and external financing. In this section, we discuss two growth rates that are particularly useful in long-range planning.

The Internal Growth Rate The first growth rate of interest is the maximum growth rate that can be achieved with no external financing of any kind. We will call this the **internal growth rate** because this is the rate the firm can maintain with internal financing only. In Figure 3.2, this internal growth rate is represented by the point where the two lines cross. At this point, the required increase in assets is exactly equal to the addition to retained earnings, and EFN is therefore zero. We have seen that this happens when the growth rate is slightly less than 10 percent. With a little algebra (see Problem 28 at the end of the chapter), we can define this growth rate more precisely as:

$$\text{Internal growth rate} = \frac{\text{ROA} \times b}{1 - \text{ROA} \times b} \tag{3.23}$$

where ROA is the return on assets we discussed earlier, and b is the plowback, or retention, ratio also defined earlier in this chapter.

For the Hoffman Company, net income was $66 and total assets were $500. ROA is thus $66/500 = 13.2 percent. Of the $66 net income, $44 was retained, so the plowback ratio, b, is $44/66 = 2/3. With these numbers, we can calculate the internal growth rate as:

$$\begin{aligned}\text{Internal growth rate} &= \frac{\text{ROA} \times b}{1 - \text{ROA} \times b} \\ &= \frac{.132 \times (2/3)}{1 - .132 \times (2/3)} \\ &= 9.65\%\end{aligned}$$

Thus, the Hoffman Company can expand at a maximum rate of 9.65 percent per year without external financing.

The Sustainable Growth Rate We have seen that if the Hoffman Company wishes to grow more rapidly than at a rate of 9.65 percent per year, external financing must be arranged. The second growth rate of interest is the maximum growth rate a firm can achieve with no external *equity* financing while it maintains a constant debt–equity ratio. This rate is commonly called the **sustainable growth rate** because it is the maximum rate of growth a firm can maintain without increasing its financial leverage.

There are various reasons why a firm might wish to avoid equity sales. For example, new equity sales can be expensive because of the substantial fees that may be involved. Alternatively, the current owners may not wish to bring in new owners or contribute additional equity. Why a firm might view a particular debt–equity ratio as optimal is discussed in later chapters; for now, we will take it as given.

Based on Table 3.17, the sustainable growth rate for Hoffman is approximately 20 percent because the debt–equity ratio is near 1.0 at that growth rate. The precise value can be calculated as follows (see Problem 28 at the end of the chapter):

$$\text{Sustainable growth rate} = \frac{\text{ROE} \times b}{1 - \text{ROE} \times b} \tag{3.24}$$

This is identical to the internal growth rate except that ROE, return on equity, is used instead of ROA.

For the Hoffman Company, net income was \$66 and total equity was \$250; ROE is thus \$66/250 = 26.4 percent. The plowback ratio, b, is still 2/3, so we can calculate the sustainable growth rate as:

$$\begin{aligned}\text{Sustainable growth rate} &= \frac{\text{ROE} \times b}{1 - \text{ROE} \times b} \\ &= \frac{.264 \times (2/3)}{1 - .264 \times (2/3)} \\ &= 21.36\%\end{aligned}$$

Thus, the Hoffman Company can expand at a maximum rate of 21.36 percent per year without external equity financing.

EXAMPLE 3.5

Sustainable Growth Suppose Hoffman grows at exactly the sustainable growth rate of 21.36 percent. What will the pro forma statements look like?

At a 21.36 percent growth rate, sales will rise from \$500 to \$606.8. The pro forma income statement will look like this:

HOFFMAN COMPANY
Pro Forma Income Statement

Sales (projected)		\$606.8
Costs (80% of sales)		485.4
Taxable income		\$121.4
Taxes (34%)		41.3
Net income		\$ 80.1
Dividends	\$26.7	
Addition to retained earnings	53.4	

(*continued*)

We construct the balance sheet just as we did before. Notice, in this case, that owners' equity will rise from $250 to $303.4 because the addition to retained earnings is $53.4.

HOFFMAN COMPANY
Pro Forma Balance Sheet

Assets			Liabilities and Owners' Equity		
	$	Percentage of Sales		$	Percentage of Sales
Current assets	$242.7	40%	Total debt	$250.0	n/a
Net fixed assets	364.1	60	Owners' equity	303.4	n/a
Total assets	$606.8	100%	Total liabilities and owners' equity	$553.4	n/a
			External financing needed	$ 53.4	n/a

As illustrated, EFN is $53.4. If Hoffman borrows this amount, then total debt will rise to $303.4, and the debt–equity ratio will be exactly 1.0, which verifies our earlier calculation. At any other growth rate, something would have to change.

Determinants of Growth Earlier in this chapter, we saw that the return on equity, ROE, could be decomposed into its various components using the Du Pont identity. Because ROE appears so prominently in the determination of the sustainable growth rate, it is obvious that the factors important in determining ROE are also important determinants of growth.

From our previous discussions, we know that ROE can be written as the product of three factors:

$$\text{ROE} = \text{Profit margin} \times \text{Total asset turnover} \times \text{Equity multiplier}$$

If we examine our expression for the sustainable growth rate, we see that anything that increases ROE will increase the sustainable growth rate by making the top bigger and the bottom smaller. Increasing the plowback ratio will have the same effect.

Putting it all together, what we have is that a firm's ability to sustain growth depends explicitly on the following four factors:

1. *Profit margin*: An increase in profit margin will increase the firm's ability to generate funds internally and thereby increase its sustainable growth.
2. *Dividend policy*: A decrease in the percentage of net income paid out as dividends will increase the retention ratio. This increases internally generated equity and thus increases sustainable growth.
3. *Financial policy*: An increase in the debt–equity ratio increases the firm's financial leverage. Because this makes additional debt financing available, it increases the sustainable growth rate.
4. *Total asset turnover*: An increase in the firm's total asset turnover increases the sales generated for each dollar in assets. This decreases the firm's need for new assets as sales grow and thereby increases the sustainable growth rate. Notice that increasing total asset turnover is the same thing as decreasing capital intensity.

The sustainable growth rate is a very useful planning number. What it illustrates is the explicit relationship between the firm's four major areas of concern: its operating efficiency

as measured by profit margin, its asset use efficiency as measured by total asset turnover, its dividend policy as measured by the retention ratio, and its financial policy as measured by the debt–equity ratio.

EXAMPLE 3.6

Profit Margins and Sustainable Growth The Sandar Co. has a debt–equity ratio of .5, a profit margin of 3 percent, a dividend payout ratio of 40 percent, and a capital intensity ratio of 1. What is its sustainable growth rate? If Sandar desired a 10 percent sustainable growth rate and planned to achieve this goal by improving profit margins, what would you think?

ROE is .03 × 1 × 1.5 = 4.5 percent. The retention ratio is 1 – .40 = .60. Sustainable growth is thus .045(.60)/[1 – .045(.60)] = 2.77 percent.

For the company to achieve a 10 percent growth rate, the profit margin will have to rise. To see this, assume that sustainable growth is equal to 10 percent and then solve for profit margin, PM:

$$.10 = PM(1.5)(.6)/[1 - PM(1.5)(.6)]$$

$$PM = .1/.99 = 10.1\%$$

For the plan to succeed, the necessary increase in profit margin is substantial, from 3 percent to about 10 percent. This may not be feasible.

Given values for all four of these, there is only one growth rate that can be achieved. This is an important point, so it bears restating:

If a firm does not wish to sell new equity and its profit margin, dividend policy, financial policy, and total asset turnover (or capital intensity) are all fixed, then there is only one possible growth rate.

One of the primary benefits of financial planning is that it ensures internal consistency among the firm's various goals. The concept of the sustainable growth rate captures this element nicely. Also, we now see how a financial planning model can be used to test the feasibility of a planned growth rate. If sales are to grow at a rate higher than the sustainable growth rate, the firm must increase profit margins, increase total asset turnover, increase financial leverage, increase earnings retention, or sell new shares.

The two growth rates, internal and sustainable, are summarized in Table 3.18.

A Note about Sustainable Growth Rate Calculations

Very commonly, the sustainable growth rate is calculated using just the numerator in our expression, ROE × b. This causes some confusion, which we can clear up here. The issue has to do with how ROE is computed. Recall that ROE is calculated as net income divided by total equity. If total equity is taken from an ending balance sheet (as we have done consistently, and is commonly done in practice), then our formula is the right one. However, if total equity is from the beginning of the period, then the simpler formula is the correct one.

In principle, you'll get exactly the same sustainable growth rate regardless of which way you calculate it (as long as you match up the ROE calculation with the right formula).

Table 3.18
Summary of Internal and Sustainable Growth Rates

I. Internal Growth Rate

$$\textit{Internal growth rate} = \frac{\text{ROA} \times b}{1 - \text{ROA} \times b}$$

where

ROA = Return on assets = Net income/Total assets
b = Plowback (retention) ratio
= Addition to retained earnings/Net income

The internal growth rate is the maximum growth rate that can be achieved with no external financing of any kind.

II. Sustainable Growth Rate

$$\textit{Sustainable growth rate} = \frac{\text{ROE} \times b}{1 - \text{ROE} \times b}$$

where

ROE = Return on equity = Net income/Total equity
b = Plowback (retention) ratio
= Addition to retained earnings/Net income

The sustainable growth rate is the maximum growth rate that can be achieved with no external equity financing while maintaining a constant debt–equity ratio.

In reality, you may see some differences because of accounting-related complications. By the way, if you use the average of beginning and ending equity (as some advocate), yet another formula is needed. Also, all of our comments here apply to the internal growth rate as well.

3.7 Some Caveats Regarding Financial Planning Models

Financial planning models do not always ask the right questions. A primary reason is that they tend to rely on accounting relationships and not financial relationships. In particular, the three basic elements of firm value tend to get left out—namely, cash flow size, risk, and timing.

Because of this, financial planning models sometimes do not produce output that gives the user many meaningful clues about what strategies will lead to increases in value. Instead, they divert the user's attention to questions concerning the association of, say, the debt–equity ratio and firm growth.

The financial model we used for the Hoffman Company was simple—in fact, too simple. Our model, like many in use today, is really an accounting statement generator at heart. Such models are useful for pointing out inconsistencies and reminding us of financial needs, but they offer little guidance concerning what to do about these problems.

In Their Own Words

ROBERT C. HIGGINS ON SUSTAINABLE GROWTH

Most financial officers know intuitively that it takes money to make money. Rapid sales growth requires increased assets in the form of accounts receivable, inventory, and fixed plant, which, in turn, require money to pay for assets. They also know that if their company does not have the money when needed, it can literally "grow broke." The sustainable growth equation states these intuitive truths explicitly.

Sustainable growth is often used by bankers and other external analysts to assess a company's credit-worthiness. They are aided in this exercise by several sophisticated computer software packages that provide detailed analyses of the company's past financial performance, including its annual sustainable growth rate.

Bankers use this information in several ways. Quick comparison of a company's actual growth rate to its sustainable rate tells the banker what issues will be at the top of management's financial agenda. If actual growth consistently exceeds sustainable growth, management's problem will be where to get the cash to finance growth. The banker thus can anticipate interest in loan products. Conversely, if sustainable growth consistently exceeds actual, the banker had best be prepared to talk about investment products because management's problem will be what to do with all the cash that keeps piling up in the till.

Bankers also find the sustainable growth equation useful for explaining to financially inexperienced small business owners and overly optimistic entrepreneurs that, for the long-run viability of their business, it is necessary to keep growth and profitability in proper balance.

Finally, comparison of actual to sustainable growth rates helps a banker understand why a loan applicant needs money and for how long the need might continue. In one instance, a loan applicant requested $100,000 to pay off several insistent suppliers and promised to repay in a few months when he collected some accounts receivable that were coming due. A sustainable growth analysis revealed that the firm had been growing at four to six times its sustainable growth rate and that this pattern was likely to continue in the foreseeable future. This alerted the banker that impatient suppliers were only a symptom of the much more fundamental disease of overly rapid growth, and that a $100,000 loan would likely prove to be only the down payment on a much larger, multiyear commitment.

Robert C. Higgins is Professor of Finance at the University of Washington. He pioneered the use of sustainable growth as a tool for financial analysis.

In closing our discussion, we should add that financial planning is an iterative process. Plans are created, examined, and modified over and over. The final plan will be a result negotiated between all the different parties to the process. In fact, long-term financial planning in most corporations relies on what might be called the Procrustes approach.[4] Upper-level management has a goal in mind, and it is up to the planning staff to rework and to ultimately deliver a feasible plan that meets that goal.

The final plan will therefore implicitly contain different goals in different areas and also satisfy many constraints. For this reason, such a plan need not be a dispassionate assessment of what we think the future will bring; it may instead be a means of reconciling the planned activities of different groups and a way of setting common goals for the future.

However it is done, the important thing to remember is that financial planning should not become a purely mechanical exercise. If it does, it will probably focus on the wrong things. Nevertheless, the alternative to planning is stumbling into the future. Perhaps the immortal Yogi Berra (the baseball catcher, not the cartoon character), said it best: "Ya gotta watch out if you don't know where you're goin.' You just might not get there."[5]

[4] In Greek mythology, Procrustes is a giant who seizes travelers and ties them to an iron bed. He stretches them or cuts off their legs as needed to make them fit the bed.

[5] We're not *exactly* sure what this means, either, but we like the sound of it.

Summary and Conclusions

This chapter focuses on working with information contained in financial statements. Specifically, we studied standardized financial statements, ratio analysis, and long-term financial planning.

1. We explained that differences in firm size make it difficult to compare financial statements, and we discussed how to form common-size statements to make comparisons easier and more meaningful.
2. Evaluating ratios of accounting numbers is another way of comparing financial statement information. We defined a number of the most commonly used ratios, and we discussed the famous Du Pont identity.
3. We showed how pro forma financial statements can be generated and used to plan for future financing needs.

After you have studied this chapter, we hope that you have some perspective on the uses and abuses of financial statement information. You should also find that your vocabulary of business and financial terms has grown substantially.

Concept Questions

1. **Financial Ratio Analysis** A financial ratio by itself tells us little about a company because financial ratios vary a great deal across industries. There are two basic methods for analyzing financial ratios for a company: time trend analysis and peer group analysis. Why might each of these analysis methods be useful? What does each tell you about the company's financial health?
2. **Industry-Specific Ratios** So-called "same-store sales" are a very important measure for companies as diverse as McDonald's and Sears. As the name suggests, examining same-store sales means comparing revenues from the same stores or restaurants at two different points in time. Why might companies focus on same-store sales rather than total sales?
3. **Sales Forecast** Why do you think most long-term financial planning begins with sales forecasts? Put differently, why are future sales the key input?
4. **Sustainable Growth** In the chapter, we used Rosengarten Corporation to demonstrate how to calculate EFN. The ROE for Rosengarten is about 7.3 percent, and the plowback ratio is about 67 percent. If you calculate the sustainable growth rate for Rosengarten, you will find it is only 5.14 percent. In our calculation for EFN, we used a growth rate of 25 percent. Is this possible? (*Hint*: Yes. How?)
5. **EFN and Growth Rate** Broslofski Co. maintains a positive retention ratio and keeps its debt–equity ratio constant every year. When sales grow by 20 percent, the firm has a negative projected EFN. What does this tell you about the firm's sustainable growth rate? Do you know, with certainty, if the internal growth rate is greater than or less than 20 percent? Why? What happens to the projected EFN if the retention ratio is increased? What if the retention ratio is decreased? What if the retention ratio is zero?
6. **Common-Size Financials** One tool of financial analysis is common-size financial statements. Why do you think common-size income statements and balance sheets are used? Note that the accounting statement of cash flows is not converted into a common-size statement. Why do you think this is?
7. **Asset Utilization and EFN** One of the implicit assumptions we made in calculating the external funds needed was that the company was operating at full capacity. If the company is operating at less than full capacity, how will this affect the external funds needed?
8. **Comparing ROE and ROA** Both ROA and ROE measure profitability. Which one is more useful for comparing two companies? Why?
9. **Ratio Analysis** Consider the ratio EBITD/Assets. What does this ratio tell us? Why might it be more useful than ROA in comparing two companies?

10. **Return on Investment** In the chapter, we presented several ratios for Kroger from www.investor.reuters.com. One of the ratios was return on investment. Return on investment is calculated as net income divided by long-term liabilities plus equity. What do you think return on investment is intended to measure? What is the relationship between return on investment and return on assets?

Use the following information to answer the next five questions: A small business called The Grandmother Calendar Company began selling personalized photo calendar kits. The kits were a hit, and sales soon sharply exceeded forecasts. The rush of orders created a huge backlog, so the company leased more space and expanded capacity, but it still could not keep up with demand. Equipment failed from overuse and quality suffered. Working capital was drained to expand production, and, at the same time, payments from customers were often delayed until the product was shipped. Unable to deliver on orders, the company became so strapped for cash that employee paychecks began to bounce. Finally, out of cash, the company ceased operations entirely three years later.

11. **Product Sales** Do you think the company would have suffered the same fate if its product had been less popular? Why or why not?

12. **Cash Flow** The Grandmother Calendar Company clearly had a cash flow problem. In the context of the cash flow analysis we developed in Chapter 2, what was the impact of customers' not paying until orders were shipped?

13. **Corporate Borrowing** If the firm was so successful at selling, why wouldn't a bank or some other lender step in and provide it with the cash it needed to continue?

14. **Cash Flow** Which was the biggest culprit here: too many orders, too little cash, or too little production capacity?

15. **Cash Flow** What are some actions a small company like The Grandmother Calendar Company can take (besides expansion of capacity) if it finds itself in a situation in which growth in sales outstrips production?

Questions and Problems

BASIC (Questions 1–10)

1. **Du Pont Identity** If Roten, Inc., has an equity multiplier of 1.75, total asset turnover of 1.30, and a profit margin of 8.5 percent, what is its ROE?

2. **Equity Multiplier and Return on Equity** Thomsen Company has a debt–equity ratio of 1.40. Return on assets is 8.7 percent, and total equity is $520,000. What is the equity multiplier? Return on equity? Net income?

3. **Using the Du Pont Identity** Y3K, Inc., has sales of $2,700, total assets of $1,185, and a debt–equity ratio of 1.00. If its return on equity is 16 percent, what is its net income?

4. **EFN** The most recent financial statements for Martin, Inc., are shown here:

Income Statement		Balance Sheet			
Sales	$19,200	Assets	$93,000	Debt	$20,400
Costs	15,550			Equity	72,600
Taxable income	$ 3,650	Total	$93,000	Total	$93,000
Taxes (34%)	1,241				
Net income	$ 2,409				

Assets and costs are proportional to sales. Debt and equity are not. A dividend of $963.60 was paid, and Martin wishes to maintain a constant payout ratio. Next year's sales are projected to be $23,040. What external financing is needed?

5. Sales and Growth The most recent financial statements for Fontenot Co. are shown here:

Income Statement		Balance Sheet			
Sales	$54,000	Current assets	$ 26,000	Long-term debt	$ 58,000
Costs	34,800	Fixed assets	105,000	Equity	73,000
Taxable income	$19,200	Total	$131,000	Total	$131,000
Taxes (34%)	6,528				
Net income	$12,672				

Assets and costs are proportional to sales. The company maintains a constant 30 percent dividend payout ratio and a constant debt–equity ratio. What is the maximum increase in sales that can be sustained assuming no new equity is issued?

6. Sustainable Growth If the Layla Corp. has a 19 percent ROE and a 25 percent payout ratio, what is its sustainable growth rate?

7. Sustainable Growth Assuming the following ratios are constant, what is the sustainable growth rate?

Total asset turnover = 1.40
Profit margin = 7.6%
Equity multiplier = 1.50
Payout ratio = 40%

8. Calculating EFN The most recent financial statements for Bradley, Inc., are shown here (assuming no income taxes):

Income Statement		Balance Sheet			
Sales	$4,400	Assets	$13,400	Debt	$ 9,100
Costs	2,685			Equity	4,300
Net income	$1,715	Total	$13,400	Total	$13,400

Assets and costs are proportional to sales. Debt and equity are not. No dividends are paid. Next year's sales are projected to be $5,192. What is the external financing needed?

9. External Funds Needed Cheryl Colby, CFO of Charming Florist Ltd., has created the firm's pro forma balance sheet for the next fiscal year. Sales are projected to grow by 10 percent to $440 million. Current assets, fixed assets, and short-term debt are 20 percent, 140 percent, and 15 percent of sales, respectively. Charming Florist pays out 40 percent of its net income in dividends. The company currently has $145 million of long-term debt and $50 million in common stock par value. The profit margin is 12 percent.

a. Construct the current balance sheet for the firm using the projected sales figure.

b. Based on Ms. Colby's sales growth forecast, how much does Charming Florist need in external funds for the upcoming fiscal year?
c. Construct the firm's pro forma balance sheet for the next fiscal year and confirm the external funds needed you calculated in part (b).

10. Sustainable Growth Rate The Steiben Company has a ROE of 8.50 percent and a payout ratio of 35 percent.
a. What is the company's sustainable growth rate?
b. Can the company's actual growth rate be different from its sustainable growth rate? Why or why not?
c. How can the company change its sustainable growth rate?

INTERMEDIATE (Questions 11–23)

11. Return on Equity Firm A and Firm B have debt–total asset ratios of 60 percent and 40 percent and returns on total assets of 20 percent and 30 percent, respectively. Which firm has a greater return on equity?

12. Ratios and Foreign Companies Prince Albert Canning PLC had a net loss of £13,156 on sales of £147,318 (both in thousands of pounds). What was the company's profit margin? Does the fact that these figures are quoted in a foreign currency make any difference? Why? In dollars, sales were $267,661. What was the net loss in dollars?

13. External Funds Needed The Optical Scam Company has forecast a 20 percent sales growth rate for next year. The current financial statements are shown here:

Income Statement

Sales		$38,000,000
Costs		33,400,000
Taxable income		$ 4,600,000
Taxes		1,610,000
Net income		$ 2,990,000
Dividends	$1,196,000	
Additions to retained earnings	1,794,000	

Balance Sheet

Assets		Liabilities and Equity	
Current assets	$ 9,000,000	Short-term debt	$ 8,000,000
		Long-term debt	6,000,000
Fixed assets	22,000,000		
		Common stock	$ 4,000,000
		Accumulated retained earnings	13,000,000
		Total equity	$17,000,000
Total assets	$31,000,000	Total liabilities and equity	$31,000,000

a. Using the equation from the chapter, calculate the external funds needed for next year.
b. Construct the firm's pro forma balance sheet for next year and confirm the external funds needed you calculated in part (a).
c. Calculate the sustainable growth rate for the company.
d. Can Optical Scam eliminate the need for external funds by changing its dividend policy? What other options are available to the company to meet its growth objectives?

14. Days' Sales in Receivables A company has net income of $173,000, a profit margin of 8.6 percent, and an accounts receivable balance of $143,200. Assuming 75 percent of sales are on credit, what is the company's days' sales in receivables?

15. Ratios and Fixed Assets The Le Bleu Company has a ratio of long-term debt to total assets of 0.70 and a current ratio of 1.20. Current liabilities are $850, sales are $4,310, profit margin is 9.5 percent, and ROE is 21.5 percent. What is the amount of the firm's net fixed assets?

16. Calculating the Cash Coverage Ratio Titan Inc.'s net income for the most recent year was $7,850. The tax rate was 34 percent. The firm paid $2,108 in total interest expense and deducted $1,687 in depreciation expense. What was Titan's cash coverage ratio for the year?

17. Cost of Goods Sold Guthrie Corp. has current liabilities of $340,000, a quick ratio of 1.8, inventory turnover of 4.2, and a current ratio of 3.3. What is the cost of goods sold for the company?

18. Common-Size and Common-Base Year Financial Statements In addition to common-size financial statements, common–base year financial statements are often used. Common–base year financial statements are constructed by dividing the current year account value by the base year account value. Thus, the result shows the growth rate in the account. Using the following financial statements, construct the common-size balance sheet and common–base year balance sheet for the company. Use 2006 as the base year.

JARROW CORPORATION
2006 and 2007 Balance Sheets

Assets	2006	2007	Liabilities and Owners' Equity	2006	2007
Current assets			Current liabilities		
Cash	$ 10,168	$ 10,683	Accounts payable	$ 73,185	$ 59,309
Accounts receivable	27,145	28,613	Notes payable	39,125	48,168
Inventory	59,324	64,853	Total	$112,310	$107,477
Total	$ 96,637	$104,149	Long-term debt	$ 50,000	$ 62,000
Fixed assets			Owners' equity		
Net plant and equipment	$304,165	$347,168	Common stock and paid-in surplus	$ 80,000	$ 80,000
			Retained earnings	158,492	201,840
			Total	$238,492	$281,840
Total assets	$400,802	$451,317	Total liabilities and owners' equity	$400,802	$451,317

Use the following information for Problems 19, 20, and 22:

The discussion of EFN in the chapter implicitly assumed that the company was operating at full capacity. Often, this is not the case. For example, assume that Rosengarten was operating at 90 percent capacity. Full-capacity sales would be $1,000/.90 = $1,111. The balance sheet shows $1,800 in fixed assets. The capital intensity ratio for the company is

$$\text{Capital intensity ratio} = \text{Fixed assets/Full-capacity sales} = \$1{,}800/\$1{,}111 = 1.62$$

This means that Rosengarten needs $1.62 in fixed assets for every dollar in sales when it reaches full capacity. At the projected sales level of $1,250, it needs $1,250 × 1.62 = $2,025

in fixed assets, which is $225 lower than our projection of $2,250 in fixed assets. So, EFN is only $565 – 225 = $340.

19. **Full-Capacity Sales** Thorpe Mfg., Inc., is currently operating at only 85 percent of fixed asset capacity. Current sales are $510,000. How much can sales increase before any new fixed assets are needed?

20. **Fixed Assets and Capacity Usage** For the company in the previous problem, suppose fixed assets are $415,000 and sales are projected to grow to $680,000. How much in new fixed assets are required to support this growth in sales?

21. **Calculating EFN** The most recent financial statements for Moose Tours, Inc., follow. Sales for 2007 are projected to grow by 20 percent. Interest expense will remain constant; the tax rate and the dividend payout rate will also remain constant. Costs, other expenses, current assets, and accounts payable increase spontaneously with sales. If the firm is operating at full capacity and no new debt or equity is issued, what external financing is needed to support the 20 percent growth rate in sales?

MOOSE TOURS, INC.
2006 Income Statement

Sales		$905,000
Costs		710,000
Other expenses		12,000
Earnings before interest and taxes		$183,000
Interest paid		19,700
Taxable income		$163,300
Taxes (35%)		57,155
Net income		$106,145
Dividends	$42,458	
Addition to retained earnings	63,687	

MOOSE TOURS, INC.
Balance Sheet as of December 31, 2006

Assets		Liabilities and Owners' Equity	
Current assets		Current liabilities	
Cash	$ 25,000	Accounts payable	$ 65,000
Accounts receivable	43,000	Notes payable	9,000
Inventory	76,000	Total	$ 74,000
Total	$144,000	Long-term debt	$156,000
Fixed assets		Owners' equity	
Net plant and equipment	$364,000	Common stock and paid-in surplus	$ 21,000
		Retained earnings	257,000
		Total	$278,000
Total assets	$508,000	Total liabilities and owners' equity	$508,000

22. **Capacity Usage and Growth** In the previous problem, suppose the firm was operating at only 80 percent capacity in 2006. What is EFN now?

23. Calculating EFN In Problem 21, suppose the firm wishes to keep its debt–equity ratio constant. What is EFN now?

CHALLENGE (Questions 24–30)

24. EFN and Internal Growth Redo Problem 21 using sales growth rates of 15 and 25 percent in addition to 20 percent. Illustrate graphically the relationship between EFN and the growth rate, and use this graph to determine the relationship between them.

25. EFN and Sustainable Growth Redo Problem 23 using sales growth rates of 30 and 35 percent in addition to 20 percent. Illustrate graphically the relationship between EFN and the growth rate, and use this graph to determine the relationship between them.

26. Constraints on Growth Bulla Recording, Inc., wishes to maintain a growth rate of 14 percent per year and a debt–equity ratio of .30. Profit margin is 6.2 percent, and the ratio of total assets to sales is constant at 1.55. Is this growth rate possible? To answer, determine what the dividend payout ratio must be. How do you interpret the result?

27. EFN Define the following:

S = Previous year's sales

A = Total assets

D = Total debt

E = Total equity

g = Projected growth in sales

PM = Profit margin

b = Retention (plowback) ratio

Show that EFN can be written as:

$$\text{EFN} = -\text{PM(S)}b + [\text{A} - \text{PM(S)}b] \times g$$

Hint: Asset needs will equal A $\times$ g. The addition to retained earnings will equal PM(S)b $\times$ $(1 + g)$.

28. Sustainable Growth Rate Based on the results in Problem 27, show that the internal and sustainable growth rates can be calculated as shown in Equations 3.23 and 3.24. *Hint:* For the internal growth rate, set EFN equal to zero and solve for g.

29. Sustainable Growth Rate In the chapter, we discussed one calculation of the sustainable growth rate as:

$$\text{Sustainable growth rate} = \frac{\text{ROE} \times b}{1 - \text{ROE} \times b}$$

In practice, probably the most commonly used calculation of the sustainable growth rate is ROE $\times$ b. This equation is identical to the sustainable growth rate equation presented in the chapter if the ROE is calculated using the beginning of period equity. Derive this equation from the equation presented in the chapter.

30. Sustainable Growth Rate Use the sustainable growth rate equations from the previous problem to answer the following questions. No Return, Inc., had total assets of $210,000 and equity of $165,000 at the beginning of the year. At the end of the year, the company had total assets of $250,000. During the year the company sold no new equity. Net income for the year was $80,000 and dividends were $49,000. What is the sustainable growth rate for the company? What is the sustainable growth rate if you calculate ROE based on the beginning of period equity?

S&P Problems

STANDARD &POOR'S

www.mhhe.com/edumarketinsight

1. **Calculating the Du Pont Identity** Find the annual income statements and balance sheets for Dow Chemical (DOW) and Gateway (GTW). Calculate the Du Pont identity for each company for the most recent three years. Comment on the changes in each component of the Du Pont identity for each company over this period and compare the components between the two companies. Are the results what you expected? Why or why not?
2. **Ratio Analysis** Find and download the "Profitability" spreadsheet for Southwest Airlines (LUV) and Continental Airlines (CAL). Find the ROA (Net ROA), ROE (Net ROE), PE ratio (P/E—high and P/E—low), and the market-to-book ratio (Price/Book—high and Price/Book—low) for each company. Because stock prices change daily, PE and market-to-book ratios are often reported as the highest and lowest values over the year, as is done in this instance. Look at these ratios for both companies over the past five years. Do you notice any trends in these ratios? Which company appears to be operating at a more efficient level based on these four ratios? If you were going to invest in an airline, which one (if either) of these companies would you choose based on this information? Why?
3. **Sustainable Growth Rate** Use the annual income statements and balance sheets under the "Excel Analytics" link to calculate the sustainable growth rate for Coca-Cola (KO) each year for the past four years. Is the sustainable growth rate the same for every year? What are possible reasons the sustainable growth rate may vary from year to year?
4. **External Funds Needed** Look up Black & Decker (BDK). Under the "Financial Highlights" link you can find a five-year growth rate for sales. Using this growth rate and the most recent income statement and balance sheet, compute the external funds needed for BDK next year.

Mini Case

Ratios and Financial Planning at East Coast Yachts

Dan Ervin was recently hired by East Coast Yachts to assist the company with its short-term financial planning and also to evaluate the company's financial performance. Dan graduated from college five years ago with a finance degree, and he has been employed in the treasury department of a *Fortune* 500 company since then.

East Coast Yachts was founded 10 years ago by Larisa Warren. The company's operations are located near Hilton Head Island, South Carolina, and the company is structured as an LLC. The company has manufactured custom midsize, high-performance yachts for clients over this period, and its products have received high reviews for safety and reliability. The company's yachts have also recently received the highest award for customer satisfaction. The yachts are primarily purchased by wealthy individuals for pleasure use. Occasionally, a yacht is manufactured for purchase by a company for business purposes.

The custom yacht industry is fragmented, with a number of manufacturers. As with any industry, there are market leaders, but the diverse nature of the industry ensures that no manufacturer dominates the market. The competition in the market, as well as the product cost, ensures that attention to detail is a necessity. For instance, East Coast Yachts will spend 80 to 100 hours on hand-buffing the stainless steel stem-iron, which is the metal cap on the yacht's bow that conceivably could collide with a dock or another boat.

To get Dan started with his analyses, Larisa has provided the following financial statements. Dan has gathered the industry ratios for the yacht manufacturing industry.

EAST COAST YACHTS
2006 Income Statement

Sales		$128,700,000
Cost of goods sold		90,700,000
Other expenses		15,380,000
Depreciation		4,200,000
Earnings before interest and taxes (EBIT)		$ 18,420,000
Interest		2,315,000
Taxable income		$ 16,105,000
Taxes (40%)		6,442,000
Net income		$ 9,663,000
Dividends	$5,797,800	
Addition to retained earnings	3,865,200	

EAST COAST YACHTS
Balance Sheet as of December 31, 2006

Assets		Liabilities & Equity	
Current assets		Current liabilities	
Cash	$ 2,340,000	Accounts payable	$ 4,970,000
Accounts receivable	4,210,000	Notes payable	10,060,000
Inventory	4,720,000		
Total	$11,270,000	Total	$15,030,000
Fixed assets		Long-term debt	$25,950,000
Net plant and equipment	$72,280,000		
		Shareholders' equity	
		Common stock	$ 4,000,000
		Retained earnings	38,570,000
		Total equity	$42,570,000
Total assets	$83,550,000	Total liabilities and equity	$83,550,000

Yacht Industry Ratios

	Lower Quartile	Median	Upper Quartile
Current ratio	0.50	1.43	1.89
Quick ratio	0.21	0.38	0.62
Total asset turnover	0.68	0.85	1.38
Inventory turnover	4.89	6.15	10.89
Receivables turnover	6.27	9.82	14.11
Debt ratio	0.44	0.52	0.61
Debt–equity ratio	0.79	1.08	1.56
Equity multiplier	1.79	2.08	2.56
Interest coverage	5.18	8.06	9.83
Profit margin	4.05%	6.98%	9.87%
Return on assets	6.05%	10.53%	13.21%
Return on equity	9.93%	16.54%	26.15%

1. Calculate all of the ratios listed in the industry table for East Coast Yachts.
2. Compare the performance of East Coast Yachts to the industry as a whole. For each ratio, comment on why it might be viewed as positive or negative relative to the industry. Suppose you create an inventory ratio calculated as inventory divided by current liabilities. How do you interpret this ratio? How does East Coast Yachts compare to the industry average?
3. Calculate the sustainable growth rate of East Coast Yachts. Calculate external funds needed (EFN) and prepare pro forma income statements and balance sheets assuming growth at precisely this rate. Recalculate the ratios in the previous question. What do you observe?
4. As a practical matter, East Coast Yachts is unlikely to be willing to raise external equity capital, in part because the owners don't want to dilute their existing ownership and control positions. However, East Coast Yachts is planning for a growth rate of 20 percent next year. What are your conclusions and recommendations about the feasibility of East Coast's expansion plans?
5. Most assets can be increased as a percentage of sales. For instance, cash can be increased by any amount. However, fixed assets often must be increased in specific amounts because it is impossible, as a practical matter, to buy part of a new plant or machine. In this case a company has a "staircase" or "lumpy" fixed cost structure. Assume that East Coast Yachts is currently producing at 100 percent of capacity. As a result, to expand production, the company must set up an entirely new line at a cost of $25,000,000. Calculate the new EFN with this assumption. What does this imply about capacity utilization for East Coast Yachts next year?

CHAPTER

4

Discounted Cash Flow Valuation

PART TWO

What do baseball players Paul Konerko, A.J. Burnett, and Ramon Hernandez have in common? All three athletes signed big contracts at the end of 2005. The contract values were reported as $60 million, $55 million, and $27.5 million, respectively. But reported numbers like these are often misleading. For example, in December 2005, Ramon Hernandez signed with the Baltimore Orioles. His contract called for salaries of $4.5 million, $6.5 million, $7.5 million, and $8 million per year over the next four years (plus a guaranteed minimum $1 million in 2010, for a total of $27.5 million). Not bad, especially for someone who makes a living using the "tools of ignorance" (jock jargon for catcher's equipment).

A closer look at the numbers shows that Paul, A.J., and Ramon did pretty well, but nothing like the quoted figures. Using A.J.'s contract as an example, although the value was reported to be $55 million, it was actually payable over several years. It consisted of a $6 million signing bonus plus $49 million in future salary and bonuses. The $49 million was to be distributed as $1 million in 2006 and $12 million per year for 2007 through 2010. Because the payments were spread out over time, we must consider the time value of money, which means his contract was worth less than reported. How much did he really get? This chapter gives you the "tools of knowledge" to answer this question.

4.1 Valuation: The One-Period Case

Keith Vaughn is trying to sell a piece of raw land in Alaska. Yesterday he was offered $10,000 for the property. He was about ready to accept the offer when another individual offered him $11,424. However, the second offer was to be paid a year from now. Keith has satisfied himself that both buyers are honest and financially solvent, so he has no fear that the offer he selects will fall through. These two offers are pictured as cash flows in Figure 4.1. Which offer should Keith choose?

Mike Tuttle, Keith's financial adviser, points out that if Keith takes the first offer, he could invest the $10,000 in the bank at an insured rate of 12 percent. At the end of one year, he would have:

$$\underset{\text{Return of principal}}{\$10{,}000} + \underset{\text{Interest}}{(0.12 \times \$10{,}000)} = \$10{,}000 \times 1.12 = \$11{,}200$$