CHAPTER

3

Financial Statements Analysis and Financial Models

OPENING CASE

The price of a share of common stock in electronics retailer Best Buy closed at about $40 on January 4, 2010. At that price, Best Buy had a price-earnings (PE) ratio of 15.4. That is, investors were willing to pay $15.4 for every dollar in income earned by Best Buy. At the same time, investors were willing to pay $6.0, $24.9, and $40.4 for each dollar earned by Jackson Hewitt Tax Service, American Eagle Outfitters, and Google, respectively. At the other extreme was the greeting card company, American Greetings, which had negative earnings for the previous year, yet the stock was priced at about $22 per share. Because it had negative earnings, the PE ratio would have been negative, so it was not reported. At the same time, the typical stock in the S&P 500 Index of large company stocks was trading at a PE of about 15.8, or about 15.8 times earnings, as they say on Wall Street.

Price-to-earnings comparisons are examples of the use of financial ratios. As we will see in this chapter, there are a wide variety of financial ratios, all designed to summarize specific aspects of a firm's financial position. In addition to discussing how to analyze financial statements and compute financial ratios, we will have quite a bit to say about who uses this information and why.

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 larger, 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 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 2009 and 2010 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 2009 and 2010 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.

TABLE 3.1

PRUFROCK CORPORATION
Balance Sheets as of December 31, 2009 and 2010
($ in millions)

Assets	**2009**	**2010**
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

TABLE 3.2

PRUFROCK CORPORATION
Common-Size Balance Sheets
December 31, 2009 and 2010

Assets	2009	2010	Change
Current assets			
Cash	2.5%	2.7%	+ .2%
Accounts receivable	4.9	5.2	+ .3
Inventory	11.7	11.8	+ .1
Total	19.0	19.7	+ .7
Fixed assets			
Net plant and equipment	81.0	80.3	− .7
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	16.1	15.1	−1.0
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	+3.5
Total	68.2	72.2	+4.1
Total liabilities and owners' equity	100.0%	100.0%	.0%

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 2010, up from 19.0 percent in 2009. Current liabilities declined from 16.1 percent to 15.1 percent of total liabilities and equity over that same time. Similarly, total equity rose from 68.2 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 a percentage of total assets. We might be tempted to conclude that the balance sheet has grown "stronger."

Common-Size Income Statements

Table 3.3 describes some commonly used measures of earnings. A useful way of standardizing the income statement shown in Table 3.4 is to express each item as a percentage of total sales, as illustrated for Prufrock in Table 3.5.

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.

TABLE 3.3
Measures of Earnings

Investors and analysts look closely at the income statement for clues on how well a company has performed during a particular year. Here are some commonly used measures of earnings (numbers in millions).

Net Income — The so-called bottom line, defined as total revenue minus total expenses. Net income for Prufrock in the latest period is $363 million. Net income reflects differences in a firm's capital structure and taxes as well as operating income. Interest expense and taxes are subtracted from operating income in computing net income. Shareholders look closely at net income because dividend payout and retained earnings are closely linked to net income.

EPS — Net income divided by the number of shares outstanding. It expresses net income on a per-share basis. For Prufrock, the EPS = (Net income)/(Shares outstanding) = $363/33 = $11.

EBIT — Earnings before interest expense and taxes. EBIT is usually called "income from operations" on the income statement and is income before unusual items, discontinued operating or extraordinary items. To calculate EBIT, operating expenses are subtracted from total operations revenues. Analysts like EBIT because it abstracts from differences in earnings from a firm's capital structure (interest expense) and taxes. For Prufrock, EBIT is $691 million.

EBITDA — Earnings before interest expense, taxes, depreciation, and amortization. EBITDA = EBIT + depreciation and amortization. Here amortization refers to a noncash expense similar to depreciation except it applies to an intangible asset (such as a patent), rather than a tangible asset (such as a machine). The word amortization here does not refer to the payment of debt. There is no amortization in Prufrock's income statement. For Prufrock, EBITDA = $691 + $276 = $967 million. Analysts like to use EBITDA because it adds back two noncash items (depreciation and amortization) to EBIT and thus is a better measure of before-tax operating cash flow.

Sometimes these measures of earnings are preceded by the letters LTM, meaning the last twelve months. For example, LTM EPS is the last twelve months of EPS and LTM EBITDA is the last twelve months of EBITDA. At other times, the letters TTM are used, meaning trailing twelve months. Needless to say, LTM is the same as TTM.

TABLE 3.4

PRUFROCK CORPORATION
2010 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 3.5

PRUFROCK CORPORATION
Common-Size Income Statement 2010

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	

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).

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:

Go to www.reuters.com/finance/stocks and find the ratios link to examine comparative ratios for a huge number of companies.

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?

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 (2010) 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:

$$\text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}} \qquad [3.1]$$

For Prufrock, the 2010 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:

$$\text{Quick ratio} = \frac{\text{Current assets} - \text{Inventory}}{\text{Current liabilities}} \qquad [3.2]$$

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 2010 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, Walmart and Manpower, Inc., had current ratios of .88 and 1.61, respectively. However, Manpower carries no inventory to speak of, whereas Walmart's current assets are virtually all inventory. As a result, Walmart's quick ratio was only .22, and Manpower's was 1.61, the same as its current ratio.

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

$$\text{Cash ratio} = \frac{\text{Cash}}{\text{Current liabilities}} \quad [3.3]$$

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:

$$\text{Total debt ratio} = \frac{\text{Total assets} - \text{Total equity}}{\text{Total assets}} = \frac{\$3{,}588 - 2{,}591}{\$3{,}588} = .28 \text{ times} \quad [3.4]$$

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:*

The online Women's Business Center has more information about financial statements, ratios, and small business topics at www.sba.gov.

$$\text{Debt-equity ratio} = \text{Total debt/Total equity} = \$.28/\$.72 = .39 \text{ times} \quad [3.5]$$

$$\text{Equity multiplier} = \text{Total assets/Total equity} = \$1/\$.72 = 1.39 \text{ times} \quad [3.6]$$

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

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

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

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:

$$\text{Times interest earned ratio} = \frac{\text{EBIT}}{\text{Interest}} = \frac{\$691}{\$141} = 4.9 \text{ times} \quad [3.7]$$

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 and amortization, noncash expenses, have been deducted out. Because interest is most definitely a cash outflow (to creditors), one way to define the *cash coverage ratio* is:

$$\text{Cash coverage ratio} = \frac{\text{EBIT} + \text{(Depreciation and amortization)}}{\text{Interest}} = \frac{\$691 + 276}{\$141} = \frac{\$967}{\$141} = 6.9 \text{ times} \quad [3.8]$$

The numerator here, EBIT plus depreciation and amortization, is often abbreviated EBITDA (earnings before interest, taxes, depreciation, and amortization). 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.

More recently another long-term solvency measure is increasingly seen in financial statement analysis and in debt covenants. It uses EBITDA and interest bearing debt. Specifically, for Prufrock:

$$\frac{\text{Interest bearing debt}}{\text{EBITDA}} = \frac{\$196 \text{ million} + 457 \text{ million}}{\$967 \text{ million}} = .68 \text{ times}$$

Here we include notes payable (most likely notes payable is bank debt) and long-term debt in the numerator and EBITDA in the denominator. Values below 1 on this ratio are considered very strong and values below 5 are considered weak. However a careful comparison with other comparable firms is necessary to properly interpret the ratio.

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:

$$\text{Inventory turnover} = \frac{\text{Cost of goods sold}}{\text{Inventory}} = \frac{\$1{,}344}{\$422} = 3.2 \text{ times} \quad [3.9]$$

In a sense, we sold off, or turned over, the entire inventory 3.2 times during 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:*

$$\text{Days' sales in inventory} = \frac{\text{365 days}}{\text{Inventory turnover}} = \frac{365}{3.2} = 114 \text{ days} \quad [3.10]$$

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 September 2007, sales of General Motors (GM) pickup trucks could have used a pickup. At that time, the company had a 120-day supply of the GMC Sierra and a 114-day supply of the Chevrolet Silverado. These numbers mean that at the then-current rate of sales, it would take GM 120 days to deplete the available supply of Sierras whereas a 60-day supply is considered normal in the industry. Of course, the days in inventory are lower for better-selling models, and, fortunately for GM, its crossover vehicles were a hit. The company had only a 22-day supply of Buick Enclaves and a 32-day supply of GMC Acadias.

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:

$$\text{Receivables turnover} = \frac{\text{Sales}}{\text{Accounts receivable}} = \frac{\$2{,}311}{\$188} = 12.3 \text{ times} \quad [3.11]$$

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:

$$\text{Days' sales in receivables} = \frac{\text{365 days}}{\text{Receivables turnover}} = \frac{365}{12.3} = 30 \text{ days} \quad [3.12]$$

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:

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

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

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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 types of 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.

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

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

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

EBITDA Margin Another commonly used measure of profitability is the EBITDA margin. As mentioned, EBITDA is a measure of before-tax operating cash flow. It adds back non-cash expenses and does not include taxes or interest expense. As a consequence, EBITDA margin looks more directly at operating cash flows than does net income and does not include the effect of capital structure or taxes. For Prufrock, EBITDA margin is:

$$\frac{\text{EBITDA}}{\text{Sales}} = \frac{\$967 \text{ million}}{\$2{,}311 \text{ million}} = 41.8\%$$

All other things being equal, a relatively high 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 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]

[3]No, it's not.

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 recent profit margins for Kroger and Pfizer were about 0.2 percent and 17.7 percent, respectively.

Return on Assets *Return on assets* (ROA) is a measure of profit per dollar of assets. It can be defined several ways,[4] but the most common is:

$$\text{Return on assets} = \frac{\text{Net income}}{\text{Total assets}} = \frac{\$363}{\$3{,}588} = 10.12\% \quad [3.15]$$

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:

$$\text{Return on equity} = \frac{\text{Net income}}{\text{Total equity}} = \frac{\$363}{\$2{,}591} = 14.01\% \quad [3.16]$$

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:

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

[4]For example, we might want a return on assets measure that is neutral with respect to capital structure (interest expense) and taxes. Such a measure for Prufrock would be:

$$\frac{\text{EBIT}}{\text{Total assets}} = \frac{\$691}{\$3{,}588} = 19.3\%$$

This measure has a very natural interpretation. If 19.3 percent exceeds Prufrock's borrowing rate, Prufrock will earn more money on its investments than it will pay out to its creditors. The surplus will be available to Prufrock's shareholders after adjusting for taxes.

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

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

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:*

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

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.

Market Capitalization The market capitalization of a public firm is equal to the firm's stock market price per share multiplied by the number of shares outstanding. For Prufrock, this is:

$$\text{Price per share} \times \text{Shares outstanding} = \$88 \times 33 \text{ million} = \$2{,}904 \text{ million}$$

This is a useful number for potential buyers of Prufrock. A prospective buyer of all of the outstanding shares of Prufrock (in a merger or acquisition) would need to come up with at least $2,904 million plus a premium.

Enterprise Value Enterprise value is a measure of firm value that is very closely related to market capitalization. Instead of focusing on only the market value of outstanding shares of stock, it measures the market value of outstanding shares of stock plus the market value of outstanding interest bearing debt less cash on hand. We know the market capitalization of Prufrock but we do not know the market value of its outstanding interest bearing debt. In this situation, the common practice is to use the book value of outstanding interest bearing debt less cash on hand as an approximation. For Prufrock, enterprise value is (in millions):

$$\begin{aligned}\text{EV} &= \text{Market capitalization} + \text{Market value of interest bearing debt} - \text{cash} \\ &= \$2{,}904 + (\$196 + 457) - \$98 = \$3{,}459 \text{ million}\end{aligned} \qquad [3.20]$$

The purpose of the EV measure is to better estimate how much it would take to buy all of the outstanding stock of a firm and also to pay off the debt. The adjustment for cash is to

recognize that if we were a buyer the cash could be used immediately to buy back debt or pay a dividend.

Enterprise Value Multiples Financial analysts use valuation multiples based upon a firm's enterprise value when the goal is to estimate the value of the firm's total business rather than just focusing on the value of its equity. To form an appropriate multiple, enterprise value is divided by EBITDA. For Prufrock, the enterprise value multiple is:

$$\frac{\text{EV}}{\text{EBITDA}} = \frac{\$3{,}459 \text{ million}}{\$967 \text{ million}} = 3.6 \text{ times}$$

The multiple is especially useful because it allows comparison of one firm with another when there are differences in capital structure (interest expense), taxes, or capital spending. The multiple is not directly affected by these differences.

Similar to PE ratios, we would expect a firm with high growth opportunities to have high EV multiples.

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 3.6 summarizes some of the ratios we've discussed.

TABLE 3.6
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

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

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

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

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

$$\text{Cash coverage ratio} = \frac{\text{EBITDA}}{\text{Interest}}$$

III. Asset Utilization, or Turnover, Ratios

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

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

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

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

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

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

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

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

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

$$\text{EV multiple} = \frac{\text{Enterprise value}}{\text{EBITDA}}$$

EXAMPLE 3.4

Atlantic and Pacific

Consider the following 2009 data for Atlantic's Companies and Pacific Depot (billions except for price per share):

	ATLANTIC'S COMPANIES, INC.	THE PACIFIC DEPOT, INC.
Sales	$48.3	$77.3
EBIT	$ 4.8	$ 7.3
Net income	$ 2.8	$ 4.4
Cash	$ .5	$ .5
Depreciation	$ 1.5	$ 1.9
Interest bearing debt	$ 6.7	$13.4
Total assets	$30.9	$44.3
Price per share	$24	$27
Shares outstanding	1.5	1.7
Shareholder equity	$16.1	$17.7

1. Determine the profit margin, ROE, market capitalization, enterprise value, PE multiple, and EV multiple for both Atlantic's and Pacific Depot.

	ATLANTIC'S COMPANIES, INC.	THE PACIFIC DEPOT, INC.
Equity multiplier	30.9/16.1 = 1.9	44.3/17.7 = 2.5
Asset turnover	48.3/30.9 = 1.6	77.3/44.3 = 1.7
Profit margin	2.8/48.3 = 5.8%	4.4/77.3 = 5.7%
ROE	2.8/16.1 = 17.4%	4.4/17.7 = 24.9%
Market capitalization	1.5 × 24 = $36 billion	1.7 × 27 = $45.9 billion
Enterprise value	(1.5 × 24) + 6.7 − .5 = $42.2 billion	(1.7 × 27) + 13.4 −.5 = $58.8 billion
PE multiple	24/1.87 = 12.8	27/2.6 = 10.4
EBITDA	4.8 + 1.5 = $6.3	7.3 + 1.9 = $9.2
EV multiple	42.2/6.3 = 6.7	58.8/9.2 = 6.4

2. How would you describe these two companies from a financial point of view? These are similarly situated companies. In 2009, Pacific Depot had a higher ROE (partially because of using more debt and higher turnover), but Atlantic's had slightly higher PE and EV multiples. Both companies' multiples were somewhat below the general market, raising questions about future growth prospects.

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:

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

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

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

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

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

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

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:

$$\text{ROE} = 10.12\% \times 1.39 = 14.01\%$$

The difference between ROE and ROA can be substantial, particularly for certain businesses. For example, based on recent financial statements, Wells Fargo has an ROA of only 0.75 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 Wells Fargo, ROE is about 6.69 percent, implying an equity multiplier of 8.9.

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:

$$\text{ROE} = \underbrace{\frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}}}_{\text{Return on assets}} \times \frac{\text{Assets}}{\text{Total equity}} \qquad [3.21]$$

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

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

TABLE 3.7

The Du Pont Breakdown for Yahoo! and Google

Yahoo!							
TWELVE MONTHS ENDING	ROE	=	PROFIT MARGIN	×	TOTAL ASSET TURNOVER	×	EQUITY MULTIPLIER
12/09	4.8%	=	9.3%	×	0.433	×	1.20
12/08	3.8%	=	5.9%	×	0.527	×	1.22
12/07	6.9%	=	9.5%	×	0.570	×	1.28
Google							
TWELVE MONTHS ENDING	ROE	=	PROFIT MARGIN	×	TOTAL ASSET TURNOVER	×	EQUITY MULTIPLIER
12/09	18.1%	=	27.6%	×	0.584	×	1.12
12/08	14.9%	=	19.4%	×	0.686	×	1.12
12/07	18.6%	=	25.3%	×	0.655	×	1.12

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.

Yahoo! and Google are among the most important Internet companies in the world. Yahoo! and Google may be good examples of how Du Pont analysis can be useful in helping to ask the right questions about a firm's financial performance. The Du Pont breakdowns for Yahoo! and Google are summarized in Table 3.7.

As can be seen, in 2009, Yahoo! had an ROE of 4.8 percent, up from its ROE in 2008 of 3.8 percent. In contrast, in 2009, Google had an ROE of 18.1 percent, up from its ROE in 2008 of 14.9 percent. Given this information, how is it possible that Google's ROE could be so much higher than the ROE of Yahoo! during this period of time, and what accounts for the decline in Yahoo!'s ROE?

On close inspection of the Du Pont breakdown, we see that Yahoo!'s profit margin in 2009 was only 4.8 percent. Meanwhile Google's profit margin was 18.1 percent in 2009. Yet Yahoo! and Google have very comparable asset turnover and financial leverage. What can account for Google's advantage over Yahoo! in profit margin? Operating efficiencies can come from higher volumes, higher prices, and/or lower costs. It is clear that the big difference in ROE between the two firms can be attributed to the difference in profit margins.

Problems with Financial Statement Analysis

We continue our chapter 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

THE REAL WORLD

WHAT'S IN A RATIO?

Abraham Briloff, a well-known financial commentator, famously remarked that "financial statements are like fine perfume; to be sniffed but not swallowed." As you have probably figured out by now, his point is that information gleaned from financial statements—and ratios and growth rates computed from that information—should be taken with a grain of salt.

For example, in early 2010, shares in Green Mountain Coffee Roasters had a PE ratio of about 58 times earnings. You would expect that this stock would have a high growth rate, and indeed analysts thought so. The estimated earnings growth rate for Green Mountain for the next year was 68 percent. At the same time, greeting card company American Greetings also had a PE ratio of about 68, but analysts estimated an earnings growth rate of only 9 percent for the next year. Why is the PE so high? The answer is that American Greetings simply had low earnings the previous year. The "forward" PE ratio, which uses next year's estimated earnings instead of past earnings was only 9. So, caution is warranted when looking at PE ratios.

U.S. Airways illustrates another issue. If you calculated its ROE in 2009, you would get about 57.7 percent, which is quite good. What's strange is the company reported a loss of about $205 million dollars during 2009! What's going on is that U.S. Airways had a book value of equity balance of *negative* $355 million. In this situation, the more U.S. Airways loses, the higher the ROE becomes. Of course, U.S. Airways' market-to-book and PE ratios are also both negative. How do you interpret a negative PE? We're not really sure, either. Whenever a company has a negative book value of equity, it means that losses have been so large that book equity has been wiped out. In such cases, the ROE, PE ratio, and market-to-book ratio are often not reported because they are meaningless.

Even if a company's book equity is positive, you still have to be careful. For example, consider venerable consumer products company Clorox, which had a market-to-book ratio of about 53 in late 2007. Since the market-to-book ratio measures the value created by the company for shareholders, this would seem to be a good sign. But a closer look shows that Clorox's book value of equity per share dropped from $7.23 in 2004 to $1.03 in 2006. This decline had to do with accounting for stock repurchases made by the company, not gains or losses, but it nonetheless dramatically increased the market-to-book ratio in that year and subsequent years as well.

Financial ratios are important tools used in evaluating companies of all types, but you cannot simply take a number as given. Instead, before doing any analysis, the first step is to ask whether the number actually makes sense.

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. 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. The nearby *The Real World* box discusses some issues along these lines.

3.4 FINANCIAL MODELS

Financial 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 financial planning models with a relatively simple example. The Computerfield Corporation's financial statements from the most recent year are shown below.

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 at 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 3.8. 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 × 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 3.9. The

TABLE 3.8

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 3.9

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

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 = 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:

$$\text{Dividend payout ratio} = \text{Cash dividends/Net income} = \$44/132 = 33\ 1/3\% \quad [3.22]$$

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:

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

The Balance Sheet To generate a pro forma balance sheet, we start with the most recent statement, as shown in Table 3.10.

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 3.10

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 $1.80 \times \$1{,}250 = \$2{,}250$, 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 3.11. Notice that the change in retained earnings is equal to the $110 addition to retained earnings we calculated earlier.

TABLE 3.11

ROSENGARTEN CORPORATION
Partial 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	100	0
Inventory	750	150	Total	$ 475	$ 75
Total	$1,500	$300	Long-term debt	$ 800	$ 0
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 assets	$3,750	$750	Total liabilities and owners' equity	$3,185	$185
			External financing needed	$ 565	$565

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:

$$EFN = \frac{\text{Assets}}{\text{Sales}} \times \Delta\text{Sales} - \frac{\text{Spontaneous liabilities}}{\text{Sales}} \times \Delta\text{Sales} - PM \times \text{Projected sales} \times (1 - d) \quad [3.23]$$

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 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.

TABLE 3.12

ROSENGARTEN CORPORATION
Pro Forma Balance Sheet

Assets			Liabilities and Owners' Equity		
	NEXT YEAR	CHANGE FROM CURRENT YEAR		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	$ 700	$300
Total	$1,500	$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 assets	$3,750	$750	Total liabilities and owners' equity	$3,750	$750

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 capital unchanged. With $565 needed, the remaining $565 − 225 = $340 would have to come from long-term debt. Table 3.12 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.

3.5 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 Company in Table 3.13. 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 3.13, we can prepare a pro forma income statement and balance sheet as in Table 3.14. As Table 3.14 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 3.13) 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 3.14, 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 3.15 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,

TABLE 3.13

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

TABLE 3.14

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			Liabilities and Owners' Equity		
	$	PERCENTAGE OF SALES		$	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

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 3.15, 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 3.15 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 3.1 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 3.15 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

TABLE 3.15
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

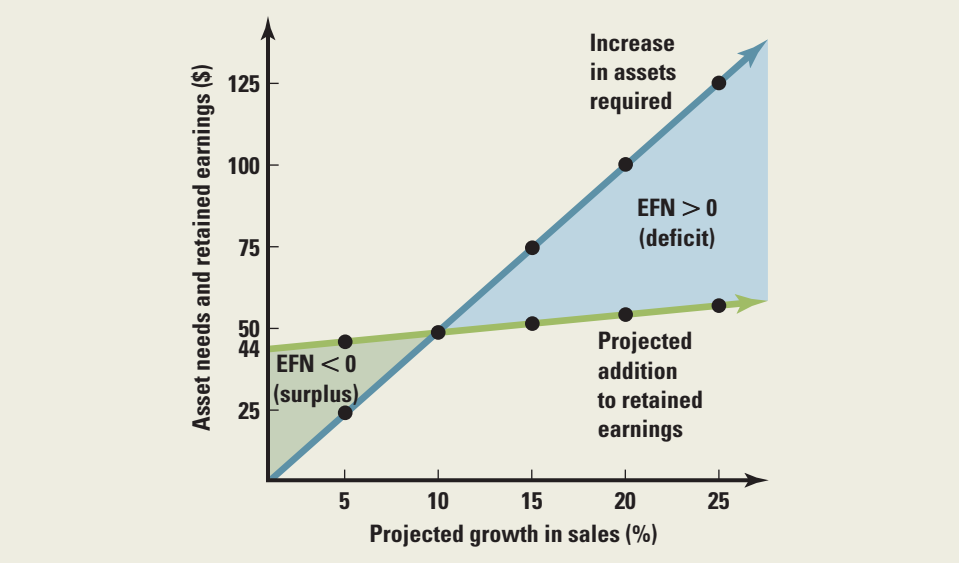

FIGURE 3.1
Growth and Related Financing Needed for the Hoffman Company

over 30 percent per year for the decade. Growth slowed down noticeably over the 2000–2009 period, but, nonetheless, Microsoft's combination of growth and substantial profit margins led to enormous cash surpluses. In part because Microsoft paid few dividends, the cash really piled up; in 2010, Microsoft's cash and short-term investment horde exceeded $36 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 3.1, 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:

$$\text{Internal growth rate} = \frac{\text{ROA} \times b}{1 - \text{ROA} \times b} \qquad [3.24]$$

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 3.15, 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):

$$\text{Sustainable growth rate} = \frac{\text{ROE} \times b}{1 - \text{ROE} \times b} \qquad [3.25]$$

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 $.03 \times 1 \times 1.5 = 4.5$ 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 3.16.

A Note about Sustainable Growth Rate Calculations

Very commonly, the sustainable growth rate is calculated using just the numerator in our expression, ROE $\times$ *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). 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.

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.

TABLE 3.16
Summary of Internal and Sustainable Growth Rates

3.6 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 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.[5] 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."[6]

[5]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.

[6]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 since 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?

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 tor cash that employee paychecks began to bounce Finally, out of cash, the company ceased operations entirely three years later.

8. **Product Sales** Do you think the company would have suffered the same fate if its product had been less popular? Why or why not?
9. **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?
10. **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?
11. **Cash Flow** Which is the biggest culprit here: too many orders, too little cash, or too little production capacity?
12. **Cash Flow** What are some of the actions that 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?
13. **Comparing ROE and ROA** Both ROA and ROE measure profitability. Which one is more useful for comparing two companies? Why?
14. **Ratio Analysis** Consider the ratio EBITDA/Assets. What does this ratio tell us? Why might it be more useful than ROA in comparing two companies?

QUESTIONS AND PROBLEMS

connect
Basic
(Questions 1–10)

1. **Du Pont Identity** If Alexander, Inc., has an equity multiplier of 2.50, total asset turnover of 1.15, and a profit margin of 6.4 percent, what is its ROE?
2. **Equity Multiplier and Return on Equity** Draiman Company has a debt-equity ratio of 0.75. Return on assets is 10.4 percent, and total equity is $900,000. What is the equity multiplier? Return on equity? Net income?
3. **Using the Du Pont Identity** Y3K, Inc., has sales of $4,350, total assets of $3,218, and a debt-equity ratio of 0.65. If its return on equity is 15 percent, what is its net income?
4. **EFN** The most recent financial statements for Cornell, Inc., are shown here:

INCOME STATEMENT		BALANCE SHEET			
Sales	$34,000	Assets	$100,300	Debt	$ 26,500
Costs	25,800			Equity	73,800
Taxable income	$ 8,200	Total	$100,300	Total	$100,300
Taxes (34%)	2,788				
Net income	$ 5,412				

Assets and costs are proportional to sales. Debt and equity are not. A dividend of $1,623.60 was paid, and the company wishes to maintain a constant payout ratio. Next year's sales are projected to be $38,420. What is the external financing needed?

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

INCOME STATEMENT		BALANCE SHEET			
Sales	$59,000	Current assets	$ 17,000	Long-term debt	$ 51,000
Costs	36,400	Fixed assets	139,000	Equity	105,000
Taxable income	$22,600	Total	$156,000	Total	$156,000
Taxes (34%)	7,684				
Net income	$14,916				

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 SGS Corp. has a 13 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	= 2.50
Profit margin	= 6.5%
Equity multiplier	= 1.10
Payout ratio	= 60%

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

INCOME STATEMENT		BALANCE SHEET			
Sales	$8,400	Assets	$21,500	Debt	$ 4,200
Costs	6,190			Equity	17,300
Net income	$2,210	Total	$21,500	Total	$21,500

Assets and costs are proportional to sales. Debt and equity are not. No dividends are paid. Next year's sales are projected to be $9,660. 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 15 percent to $317.4 million. Current assets, fixed assets, and short-term debt are 20 percent, 90 percent, and 15 percent of sales, respectively. Charming Florist pays out 40 percent of its net income in dividends. The company currently has $40 million of long-term debt, and $20 million in common stock par value. The profit margin is 10 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 that you calculated in part (b).

10. **Sustainable Growth Rate** The Steiben Company has an ROE of 8.45 percent and a payout ratio of 30 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 increase its sustainable growth rate?

11. Return on Equity Firm A and Firm B have debt/total asset ratios of 35 percent and 30 percent and returns on total assets of 10 percent and 12 percent, respectively. Which firm has a greater return on equity?

Intermediate
(Questions 11–23)

12. Ratios and Foreign Companies Prince Albert Canning PLC had a net loss of £18,351 on sales of £163,184. 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 $261,070. What was the net loss in dollars?

13. External Funds Needed The Optical Scam Company has forecast an 18 percent sales growth rate for next year. The current financial statements are shown below. Current assets, fixed assets, and short-term debt are proportional to sales.

INCOME STATEMENT		
Sales		$37,000,000
Costs		28,900,000
Taxable income		$ 8,100,000
Taxes		2,835,000
Net income		$ 5,265,000
Dividends	$1,579,500	
Additions to retained earnings	$3,685,500	

BALANCE SHEET			
Assets		**Liabilities and Equity**	
Current assets	$10,500,000	Short-term debt	$ 6,500,000
		Long-term debt	7,000,000
Fixed assets	30,000,000		
		Common stock	$ 3,000,000
		Accumulated retained earnings	24,000,000
		Total equity	$27,000,000
Total assets	$40,500,000	Total liabilities and equity	$40,500,000

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 $187,000, a profit margin of 6.5 percent, and an accounts receivable balance of $145,900. Assuming 80 percent of sales are on credit, what is the company's days' sales in receivables?

15. **Ratios and Fixed Assets** The Burk Company has a ratio of long-term debt to long-term debt plus equity of 0.40 and a current ratio of 1.25. Current liabilities are $1,075, sales are $6,180, profit margin is 8.5 percent, and ROE is 16.25 percent. What is the amount of the firm's net fixed assets?

16. **Calculating the Cash Coverage Ratio** FVA Inc.'s net income for the most recent year was $17,590. The tax rate was 34 percent. The firm paid $4,150 in total interest expense and deducted $5,820 in depreciation expense. What was FVA's cash coverage ratio for the year?

17. **Cost of Goods Sold** Sexton Corp. has current liabilities of $325,000, a quick ratio of 0.85, inventory turnover of 9.5, and a current ratio of 1.25. 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 financial statements below, construct the common-size balance sheet and common-base year balance sheet for the company. Use 2009 as the base year.

JARROW CORPORATION
2009 and 2010 Balance Sheets

ASSETS			LIABILITIES AND OWNERS' EQUITY		
	2009	2010		2009	2010
Current assets			Current liabilities		
Cash	$ 13,582	$ 15,675	Accounts payable	$ 19,085	$ 20,640
Accounts receivable	21,640	22,340	Notes payable	24,530	25,305
Inventory	36,823	39,703	Total	$ 43,615	$ 45,945
Total	$ 72,045	$ 77,718	Long-term debt	$ 35,000	$ 50,000
			Owners' equity		
Fixed assets			Common stock and paid-in surplus	$ 45,000	$ 45,000
Net plant and equipment	$274,583	$290,586	Accumulated retained earnings	223,013	227,359
			Total	$268,013	$272,359
Total assets	$346,628	$368,304	Total liabilities and owners' equity	$346,628	$368,304

19. **Full-Capacity Sales** Pumpkin Mfg., Inc., is currently operating at only 92 percent of fixed asset capacity. Current sales are $725,000. How fast can sales grow before any new fixed assets are needed?

20. **Fixed Assets and Capacity Usage** For the company in the previous problem, suppose fixed assets are $645,000 and sales are projected to grow to $850,000. How much in new fixed assets is required to support this growth in sales? Assume the company operates at full capacity.

21. **Calculating EFN** The most recent financial statements for Retro Machine, Inc., follow. Sales for 2010 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,

fixed assets, and accounts payable increase spontaneously with sales. If the firm is operating at full capacity and no new debt or equity are issued, what is the external financing needed to support the 20 percent growth rate in sales?

RETRO MACHINE INC 2009 Income Statement	
Sales	$929,000
Costs	723,000
Other expenses	19,000
Earnings before interest and taxes	$187,000
Interest paid	14,000
Taxable income	$173,000
Taxes (35%)	60,550
Net income	$112,450
Dividends	$ 33,735
Addition to retained earnings	78,715

RETRO MACHINE, INC Balance Sheet as of December 31, 2009			
ASSETS		LIABILITIES AND OWNERS' EQUITY	
Current assets		Current liabilities	
Cash	$ 25,300	Accounts payable	$ 68,000
Accounts receivable	40,700	Notes payable	17,000
Inventory	86,900	Total	$ 85,000
Total	$152,900	Long-term debt	$158,000
Fixed assets		Owners' equity	
Net plant and equipment	$413,000	Common stock and paid-in surplus	$140,000
		Accumulated retained earnings	182,900
		Total	$322,900
Total assets	$565,900	Total liabilities and owners' equity	$565,900

22. **Capacity Usage and Growth** In the previous problem, suppose the firm was operating at only 80 percent capacity in 2009. 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?

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** Dahlia, Inc., wishes to maintain a growth rate of 9 percent per year and a debt-equity ratio of 0.55. Profit margin is 6.2 percent, and the ratio of total assets to sales is constant at 1.90. Is this growth rate possible? To answer, determine what the dividend payout ratio must be. How do you interpret the result?

Challenge
(Questions 24–30)

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 3.24 and 3.25. 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 two sustainable growth rate equations 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 $380,000 and equity of $230,000 at the beginning of the year. At the end of the year, the company had total assets of $430,000. During the year the company sold no new equity. Net income for the year was $95,000 and dividends were $43,000. What is the approximate sustainable growth rate for the company? What is the exact sustainable growth rate? What is the approximate sustainable growth rate if you calculate ROE based on the beginning of period equity? Is this number too high or too low? Why?

WHAT'S ON THE WEB?

1. Du Pont Identity You can find financial statements for Walt Disney Company at Disney's home page, disney.go.com. For the three most recent years, calculate the Du Pont identity for Disney. How has ROE changed over this period? How have changes in each component of the Du Pont identity affected ROE over this period?

2. Ratio Analysis You want to examine the financial ratios for Dell Computer Corporation. Go to www.reuters.com and type in the ticker symbol for the company (DELL). Now find financial ratios for Dell and the industry, sector, and S&P 500 averages for each ratio.

a. What do TTM and MRQ mean?

b. How do Dell's recent profitability ratios compare to their values over the past five years? To the industry averages? To the sector averages? To the S&P 500 averages? Which is the better comparison group for Dell: the industry, sector, or S&P 500 averages? Why?

c. In what areas does Dell seem to outperform its competitors based on the financial ratios? Where does Dell seem to lag behind its competitors?

d. Dell's inventory turnover ratio is much larger than that for all comparison groups. Why do you think this is?

3. **Applying Percentage of Sales** Locate the most recent annual financial statements for Du Pont at www.dupont.com under the "Investor Center" link. Locate the annual report. Using the growth in sales for the most recent year as the projected sales growth for next year, construct a pro forma income statement and balance sheet. Based on these projections, what are the external funds needed?

4. **Growth Rates** You can find the home page for Caterpillar, Inc., at www.cat.com. Go to the Web page and find the most recent annual report. Using the information from the financial statements, what is the sustainable growth rate?

CLOSING CASE

RATIOS AND FINANCIAL PLANNING AT EAST COAST YACHTS

After Dan's analysis of East Coast Yachts' cash flow (at the end of our previous chapter), Larissa approached Dan about the company's performance and future growth plans. First, Larissa wants to find out how East Coast Yachts is performing relative to its peers. Additionally, she wants to find out the future financing necessary to fund the company's growth. In the past, East Coast Yachts experienced difficulty in financing its growth plan, in large part because of poor planning. In fact, the company had to turn down several large jobs because its facilities were unable to handle the additional demand. Larissa hoped that Dan would be able to estimate the amount of capital the company would have to raise next year so that East Coast Yachts would be better prepared to fund its expansion plans.

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

EAST COAST YACHTS
2010 Income Statement

Sales	$617,760,000
Cost of goods sold	435,360,000
Selling, general, and administrative	73,824,000
Depreciation	20,160,000
EBIT	$ 88,416,000
Interest expense	11,112,000
EBT	$ 77,304,000
Taxes	30,921,600
Net income	$ 46,382,400
Dividends	$ 17,550,960
Retained earnings	$ 28,831,440

(*continued*)

EAST COAST YACHTS 2010 Balance Sheet			
Current assets		Current liabilities	
Cash and equivalents	$ 11,232,000	Accounts payable	$ 24,546,000
Accounts receivable	20,208,000	Notes payable	18,725,000
Inventories	22,656,000	Accrued expenses	6,185,000
Other	1,184,000	Total current liabilities	$ 49,456,000
Total current assets	$ 55,280,000		
Fixed assets		Long-term debt	$146,560,000
Property, plant, and equipment	$462,030,000	Total long-term liabilities	$146,560,000
Less accumulated depreciation	(114,996,000)		
Net property, plant, and equipment	$347,034,000		
Intangible assets and others	6,840,000	Stockholders' equity	
Total fixed assets	$353,874,000	Preferred stock	$ 3,000,000
		Common stock	40,800,000
		Capital surplus	31,200,000
		Accumulated retained earnings	186,138,000
		Less treasury stock	(48,000,000)
		Total equity	$213,138,000
Total assets	$409,154,000	Total liabilities and shareholders' equity	$409,154,000

Yacht Industry Ratios			
	LOWER QUARTILE	MEDIAN	UPPER QUARTILE
Current ratio	0.86	1.51	1.97
Quick ratio	0.43	0.75	1.01
Total asset turnover	1.10	1.27	1.46
Inventory turnover	12.18	14.38	16.43
Receivables turnover	10.25	17.65	22.43
Debt ratio	0.32	0.49	0.61
Debt-equity ratio	0.51	0.83	1.03
Equity multiplier	1.51	1.83	2.03
Interest coverage	5.72	8.21	10.83
Profit margin	5.02%	7.48%	9.05%
Return on assets	7.05%	10.67%	14.16%
Return on equity	9.06%	14.32%	22.41%

1. East Coast Yachts uses a small percentage of preferred stock as a source of financing. In calculating the ratios for the company, should preferred stock be included as part of the company's total equity?
2. Calculate all of the ratios listed in the industry table for East Coast Yachts.
3. 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 would you interpret this ratio? How does East Coast Yachts compare to the industry average for this ratio?
4. Calculate the sustainable growth rate for 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?

5. As a practical matter, East Coast Yachts is unlikely to be willing to raise external equity capital, in part because the shareholders 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?
6. 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 since 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 and sales are expected to grow at 20 percent. As a result, to expand production, the company must set up an entirely new line at a cost of $95,000,000. Prepare the pro forma income statement and balance sheet. What is the new EFN with these assumptions? What does this imply about capacity utilization for East Coast Yachts next year?