

3

Working with Financial Statements

On April 17, 2007, shares of stock in TransCanada were trading for about \$38. At that price, TransCanada had a price-earnings ratio of 17, meaning that investors were willing to pay \$17 for every dollar in income earned by TransCanada. At the same time, investors were willing to pay a stunning \$2,685 for each dollar earned by Nortel Networks, but only about \$12 and \$5 for each dollar earned by Canadian Imperial Bank of Commerce and Onex Corp., respectively. And there were stocks like NovaGold Resources, which, despite having no earnings (a loss actually), had a stock price of about \$20 per share. Meanwhile, the average stock in the S&P/TSX Composite Index, which included 279 of the Canadian companies listed on the TSX, had a PE ratio of 16.8, so TransCanada was about average in this regard.

As we look at these numbers, an obvious question arises: Why were investors willing to pay so much more for a dollar of Nortel's earnings and so much less for a dollar earned by Onex? To understand the answer, we need to delve into subjects such as relative profitability and growth potential, and we also need to know how to compare financial and operating information across companies. And that is precisely what this chapter is about.

The PE ratio is just one example of a financial ratio. As we will see in this chapter, there are quite a number of such ratios, all designed to summarize specific aspects of a firm's financial position. In addition to discussing financial ratios and what they mean, we will have something to say about who uses this information and why.



The most important thing to carry away from this chapter is a good understanding of:

- 3.1** How to standardize financial statements for comparison purposes.
- 3.2** How to compute and, more important, interpret some common ratios.
- 3.3** How to analyze financial performance by using the Du Pont identity.
- 3.4** The relationship between growth and financing needs.
- 3.5** How to establish benchmarks for comparison purposes, and some of the problems in financial statement 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.

In the best of all worlds, the financial manager has full market value information about all of the firm's assets. This will rarely (if ever) happen. So, the reason we rely on accounting figures for much of our financial information is that we are almost always unable to obtain all (or even part) of the market information that we want. The only meaningful yardstick for evaluating business decisions is whether or not they create economic value (see Chapter 1). However, in many important situations, it will not be possible to make this judgment directly because we can't see the market value effects.

We recognize that accounting numbers are often just pale reflections of economic reality, but they frequently are the best available information. For privately held corporations, not-for-profit businesses, and smaller firms, for example, very little direct market value information exists at all. The accountant's reporting function is crucial in these circumstances.

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.

3.1 | STANDARDIZED FINANCIAL 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, CIBC and Royal Bank of Canada are obviously serious rivals in the banking industry, but Royal Bank is almost twice as large (in terms of assets), so it is difficult to compare them directly. For that matter, it's difficult to even 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 Royal Bank and, say, Citibank. Because Citibank's financial statements are denominated in U.S. dollars, then we have a size *and* a currency difference.

To start making comparisons, one obvious thing we might try to do is to somehow standardize the financial statements. One very 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, Maple Leaf Corporation's 2006 and 2007 balance sheets are provided in Table 3.1. Using these, we construct common-size balance sheets by expressing each

Company financial information can be found in many places on the Web, including ca.finance.yahoo.com and www.globeinvestor.com.

common-size statement

A standardized financial statement presenting all items in percentage terms. Balance sheet items are shown as a percentage of assets and income statement items as a percentage of sales.

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

TABLE 3.1

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

item as a percentage of total assets. Maple Leaf's 2006 and 2007 common-size balance sheets are shown in Table 3.2.

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

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

Overall, Maple Leaf's liquidity, as measured by current assets compared to current liabilities, increased over the year. Simultaneously, Maple Leaf'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

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

This income statement tells us what happens to each dollar in sales. For Maple Leaf, interest expense eats up \$.061 out of every sales dollar, and taxes take another \$.081.

IBM's Web site has a good guide to reading financial statements. Select "Investor tools" at www.ibm.com/investor.

TABLE 3.2

MAPLE LEAF CORPORATION Common-Size Balance Sheets December 31, 2006 and 2007			
	2006	2007	Change
Assets			
Current assets			
Cash	2.5%	2.7%	+ .2%
Accounts receivable	4.9	5.2	+ .3
Inventory	<u>11.7</u>	<u>11.8</u>	+ .1
Total	<u>19.1</u>	<u>19.7</u>	+ .6
Fixed assets			
Net plant and equipment	<u>80.9</u>	<u>80.3</u>	- .6
Total assets	<u>100.0%</u>	<u>100.0%</u>	<u>.0%</u>
Liabilities and Owners' Equity			
Current liabilities			
Accounts payable	9.2%	9.6%	+ .4%
Notes payable	<u>6.8</u>	<u>5.5</u>	-1.3
Total	<u>16.0</u>	<u>15.1</u>	- .9
Long-term debt	<u>15.7</u>	<u>12.7</u>	-3.0
Owners' equity			
Common stock and paid-in surplus	14.8	15.3	+ .5
Retained earnings	<u>53.3</u>	<u>56.9</u>	+3.6
Total	<u>68.1</u>	<u>72.2</u>	+4.1
Total liabilities and owners' equity	<u>100.0%</u>	<u>100.0%</u>	<u>.0%</u>

TABLE 3.3

MAPLE LEAF CORPORATION 2007 Income Statement (\$ in millions)		
Sales		\$2,311
Cost of goods sold		1,344
Depreciation		<u>276</u>
Earnings before interest and taxes		\$ 691
Interest paid		<u>141</u>
Taxable income		\$ 550
Taxes (34%)		<u>187</u>
Net income		<u>\$ 363</u>
Dividends	\$121	
Addition to retained earnings	242	

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

MAPLE LEAF CORPORATION
Common-Size Income Statement
2007

TABLE 3.4

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	

CONCEPT QUESTIONS

3.1a Why is it often necessary to standardize financial statements?

3.1b Describe how common-size balance sheets and income statements are formed.

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, but there are many others that we don't touch on.

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 ever using ratios as a tool 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 a bit later in the chapter. For now, for each of the ratios we discuss, several questions come to mind:

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

Financial ratios are traditionally grouped into the following categories:

1. Short-term solvency, or liquidity, ratios.
2. Long-term solvency, or financial leverage, ratios.

financial ratios

Relationships that are determined from a firm's financial information and used for comparison purposes.

Visit sme.ic.gc.ca and try an interactive on-line financial performance tool "Performance Plus," which lets you compare a company's financial data with Canadian industry averages.

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 Maple Leaf, we will use the ending balance sheet (2007) figures unless we explicitly say otherwise. Also notice that the various ratios are colour-keyed to indicate which numbers come from the **income statement** and which come from the **balance sheet**.

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. Since 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:

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

For Maple Leaf, the 2007 current ratio is:

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

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

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.

Current Events EXAMPLE 3.1

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, then 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, then 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.

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 since 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:

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

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 Maple Leaf, this ratio in 2007 was:

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

The quick ratio here tells a somewhat different story than the current ratio, because inventory accounts for more than half of Maple Leaf'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.

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 Maple Leaf.

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:

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

In this case, an analyst might say that Maple Leaf uses 28 percent debt.¹ Whether this is high or low or whether it even makes any difference depends on whether or not capital structure matters, a subject we discuss in Chapter 13.

Maple Leaf 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*:

$$\begin{aligned} \text{Debt-equity ratio} &= \frac{\text{Total debt}}{\text{Total equity}} \\ &= \frac{\$.28}{\$.72} = .39 \text{ times} \end{aligned} \quad [3.5]$$

$$\begin{aligned} \text{Equity multiplier} &= \frac{\text{Total assets}}{\text{Total equity}} \\ &= \frac{\$1}{\$.72} = 1.39 \text{ times} \end{aligned} \quad [3.6]$$

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

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

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

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

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

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 Maple Leaf, the interest bill is covered 4.9 times over.

Cash Coverage A problem with the TIE ratio is that it is based on EBIT, which is not really a measure of cash available to pay interest. The reason is that depreciation, a

¹Total equity here includes preferred stock (discussed in Chapter 7), if there is any. An equivalent numerator in this ratio would be (Current liabilities + Long-term debt).

The Business Development Bank of Canada has online ratio calculators. Go to www.bdc.ca and follow the "Business Tools" link and then "Ratio calculators."

non-cash expense, has been deducted out. Since interest is most definitely a cash outflow (to creditors), one way to define the *cash coverage ratio* is

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

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

Asset Management, or Turnover, Measures

We next turn our attention to the efficiency with which Maple Leaf uses its assets. The measures in this section are sometimes called *asset 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, Maple Leaf had a cost of goods sold of \$1,344. Inventory at the end of the year was \$422. With these numbers, *inventory turnover* can be calculated as:

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

In a sense, we sold off, or turned over, the entire inventory 3.2 times. 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, then we can immediately figure out how long it took us to turn it over on average. The result is the average *days' sales in inventory*:

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

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, we frequently hear things like “Majestic Motors has a 60 days’ supply of cars.” This means that, at current daily sales, it would take 60 days to deplete the available inventory. We could also say that Majestic has 60 days of sales in inventory.

Receivables Turnover and Days' Sales in Receivables Our inventory measures give some indication of how fast we can sell products. We now look at how fast we

collect on those sales. The *receivables turnover* is defined in the same way as inventory turnover:

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

Loosely speaking, we collected our outstanding credit accounts and reloaned the money 12.3 times during the year.²

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

$$\begin{aligned}\text{Day's sales in receivables} &= \frac{365 \text{ days}}{\text{Receivables turnovers}} \\ &= \frac{365}{12.3} = 30 \text{ days}\end{aligned}\quad [3.12]$$

Therefore, on average, we collect on our credit sales in 30 days. For obvious reasons, this ratio is very 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. We will learn more about this subject when we study credit policy in Chapter 17.

EXAMPLE 3.2 Payables Turnover

Here is a variation on the receivables collection period. How long, on average, does it take for Maple Leaf 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 Maple Leaf 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, Maple Leaf takes 94 days to pay. As a potential creditor, we might take note of this fact.

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:

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

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

A closely related ratio, the *capital intensity ratio*, is simply the reciprocal of (that is, 1 divided by) total asset turnover. It can be interpreted as the dollar investment in assets needed to generate \$1 in sales. High values correspond to capital-intensive industries (such as public utilities). For Maple Leaf, total asset turnover is .64, so, if we flip this over, we get that capital intensity is \$1/.64 = \$1.56. That is, it takes Maple Leaf \$1.56 in assets to create \$1 in sales.

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

It might seem that a high total asset turnover ratio is always a good sign for a company, but it isn't necessarily. Consider a company with old assets. The assets would be almost fully depreciated and might be very outdated. In this case, the book value of assets is low, contributing to a higher asset turnover. Plus, the high turnover might also mean that the company will need to make major capital outlays in the near future. A low asset turnover might seem bad, but it could indicate the opposite: The company could have just purchased a lot of new equipment, which implies that the book value of assets is relatively high. These new assets could be more productive and efficient than those used by the company's competitors.

More Turnover **EXAMPLE 3.3**

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

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

Profitability Measures

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

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

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

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

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

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

Two additional forms of profit margin are sometimes used. Gross profit margin measures the profitability of a company's sales after the costs of goods sold (COGS) have been subtracted:

$$\text{Gross profit margin} = \frac{\text{Sales} - \text{COGS}}{\text{Sales}}$$

³No, it's not; margins can be small, but they do need to be positive!

Operating profit margin measures profitability after all other expenses, except interest and taxes, have been deducted:

$$\text{Operating profit margin} = \frac{\text{EBIT}}{\text{Sales}}$$

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

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

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

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

Therefore, for every dollar in equity, Maple Leaf generated 14 cents in profit, but, again, this is only correct 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 Maple Leaf's use of financial leverage. We will examine the relationship between these two measures in more detail below.

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

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

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

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

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

Since 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*:

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

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

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

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

CONCEPT QUESTIONS

- 3.2a** What are the five groups of ratios? Give two or three examples of each kind.
- 3.2b** Turnover ratios all have one of two figures as numerators. What are these two figures? What do these ratios measure? How do you interpret the results?
- 3.2c** Profitability ratios all have the same figure in the numerator. What is it? What do these ratios measure? How do you interpret the results?
- 3.2d** Given the total debt ratio, what other two ratios can be computed? Explain how.

3.3 | THE DU PONT IDENTITY

As we mentioned in discussing ROA and ROE, the difference between these two profitability measures is a reflection of 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.

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

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

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

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

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

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

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

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

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

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

If we rearrange things a bit, ROE is:

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

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

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

$$\begin{aligned} \text{ROE} &= \text{Profit margin} \times \text{Total asset turnover} \times \text{Equity multiplier} \\ &= .157 \times .64 \times 1.39 \\ &= .14 = 14\% \end{aligned}$$

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 a firm could leverage up its ROE by increasing its amount of debt. It turns out this will only happen if the firm's ROA exceeds the interest rate on the debt. More importantly, the use of debt financing has a number of other effects, and, as we discuss at some length in later chapters, the amount of leverage a firm uses is governed by its capital structure policy.

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

An Expanded Du Pont Analysis

So far, we've seen how the Du Pont equation lets us break down ROE into its basic three components: profit margin, total asset turnover, and financial leverage. We now

Du Pont identity
A way of breaking ROE into three parts: profit margin, total asset turnover, and financial leverage.

FINANCIAL STATEMENTS FOR MAGNA INTERNATIONAL
For the year ended December 31, 2005
(US dollars in millions)

TABLE 3.5

Income Statement		Balance Sheet			
Sales	\$22,811	Current assets		Current liabilities	
CoGS	<u>19,831</u>	Cash	\$ 1,682	Accounts payable	\$ 3,241
Gross profit	\$ 2,980	Accounts receivable	3,533	Other	<u>1,147</u>
SG&A expense	1,198	Inventory	<u>1,388</u>	Total	\$ 4,388
Other expenses	80	Total	\$ 6,603		
Depreciation	<u>711</u>	Fixed assets	\$ 5,718	Total long-term debt	\$ 1,368
EBIT	\$ 991			Total equity	<u>\$ 6,565</u>
Interest	<u>60</u>	Total assets	<u>\$12,321</u>	Total liabilities and equity	<u>\$12,321</u>
EBT	931				
Taxes	<u>292</u>				
Net income	<u>\$ 639</u>				

extend this analysis to take a closer look at how key parts of a firm's operations feed into ROE. To get going, we went to the SEDAR Web site (www.sedar.com) and found the 2005 annual report for Magna International, Inc., a supplier of automotive systems and components headquartered in Aurora, Ontario. In this report, we located the financial statements for the year ended December 31, 2005. What we found is summarized in Table 3.5.

Using the information in Table 3.5, Figure 3.1 shows how we can construct an expanded Du Pont analysis for Magna International and present that analysis in chart form. The advantage of the extended Du Pont chart is that it lets us examine several ratios at once, thereby getting a better overall picture of a company's performance and also allowing us to determine possible items to improve.

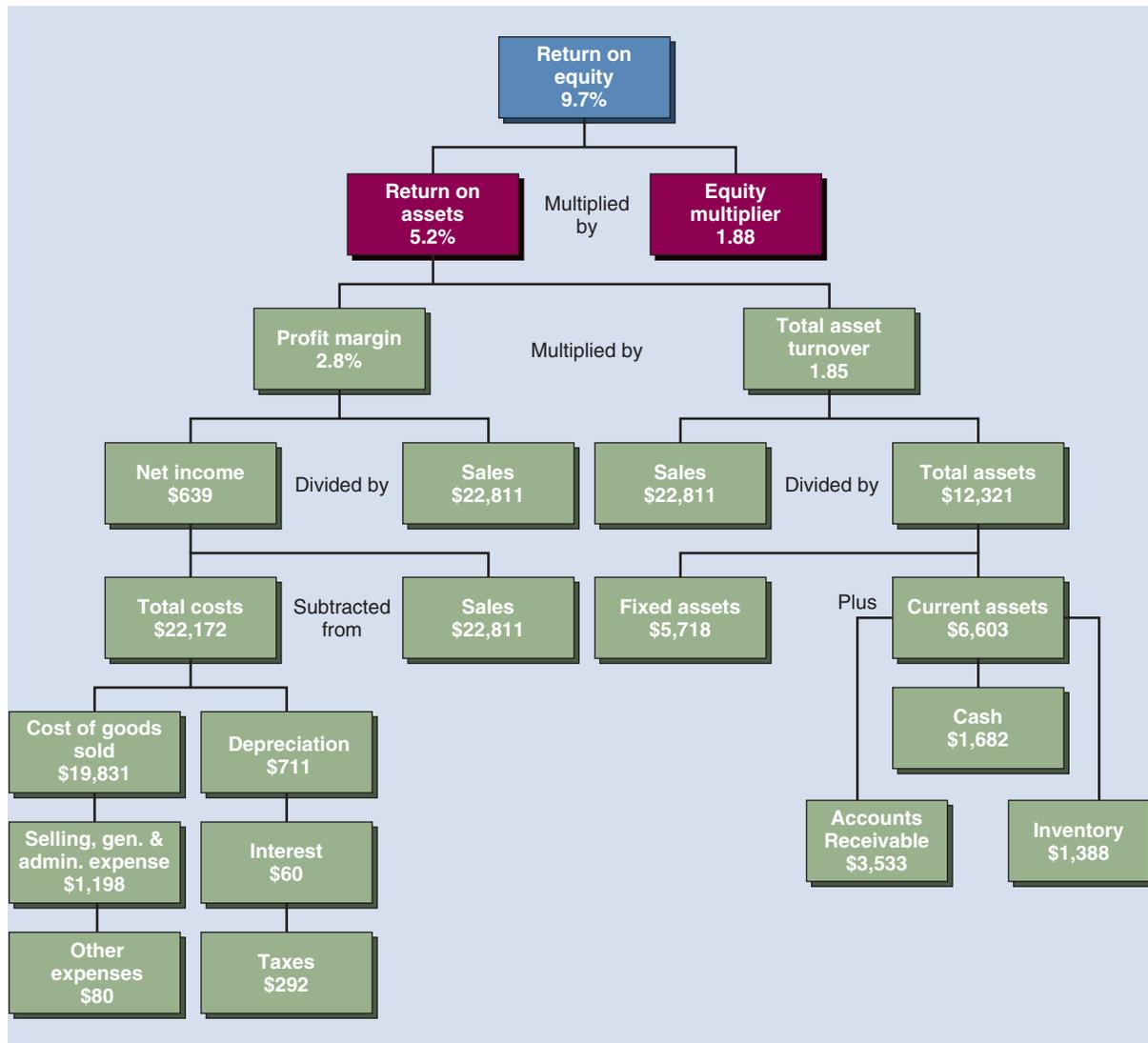
Looking at the left-hand side of our Du Pont chart in Figure 3.1, we see items related to profitability. As always, profit margin is calculated as net income divided by sales. But, as our chart emphasizes, net income depends on sales and a variety of costs, such as cost of goods sold (CoGS) and selling,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

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

CONCEPT QUESTIONS

3.3a Return on assets, or ROA, can be expressed as the product of two ratios. Which two?

3.3b Return on equity, or ROE, can be expressed as the product of three ratios. Which three?

FIGURE 3.1 Extended Du Pont Chart for Magna International

3.4 | INTERNAL AND SUSTAINABLE GROWTH

A firm's return on assets and return on equity are frequently used to calculate two additional numbers, both of which have to do with the ability to grow. We examine these next, and we introduce two basic ratios. Growth rates are discussed in our nearby Reality Bytes box.

Dividend Payout and Earnings Retention

As we have seen in various places, a net income gets divided into two pieces. The first piece is cash dividends paid to stockholders. Whatever is left over is the addition to retained

earnings. For example, from Table 3.3, Maple Leaf's net income was \$363, of which \$121 was paid out in dividends. If we express dividends paid as a percentage of net income, the result is the *dividend payout ratio*:

$$\begin{aligned}\text{Dividend payout ratio} &= \text{Cash dividends/Net income} \\ &= \$121/\$363 \\ &= 33\frac{1}{3}\%\end{aligned}\quad [3.21]$$

What this tells us is that Maple Leaf pays out one-third of its net income in dividends.

Anything Maple Leaf does not pay out in the form of dividends must be retained in the firm, so we can define the *retention ratio* as:

$$\begin{aligned}\text{Retention ratio} &= \text{Addition to retained earnings/Net income} \\ &= \$242/\$363 \\ &= 66\frac{2}{3}\%\end{aligned}\quad [3.22]$$

So, Maple Leaf retains two-thirds of its net income. The retention ratio is also known as the *plow-back ratio* because it is, in effect, the portion of net income that is plowed back into the business.

Notice that net income must be either paid out or plowed back, so the dividend payout and plowback ratios have to add up to 1. Put differently, if you know one of these figures, you can figure the other one immediately.

Payout and Retention

EXAMPLE 3.4

The Igloo Construction Corporation routinely pays out 40 percent of net income in the form of dividends. What is its plowback ratio? If net income was \$800, how much did stockholders actually receive?

If the payout ratio is 40 percent, then the retention, or plowback, ratio must be 60 percent since the two have to add up to 100 percent. Dividends were 40 percent of \$800, or \$320.

ROA, ROE, and Growth

Investors and others are frequently interested in knowing how rapidly a firm's sales can grow. The important thing to recognize is that if sales are to grow, assets have to grow as well, at least over the long run. Further, if assets are to grow, then the firm must somehow obtain the money to pay for the needed acquisitions. In other words, growth has to be financed, and as a direct corollary, a firm's ability to grow depends on its financing policies.

A firm has two broad sources of financing: *internal* and *external*. Internal financing simply refers to what the firm earns and subsequently plows back into the business. External financing refers to funds raised by either borrowing money or selling stock.

The Internal Growth Rate Suppose a firm has a policy of financing growth using only internal financing. This means that the firm won't borrow any funds and won't sell any new stock. How rapidly can the firm grow? The answer is given by the **internal growth rate**:

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

where ROA is, as usual, return on assets, and b is the retention, or plowback, ratio we just discussed.

internal growth rate
The maximum possible growth rate for a firm that relies only on internal financing.



REALITY BYTES

How Fast Is Too Fast?

Growth rates are an important tool for evaluating a company and, as we will see later, an important tool for valuing a company's stock. When thinking about (and calculating) growth rates, a little common sense goes a long way. For example, in the end of 2005 Canadian Tire had 14.9 million square feet of retail space. The company expected to increase its square footage by 1.5 million, which represented a 10 percent growth, over the next year. This doesn't sound too outrageous, but can Canadian Tire increase its square footage at 10 percent indefinitely?

We'll get into the calculation in our next chapter, but if you assume that Canadian Tire grows at 10 percent per year over the next 165 years, the company will have about 100.7 trillion square feet of property, which is more than the entire total land mass of Canada! In other words, if Canadian Tire keeps growing its retail space at 10 percent, the entire country will eventually be one big Canadian Tire store. Scary.

Rogers Communications is another example. The company had total revenues of about \$7.5 billion in 2005. This represents an annual increase of 33 percent! How likely do you think it is that the company can continue this growth rate? If this growth continued, the company would have revenues of about \$1.7 trillion in nineteen years, which exceeds the

gross domestic product (GDP) of Canada. Obviously, Rogers Communications' growth rate will slow in the future.

What about growth in cash flow? As of the end of 2005, cash flow from operations for Teck Cominco, a diversified mining company headquartered in Vancouver, had grown, on average, at an annual rate of about 79 percent for the past five years. The company generated about \$1.67 billion in operating cash flow for 2005. If the company's cash flow grew at the same rate for the next six years, it would generate almost \$55 billion dollars per year, which is more than the total amount of Canadian currency in circulation.

As these examples show, growth rates can be deceiving. It is fairly easy for a small company to grow very fast. If a company has \$100 dollars in sales, it only has to increase sales by another \$100 to have a 100 percent increase in sales. If the company's sales are \$10 billion, it has to increase sales by another \$10 billion to achieve the same 100 percent increase. So, long-term growth rate estimates must be chosen very carefully. As a rule of thumb, for really long-term growth estimates, you should probably assume that a company will not grow much faster than the economy as a whole, which is about 1 to 3 percent (inflation-adjusted).

For example, for the Maple Leaf Corporation, we earlier calculated ROA as 10.12 percent. We also saw that the retention ratio is $66\frac{2}{3}$ percent, or $\frac{2}{3}$, so the internal growth rate is:

$$\begin{aligned} \text{Internal growth rate} &= \frac{\text{ROA} \times b}{1 - \text{ROA} \times b} \\ &= \frac{.1012 \times \frac{2}{3}}{1 - .1012 \times \frac{2}{3}} \\ &= 7.23\% \end{aligned}$$

Thus, if Maple Leaf relies solely on internally generated financing, it can grow at a maximum rate of 7.23 percent per year.

The Sustainable Growth Rate If a firm only relies on internal financing, then, through time, its total debt ratio will decline. The reason is that assets will grow, but total debt will remain the same (or even fall if some is paid off). Frequently, firms have a particular total debt ratio or equity multiplier that they view as optimal (why this is so is the subject of Chapter 13).

With this in mind, we now consider how rapidly a firm can grow if (1) it wishes to maintain a particular total debt ratio and (2) it is unwilling to sell new stock. There are various reasons why a firm might wish to avoid selling stock, and equity sales by established firms are actually a relatively rare occurrence. Given these two assumptions, the maximum growth rate that can be achieved, called the **sustainable growth rate**, is:

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

Notice that this is the same as the internal growth rate, except that ROE is used instead of ROA.

Looking at Maple Leaf, we earlier calculated ROE as 14 percent, and we know that the retention ratio is $\frac{2}{3}$, so we can easily calculate sustainable growth as:

$$\begin{aligned} \text{Sustainable growth rate} &= \frac{\text{ROE} \times b}{1 - \text{ROE} \times b} \\ &= \frac{.14 \times \frac{2}{3}}{1 - .14 \times \frac{2}{3}} \\ &= 10.29\% \end{aligned}$$

If you compare this sustainable growth rate of 10.29 percent to the internal growth rate of 7.23 percent, you might wonder why it is larger. The reason is that, as the firm grows, it will have to borrow additional funds if it is to maintain a constant debt ratio. This new borrowing is an extra source of financing in addition to internally generated funds, so Maple Leaf can expand more rapidly.

Determinants of Growth In our previous section, we saw that the return on equity, or ROE, could be decomposed into its various components using the Du Pont identity. Since ROE appears so prominently in the determination of the sustainable growth rate, the factors important in determining ROE are also important determinants of growth.

As we saw, 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. **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.
3. **Financial policy.** An increase in the debt-equity ratio increases the firm's financial leverage. Since this makes additional debt financing available, it increases the sustainable growth rate.
4. **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 internal and sustainable growth.

sustainable growth rate

The maximum possible growth rate for a firm that maintains a constant debt ratio and doesn't sell new stock.

The sustainable growth rate is a very useful 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 financial policy as measured by the debt-equity ratio, and its dividend policy as measured by the retention ratio. 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.

A Note on 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.

CONCEPT QUESTIONS

- 3.4a** What does a firm's internal growth rate tell us?
 - 3.4b** What does a firm's sustainable growth rate tell us?
 - 3.4c** Why is the sustainable growth rate likely to be larger than the internal growth rate?
-

3.5 USING FINANCIAL STATEMENT INFORMATION

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

Why Evaluate Financial Statements?

As we have discussed, the primary reason for looking at accounting information is that we don't have, and can't reasonably expect to get, market value information. It is important to emphasize that, whenever we have market information, we will use it instead of accounting data. Also, if there is a conflict between accounting and market data, market data should be given precedence.

Financial statement analysis is essentially an application of "management by exception." In many cases, such analysis will boil down to comparing ratios for one business with some kind of average or representative ratios. Those ratios that seem to differ the most from the averages are tagged for further study.

Internal Uses Financial statement information has a variety of uses within a firm. Among the most important of these is performance evaluation. For example, managers are frequently evaluated and compensated on the basis of accounting measures of performance such as profit margin and return on equity. Also, firms with multiple divisions frequently compare the performance of those divisions using financial statement information.

Another important internal use of financial statement information involves planning for the future. Historical financial statement information is very useful for generating projections about the future and for checking the realism of assumptions made in those projections.

External Uses Financial statements are useful to parties outside the firm, including short-term and long-term creditors and potential investors. For example, we would find such information quite useful in deciding whether or not to grant credit to a new customer.

We would also use this information to evaluate suppliers, and suppliers would use our statements before deciding to extend credit to us. Large customers use this information to decide if we are likely to be around in the future. Credit-rating agencies rely on financial statements in assessing a firm's overall creditworthiness. The common theme here is that financial statements are a prime source of information about a firm's financial health.

We would also find such information useful in evaluating our main competitors. We might be thinking of launching a new product. A prime concern would be whether the competition would jump in shortly thereafter. In this case, we would be interested in our competitors' financial strength to see if they could afford the necessary development.

Finally, we might be thinking of acquiring another firm. Financial statement information would be essential in identifying potential targets and deciding what to offer.

Choosing a Benchmark

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

Time-Trend Analysis One standard we could use is history. Suppose we found that the current ratio for a particular firm is 2.4 based on the most recent financial statement information. Looking back over the last 10 years, we might find that this ratio has declined fairly steadily over that period.

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

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

North American Industry Classification System (NAICS)

North American code used to classify a firm by its type of business operations.

Learn more about NAICS at www.naics.com.

One common way of identifying potential peers is based on the **North American Industry Classification System** (NAICS, pronounced “nakes”). These are six-digit codes jointly established by Canada, Mexico and the United States as a uniform classification system for statistical reporting purposes. The NAICS was introduced in 1997 to replace the Standard Industrial Classification (SIC) system. Since then the NAICS was modified in 2002, and the next major revision is scheduled for 2007. Firms with the same NAICS code are assumed to be similar. While the first five digits are standardized in the international NAICS agreement, the sixth digit, where used, serves the needs of a specific country. Thus, six-digit Canadian codes may vary from their counterparts in the U.S. and Mexico.

The first two digits in a NAICS code specify one of 20 industry sectors. For example, firms engaged in finance and insurance have NAICS codes beginning with 52. Each additional digit narrows down the industry. So, companies with NAICS codes beginning with 522 are involved in lending funds raised from depositors or by issuing debt; those with codes beginning with 5221 are engaged in lending funds raised from deposits only; NAICS codes starting with 52211 are mostly chartered banks and trust companies; and, finally, NAICS code 522111 is assigned to establishments involved in personal and small-business commercial banking. Table 3.6 is a list of 20 two-digit codes (the first two digits of the six-digit NAICS codes) and the industries they represent.

However, NAICS codes are not perfect. For example, suppose you were examining financial statements for the Hudson’s Bay Company (HBC), Canada’s oldest general merchandise retailer. In a quick scan of the nearest financial database, you might find about ten businesses with this same NAICS code, but you might not be too comfortable with some of them. Sears Canada would seem to be a reasonable peer, but Otter Farm & Home Co-operative also carries the same industry code. Are HBC and Otter Farm & Home Co-operative really comparable?

TABLE 3.6

Two-digit NAICS codes

Code	NAICS Sectors
11	Agriculture, Forestry, Fishing and Hunting
21	Mining
22	Utilities
23	Construction
31-33	Manufacturing
42	Wholesale Trade
44-45	Retail Trade
48-49	Transportation and Warehousing
51	Information
52	Finance and Insurance
53	Real Estate and Rental and Leasing
54	Professional, Scientific, and Technical Services
55	Management of Companies and Enterprises
56	Administrative and Support and Waste Management and Remediation Services
61	Education Services
62	Health Care and Social Assistance
71	Arts, Entertainment, and Recreation
72	Accommodation and Food Services
81	Other Services (except Public Administration)
92	Public Administration



WORK THE WEB

Financial ratios have become more available with the rise of the Web. One of the best sites is today.reuters.com. We went there and entered the ticker symbol “PCZ” (for Petro-Canada). Then we selected the “Ratios” link. Here is an abbreviated look at the results:

PETRO-CANADA (NYS)				
LAST	CHANGE			
40.78	▼	-0.23	(-0.56%)	4:00 PM ET
SECTOR: Energy INDUSTRY: Oil & Gas - Integrated				

Financial Strength				
Financial Strength	Company	Industry	Sector	S&P 500
Quick Ratio (MRQ)	0.76	1.04	1.17	1.22
Current Ratio (MRQ)	0.95	1.39	1.55	1.77
LT Debt to Equity (MRQ)	0.30	0.13	0.34	0.64
Total Debt to Equity (MRQ)	0.30	0.15	0.37	0.81
Interest Coverage (TTM)	24.32	37.40	19.58	14.82

Most of the information is self-explanatory. The interest coverage ratio is the same as the times interest earned ratio discussed in the text. The abbreviation MRQ refers to results from the most recent quarterly financial statements, and TTM refers to results from the previous (“trailing”) 12 months. Here’s a question for you about Petro-Canada: What does it imply when the long-term debt-equity and total debt-equity ratios are the same? The site also provides a comparison to the industry, business sector, and S&P 500 average for the ratios. Other ratios are available on the site and some have five-year averages calculated. Have a look!

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

As we discussed in this chapter, ratios are an important tool for examining a company’s performance. Gathering the necessary financial statements can be tedious and time-consuming. Fortunately, many sites on the Web provide this information for free. Our *Work the Web* box above shows how to get this information for Canadian companies traded on U.S. exchanges, along with some very useful benchmarking information. Be sure to look it over and then benchmark your favourite company.

Canada’s Business and Consumer Site includes business information for industry sectors. Go to strategis.ic.gc.ca and follow the “Business Information by Sector” link.



REALITY BYTES

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, looking back at the beginning of the chapter, investors must really think that Nortel Networks will have extraordinary growth. After all, they are willing to pay \$2,685 for every dollar the company earns, which means they must be expecting much greater earnings in the future. Of course, this PE ratio is too high to even be realistically evaluated. It was so high because Nortel's earnings for 2006 were very small. Indeed, earnings per share calculated based on net income for the preceding 12 months were only \$0.01.

Another problem that can occur with ratio analysis is negative equity. Let's look at M8 Entertainment Inc., an independent film entertainment company traded on the TSX, for example. This company, with offices in Montreal and Los Angeles, reported a loss of about \$14 million in the first half of 2006, and it had a book value of equity balance of negative \$2.3 million. If you calculate the ROE of the company, you will find it is an

enormous 609 percent, which does not make sense, given the company's losses. And the calculations for the market-to-book and PE ratios are 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 the losses for the company have been so large that it has erased all equity. In this case, the ROE, PE ratio, and market-to-book ratio are not reported because they are meaningless.

Even if a company's book equity is positive, you still have to be careful. For example, consider Maytag, which had market-to-book ratio of about 30 at the end of 2004. Since this ratio measures the value created by the company for shareholders, this would seem to be a good sign. But a closer look shows that Maytag's book value of equity per share was \$5.18 in 1999, but then dropped to \$0.28 in 2000. This drop 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.

Problems with Financial Statement Analysis

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

As we discuss in other chapters, there are many cases where financial theory and economic logic provide guidance in making judgments about value and risk. Very 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 some firms are conglomerates, such as Canadian Tire Corporation, owning several lines of business: retail, gas stations, auto service, and financial services. The consolidated financial statements for such firms don't really fit any neat industry category. More generally, the kind of peer group analysis we have been describing is going to work best when the firms are strictly in the same line of business, the industry is competitive, and there is only one way of operating.

Another problem that is becoming increasingly common is that major competitors and natural peer group members in an industry may be scattered around the globe. The oil industry is an obvious example. The problem here is that financial statements from outside

Canada do not necessarily conform to GAAP (more precisely, different countries can have different GAAPs). The existence of different standards and procedures makes it very 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, utilities engaged in hydro-electric power generation are all classified in the same group (NAICS 221111). This group is often thought to be relatively homogeneous. However, utilities generally operate as regulated monopolies, so they don't compete with each other. Many have stockholders, and many are organized as cooperatives with no stockholders. Finally, profitability is strongly affected by regulatory environment, so utilities in different locations can be very similar but show very different profits.

Several other general problems crop up frequently. 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. In comparing firms, such events can give misleading signals. Our nearby *Reality Bytes* box discusses some additional issues.

CONCEPT QUESTIONS

- 3.5a** What are some uses for financial statement analysis?
- 3.5b** What are NAICS codes and how might they be useful?
- 3.5c** Why do we say that financial statement analysis is management by exception?
- 3.5d** What are some of the problems that can come up with financial statement analysis?

KEY EQUATIONS:

I. Short-term solvency, or liquidity, ratios

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

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

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

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

$$\text{Total debt ratio} = \frac{\text{Total assets} - \text{Total equity}}{\text{Total assets}} \quad [3.4]$$

$$\text{Debt-equity ratio} = \text{Total debt}/\text{Total equity} \quad [3.5]$$

$$\text{Equity multiplier} = \text{Total assets}/\text{Total equity} \quad [3.6]$$

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

$$\text{Cash coverage ratio} = \frac{\text{EBIT} + \text{Depreciation}}{\text{Interest}} \quad [3.8]$$

III. Asset utilization, or turnover, ratios

$$\text{Inventory turnover} = \frac{\text{Cost of goods sold}}{\text{Inventory}} \quad [3.9]$$

$$\text{Day's sales in inventory} = \frac{365 \text{ days}}{\text{Inventory turnover}} \quad [3.10]$$

$$\text{Receivables turnover} = \frac{\text{Sales}}{\text{Accounts receivable}} \quad [3.11]$$

$$\text{Day's sales in receivables} = \frac{365 \text{ days}}{\text{Receivables turnover}} \quad [3.12]$$

$$\text{Total asset turnover} = \frac{\text{Sales}}{\text{Total assets}} \quad [3.13]$$

IV. Profitability ratios

$$\text{Profit margin} = \frac{\text{Net income}}{\text{Sales}} \quad [3.14]$$

Other forms of profit margin:

$$\text{Gross profit margin} = \frac{\text{Sales} - \text{COGS}}{\text{Sales}}$$

$$\text{Operating profit margin} = \frac{\text{EBIT}}{\text{Sales}}$$

$$\text{Return on assets (ROA)} = \frac{\text{Net income}}{\text{Total assets}} \quad [3.15]$$

$$\text{Return on equity (ROE)} = \frac{\text{Net income}}{\text{Total equity}} \quad [3.16]$$

V. Market value ratios

$$\text{Earnings per share (EPS)} = \frac{\text{Net income}}{\text{Shares outstanding}} \quad [3.17]$$

$$\text{Price-earnings (PE) ratio} = \frac{\text{Price per share}}{\text{Earnings per share}} \quad [3.18]$$

$$\text{Market-to-book ratio} = \frac{\text{Market value per share}}{\text{Book value per share}} \quad [3.19]$$

VI. Du Pont identity

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

$$\text{ROE} = \frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Total equity}} \quad [3.20]$$

VII. Dividend payout and earnings retention

$$\text{Dividend payout ratio} = \text{Cash dividends/Net income} \quad [3.21]$$

$$\text{Retention ratio} = \text{Addition to retained earnings/Net income} \quad [3.22]$$

VIII. Internal growth rate

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

where

$$\begin{aligned} b &= \text{Plowback (retention) ratio} \\ &= \text{Addition to retained earnings/Net income} \\ &= 1 - \text{Dividend payout ratio} \end{aligned}$$

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

IX. Sustainable growth rate

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

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.

SUMMARY AND CONCLUSIONS

This chapter has discussed aspects of financial statement analysis, including

1. Standardized financial statements. 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.
2. Ratio analysis. Evaluating ratios of accounting numbers is another way of comparing financial statement information. We therefore defined and discussed a number of the most commonly reported and used financial ratios.
3. The Du Pont Identity. We discussed the famous Du Pont identity as a way of analyzing financial performance. We have seen how the Du Pont equation lets us break down ROE into its basic three components: profit margin, total asset turnover, and financial leverage.
4. Internal and sustainable growth. We defined the internal and sustainable growth rate, and we examined the connection between profitability, financial policy, and growth.
5. Using financial statements. We described how to establish benchmarks for comparison purposes and discussed some of the potential problems that can arise.

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

CHAPTER REVIEW AND SELF-TEST PROBLEMS

3.1 Common-Size Statements. Below are the most recent financial statements for Royal Roads Corp. Prepare a common-size income statement based on this information. How do you interpret the standardized net income? What percentage of sales goes to cost of goods sold?

ROYAL ROADS CORPORATION 2007 Income Statement (\$ in millions)	
Sales	\$3,756
Cost of goods sold	2,453
Depreciation	<u>490</u>
Earnings before interest and taxes	\$ 813
Interest paid	<u>613</u>
Taxable income	\$ 200
Taxes (34%)	<u>68</u>
Net income	<u>\$ 132</u>
Dividends	\$46
Addition to retained earnings	86

ROYAL ROADS CORPORATION Balance Sheets as of December 31, 2006 and 2007 (\$ in millions)					
	2006	2007		2006	2007
Assets			Liabilities and Owners' Equity		
Current assets			Current liabilities		
Cash	\$ 120	\$ 88	Accounts payable	\$ 124	\$ 144
Accounts receivable	224	192	Notes payable	<u>1,412</u>	<u>1,039</u>
Inventory	<u>424</u>	<u>368</u>	Total	<u>\$1,536</u>	<u>\$1,183</u>
Total	<u>\$ 768</u>	<u>\$ 648</u>	Long-term debt	<u>\$1,804</u>	<u>\$2,077</u>
Fixed assets			Owners' equity		
Net plant and equipment	<u>\$5,228</u>	<u>\$5,354</u>	Common stock and paid-in surplus	\$ 300	\$ 300
Total	<u>\$5,996</u>	<u>\$6,002</u>	Retained earnings	<u>2,356</u>	<u>2,442</u>
			Total	<u>\$2,656</u>	<u>\$2,742</u>
Total assets	<u>\$5,996</u>	<u>\$6,002</u>	Total liabilities and owner's equity	<u>\$5,996</u>	<u>\$6,002</u>

3.2 Financial Ratios. Based on the balance sheets and income statement in the previous problem, calculate the following ratios for 2007:

Current ratio _____
 Quick ratio _____
 Cash ratio _____

Inventory turnover	_____
Receivables turnover	_____
Days' sales in inventory	_____
Days' sales in receivables	_____
Total debt ratio	_____
Times interest earned ratio	_____
Cash coverage ratio	_____

3.3 ROE and the Du Pont Identity. Calculate the 2007 ROE for the Royal Roads Corporation and then break down your answer into its component parts using the Du Pont identity.

3.4 Sustainable Growth. Based on the following information, what growth rate can Brock maintain if no external financing is used? What is the sustainable growth rate?

BROCK COMPANY Financial Statements					
Income Statement			Balance Sheet		
Sales	\$2,750	Current assets	\$ 600	Long-term debt	\$ 200
Cost of sales	2,400	Net fixed assets	800	Equity	1,200
Tax (34%)	119	Total	<u>\$1,400</u>	Total	<u>\$1,400</u>
Net income	<u>\$ 231</u>				
Dividends	\$ 77				

■ Answers to Chapter Review and Self-Test Problems

3.1 We've calculated the common-size income statement below. Remember that we simply divide each item by total sales.

ROYAL ROADS CORPORATION 2007 Common-Size Income Statement	
Sales	100.0%
Cost of goods sold	65.3
Depreciation	<u>13.0</u>
Earnings before interest and taxes	21.6
Interest paid	<u>16.3</u>
Taxable income	5.3
Taxes (34%)	<u>1.8</u>
Net income	<u><u>3.5%</u></u>
Dividends	1.2%
Addition to retained earnings	2.3

Net income is 3.5 percent of sales. Since this is the percentage of each sales dollar that makes its way to the bottom line, the standardized net income is the firm's profit margin. Cost of goods sold is 65.3 percent of sales.

3.2 We've calculated the ratios below based on the ending figures. If you don't remember a definition, refer to the Key Equations.

Current ratio	\$648/\$1,183	= .55 times
Quick ratio	\$280/\$1,183	= .24 times
Cash ratio	\$88/\$1,183	= .07 times
Inventory turnover	\$2,453/\$368	= 6.7 times
Receivables turnover	\$3,756/\$192	= 19.6 times
Days' sales in inventory	365/6.7	= 54.5 days
Days' sales in receivables	365/19.6	= 18.6 days
Total debt ratio	\$3,260/\$6,002	= 54.3%
Times interest earned ratio	\$813/\$613	= 1.33 times
Cash coverage ratio	\$1,303/\$613	= 2.13 times

3.3 The return on equity is the ratio of net income to total equity. For Royal Roads, this is $\$132/\$2,742 = 4.8\%$, which is not outstanding. Given the Du Pont identity, ROE can be written as:

$$\begin{aligned} \text{ROE} &= \text{Profit margin} \times \text{Total asset turnover} \times \text{Equity multiplier} \\ &= \$132/\$3,756 \times \$3,756/\$6,002 \times \$6,002/\$2,742 \\ &= 3.5\% \times .626 \times 2.19 \\ &= 4.8\% \end{aligned}$$

Notice that return on assets, ROA, is $3.5\% \times .626 = 2.2\%$.

3.4 Brock retains $b = (1 - .33) = 2/3 \approx .67$ of net income. Return on assets is $\$231/\$1,400 = 16.5\%$. The internal growth rate is:

$$\begin{aligned} \frac{\text{ROA} \times b}{1 - \text{ROA} \times b} &= \frac{.165 \times 2/3}{1 - .165 \times 2/3} \\ &= 12.36\% \end{aligned}$$

Return on equity for Brock is $\$231/\$1,200 = 19.25\%$, so we can calculate the sustainable growth rate as:

$$\begin{aligned} \frac{\text{ROE} \times b}{1 - \text{ROE} \times b} &= \frac{.1925 \times 2/3}{1 - .1925 \times 2/3} \\ &= 14.72\% \end{aligned}$$

CRITICAL THINKING AND CONCEPTS REVIEW

3.1 Current Ratio. What effect would the following actions have on a firm's current ratio? Assume that net working capital is positive.

- Inventory is purchased.
- A supplier is paid.
- A short-term bank loan is repaid.
- A long-term debt is paid off early.
- A customer pays off a credit account.
- Inventory is sold at cost.
- Inventory is sold for a profit.

- 3.2 Current Ratio and Quick Ratio.** In recent years, Wild Rose Co. has greatly increased its current ratio. At the same time, the quick ratio has fallen. What has happened? Has the liquidity of the company improved?
- 3.3 Current Ratio.** Explain what it means for a firm to have a current ratio equal to .50. Would the firm be better off if the current ratio were 1.50? What if it were 15.0? Explain your answers.
- 3.4 Financial Ratios.** Fully explain the kind of information the following financial ratios provide about a firm:
- Quick ratio
 - Cash ratio
 - Capital intensity ratio
 - Total asset turnover
 - Equity multiplier
 - Long-term debt ratio
 - Times interest earned ratio
 - Profit margin
 - Return on assets
 - Return on equity
 - Price-earnings ratio
- 3.5 Standardized Financial Statements.** What types of information do common-size financial statements reveal about the firm? What is the best use for these common-size statements?
- 3.6 Peer Group Analysis.** Explain what peer group analysis means. As a financial manager, how could you use the results of peer group analysis to evaluate the performance of your firm? How is a peer group different from an aspirant group?
- 3.7 Du Pont Identity.** Why is the Du Pont identity a valuable tool for analyzing the performance of a firm? Discuss the types of information it reveals as compared to ROE considered by itself.
- 3.8 Industry-Specific Ratios.** Specialized ratios are sometimes used in specific industries. For example, the so-called book-to-bill ratio is closely watched for semiconductor manufacturers. A ratio of .93 indicates that for every \$100 worth of chips shipped over some period, only \$93 worth of new orders were received. In November 2004, the North American semiconductor equipment industry's book-to-bill ratio was at parity, or 1.0, with orders of \$1.35 billion and billings of \$1.34 billion. The most recent peak in the book-to-bill ratio was in June 2004 when it reached 1.07. Orders for November 2004 declined 2 percent from October, but were up 46 percent from November 2003. Billings in November 2004 were down 6 percent from October but up 53 percent from November 2003. What is this ratio intended to measure? Why do you think it is so closely followed?
- 3.9 Industry-Specific Ratios.** So-called same-store sales are a very important measure for companies as diverse as Tim Hortons and Sears Canada. 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?

3.10 Industry-Specific Ratios. There are many ways of using standardized financial information beyond those discussed in this chapter. The usual goal is to put firms on an equal footing for comparison purposes. For example, for auto manufacturers, it is common to express sales, costs, and profits on a per-car basis. For each of the following industries, give an example of an actual company and discuss one or more potentially useful means of standardizing financial information:

- a. Public utilities
- b. Large retailers
- c. Airlines
- d. Online services
- e. Hospitals
- f. University textbook publishers

QUESTIONS AND PROBLEMS

Basic
(Questions 1–25)



1. **Calculating Liquidity Ratios.** Lodgepole Pine, Inc., has net working capital of \$1,100, current liabilities of \$4,180, and inventory of \$1,600. What is the current ratio? What is the quick ratio?
2. **Calculating Profitability Ratios.** Nick's Bird Cages has sales of \$43 million, total assets of \$29 million, and total debt of \$9.5 million. If the profit margin is 8 percent, what is net income? What is ROA? What is ROE?
3. **Calculating the Average Collection Period.** Bonds Lumber Yard has a current accounts receivable balance of \$527,381. Credit sales for the year just ended were \$4,386,500. What is the receivables turnover? The days' sales in receivables? How long did it take on average for credit customers to pay off their accounts during the past year?
4. **Calculating Inventory Turnover.** Windy Corporation has ending inventory of \$865,371, and cost of goods sold for the year just ended was \$4,378,650. What is the inventory turnover? The days' sales in inventory? How long on average did a unit of inventory sit on the shelf before it was sold?
5. **Calculating Leverage Ratios.** Victoria Golf, Inc., has a total debt ratio of .55. What is its debt-equity ratio? What is its equity multiplier?
6. **Calculating Market Value Ratios.** Niagara Cleaning, Inc., had additions to retained earnings for the year just ended of \$380,000. The firm paid out \$220,000 in cash dividends, and it has ending total equity of \$5.5 million. If Niagara currently has 400,000 shares of common stock outstanding, what are earnings per share? Dividends per share? What is book value per share? If the stock currently sells for \$32 per share, what is the market-to-book ratio? The price-earnings ratio?
7. **Du Pont Identity.** If Ottawa Legal has an equity multiplier of 1.70, total asset turnover of 1.45, and a profit margin of 9 percent, what is its ROE?
8. **Du Pont Identity.** Jiminy Cricket Removal has a profit margin of 11 percent, total asset turnover of 1.25, and ROE of 20.50 percent. What is this firm's debt-equity ratio?
9. **Calculating Average Payables Period.** For the past year, Miguaska, Inc., had a cost of goods sold of \$41,682. At the end of the year, the accounts payable balance was

\$8,917. How long on average did it take the company to pay off its suppliers during the year? What might a large value for this ratio imply?

- 10. Equity Multiplier and Return on Equity.** Sunny Beach Chair Company has a debt-equity ratio of .90. Return on assets is 7.9 percent, and total equity is \$520,000. What is the equity multiplier? Return on equity? Net income?
- 11. Internal Growth.** If Listen to Me, Inc., has a 12 percent ROA and a 25 percent payout ratio, what is its internal growth rate?
- 12. Sustainable Growth.** If the Crash Davis Driving School has a 18.5 percent ROE and a 35 percent payout ratio, what is its sustainable growth rate?
- 13. Sustainable Growth.** Based on the following information, calculate the sustainable growth rate for Maple Syrup Pies:

Profit margin = 8.7%

Capital intensity ratio = .60

Debt-equity ratio = .40

Net income = \$40,000

Dividends = \$9,000

What is the ROE here?

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

Total asset turnover = 1.80

Profit margin = 7.2%

Equity multiplier = 2.15

Payout ratio = 30%

Alberta Mining Company reports the following balance sheet information for 2006 and 2007. Use this information to work Problems 15 through 17.



ALBERTA MINING COMPANY					
Balance Sheets as of December 31, 2006 and 2007					
	2006	2007		2006	2007
Assets			Liabilities and Owners' Equity		
Current assets			Current liabilities		
Cash	\$ 19,250	\$ 21,386	Accounts payable	\$157,832	\$141,368
Accounts receivable	46,381	49,327	Notes payable	72,891	99,543
Inventory	<u>109,831</u>	<u>119,834</u>	Total	<u>\$230,723</u>	<u>\$240,911</u>
Total	<u>\$175,462</u>	<u>\$190,547</u>	Long-term debt	\$200,000	\$250,000
Fixed Assets			Owners' equity		
Net plant and equipment	<u>\$612,832</u>	<u>\$702,683</u>	Common stock and paid-in surplus	\$175,000	\$175,000
			Retained earnings	182,571	227,319
			Total	<u>\$357,571</u>	<u>\$402,319</u>
Total assets	<u>\$788,294</u>	<u>\$893,230</u>	Total liabilities and owners' equity	<u>\$788,294</u>	<u>\$893,230</u>



15. Preparing Standardized Financial Statements. Prepare the 2006 and 2007 common-size balance sheets for Alberta Mining.



16. Calculating Financial Ratios. Based on the balance sheets given for Alberta Mining, calculate the following financial ratios for each year:

- Current ratio
- Quick ratio
- Cash ratio
- Debt-equity ratio and equity multiplier
- Total debt ratio

17. Du Pont Identity. Suppose that the Alberta Mining Company had sales of \$1,728,347 and net income of \$148,320 for the year ending December 31, 2007. Calculate the Du Pont identity.

18. Du Pont Identity. The White Spruce Company has an ROA of 10 percent, a 7 percent profit margin, and an ROE of 18 percent. What is the company's total asset turnover? What is the equity multiplier?

19. Return on Assets. Gros Morne has a profit margin of 8 percent on sales of \$23,000,000. If the firm has debt of \$9,500,000 and total assets of \$24,000,000, what is the firm's ROA?

20. Calculating Internal Growth. The most recent financial statements for Kayak Manufacturing Co. are shown below:

Income Statement		Balance Sheet			
Sales	\$32,540	Current assets	\$18,000	Debt	\$28,200
Costs	<u>10,680</u>	Fixed assets	<u>54,500</u>	Equity	<u>44,300</u>
Taxable income	\$21,860	Total	<u>\$72,500</u>	Total	<u>\$72,500</u>
Tax (35%)	<u>7,651</u>				
Net Income	<u>\$14,209</u>				

Assets and costs are proportional to sales. Debt and equity are not. The company maintains a constant 40 percent dividend payout ratio. No external financing is possible. What is the internal growth rate?

21. Calculating Sustainable Growth. For Kayak Manufacturing in Problem 20, what is the sustainable growth rate?

22. Total Asset Turnover. Kaleb's Karate Supply had a profit margin of 10 percent, sales of \$14 million, and total assets of \$6 million. What was total asset turnover? If management set a goal of increasing total asset turnover to 2.75 times, what would the new sales figure need to be, assuming no increase in total assets?

23. Return on Equity. Taylor's Cleaning Service has a total debt ratio of .60, total debt of \$165,000, and net income of \$15,250. What is Taylor's return on equity?

24. Market Value Ratios. Lemon Lymon, Inc., has a current stock price of \$65. For the past year the company had net income of \$7,400,000, total equity of \$32,450,000, and 3.6 million shares of stock outstanding. What is the earnings per share (EPS)? Price-earnings ratio? Book value per share? Market-to-book ratio?

- 25. Profit Margin.** Donna's Donuts has total assets of \$9,500,000 and a total asset turnover of 2.85 times. If the return on assets is 12 percent, what is Donna's profit margin?
- 26. Using the Du Pont Identity.** Y3K, Inc., has sales of \$8,750, total assets of \$2,680, and a debt-equity ratio of .75. If its return on equity is 15 percent, what is its net income?
- 27. Ratios and Fixed Assets.** The Hooya Company has a long-term debt ratio (i.e., the ratio of long-term debt to long-term debt plus equity) of 0.70 and a current ratio of 1.3. Current liabilities are \$750, sales are \$3,920, profit margin is 9 percent, and ROE is 18.5 percent. What is the amount of the firm's net fixed assets?
- 28. Profit Margin.** In response to complaints about high prices, a grocery chain runs the following advertising campaign: "If you pay your child 50 cents to go buy \$25 worth of groceries, then your child makes twice as much on the trip as we do." You've collected the following information from the grocery chain's financial statements:

(millions)	
Sales	\$520.0
Net income	5.2
Total assets	110.0
Total debt	71.5

Evaluate the grocery chain's claim. What is the basis for the statement? Is this claim misleading? Why or why not?

- 29. Using the Du Pont Identity.** The Concordia Company has net income of \$147,650. There are currently 32.80 days' sales in receivables. Total assets are \$980,000, total receivables are \$138,600, and the debt-equity ratio is .80. What is Concordia's profit margin? Its total asset turnover? Its ROE?
- 30. Calculating the Cash Coverage Ratio.** Delectable Turnip Inc.'s net income for the most recent year was \$8,430. The tax rate was 34 percent. The firm paid \$2,180 in total interest expense and deducted \$2,683 in depreciation expense. What was Delectable Turnip's cash coverage ratio for the year?
- 31. Calculating the Times Interest Earned Ratio.** For the most recent year, Wanda's Candles, Inc., had sales of \$425,000, cost of goods sold of \$104,000, depreciation expense of \$51,000, and additions to retained earnings of \$63,750. The firm currently has 20,000 shares of common stock outstanding, and the previous year's dividends per share were \$1.80. Assuming a 34 percent income tax rate, what was the times interest earned ratio?
- 32. Return on Assets.** A fire has destroyed a large percentage of the financial records of the Puffin Company. You have the task of piecing together information in order to release a financial report. You have found the return on equity to be 17 percent. Sales were \$1,950,000, the total debt ratio was .60, and total debt was \$750,000. What is the return on assets (ROA)?

Intermediate
(Questions 26–43)



33. Ratios and Foreign Companies. King Albert Carpet PLC had a 2006 net loss of £14,537 on sales of £176,460 (both in thousands of pounds). What was the company's profit margin? Does the fact that these figures are quoted in a foreign currency make any difference? Why? In dollars, sales were \$317,628. What was the net loss in dollars?

Some recent financial statements for Blue Jay Golf, Inc., follow. Use this information to work Problems 34 through 37.

BLUE JAY GOLF, INC.					
Balance Sheets as of December 31, 2006 and 2007					
	2006	2007		2006	2007
Assets			Liabilities and Owners' Equity		
Current assets			Current liabilities		
Cash	\$ 2,612	\$ 2,783	Accounts payable	\$ 1,975	\$ 2,190
Accounts receivable	3,108	3,780	Notes payable	1,386	1,438
Inventory	<u>9,840</u>	<u>10,970</u>	Other	<u>80</u>	<u>179</u>
Total	\$15,560	\$17,533	Total	\$ 3,441	\$ 3,807
Fixed Assets			Long-term debt	<u>12,510</u>	<u>13,840</u>
Net plant and equipment	<u>29,650</u>	<u>41,323</u>	Owners' equity		
			Common stock and paid-in surplus	\$25,000	\$25,000
			Retained earnings	<u>4,259</u>	<u>16,209</u>
			Total	\$29,259	\$41,209
Total assets	<u>\$45,210</u>	<u>\$58,856</u>	Total	<u>\$45,210</u>	<u>\$58,856</u>

BLUE JAY GOLF, INC.	
2007 Income Statement	
Sales	\$87,480
Cost of goods sold	56,820
Depreciation	<u>3,217</u>
Earnings before interest and taxes	\$27,443
Interest paid	<u>2,064</u>
Taxable income	\$25,379
Taxes (34%)	<u>8,629</u>
Net income	<u>\$16,750</u>
Dividends	\$ 4,800
Addition to retained earnings	11,950

34. Calculating Financial Ratios. Find the following financial ratios for Blue Jay Golf (use year-end figures rather than average values where appropriate):

Short-term solvency ratios

- a. Current ratio _____
- b. Quick ratio _____
- c. Cash ratio _____

Asset utilization ratios

- d. Total asset turnover _____
- e. Inventory turnover _____
- f. Receivables turnover _____

Long-term solvency ratios

- g. Total debt ratio _____
- h. Debt-equity ratio _____
- i. Equity multiplier _____
- j. Times interest earned ratio _____
- k. Cash coverage ratio _____

Profitability ratios

- l. Profit margin _____
- m. Return on assets _____
- n. Return on equity _____

- 35. Du Pont Identity.** Construct the Du Pont identity for Blue Jay Golf.
- 36. Market Value Ratios.** Blue Jay Golf has 10,000 shares of common stock outstanding, and the market price for a share of stock at the end of 2007 was \$24. What is the price-earnings ratio? What are the dividends per share? What is the market-to-book ratio at the end of 2007?
- 37. Interpreting Financial Ratios.** After calculating the ratios for Blue Jay Golf, you have uncovered the following industry ratios for 2007:

	Lowest Quartile	Median	Highest Quartile
Current ratio	1.2	2.4	4.7
Total asset turnover	1.5	2.6	3.8
Debt-equity ratio	.25	.40	.60
Profit margin	8.4%	11.9%	16.3%

How is Blue Jay Golf performing based on these ratios?

- 38. Growth and Profit Margin.** Mackenzie Manufacturing wishes to maintain a growth rate of 7 percent a year, a debt-equity ratio of .60, and a dividend payout ratio of 35 percent. The ratio of total assets to sales is constant at 1.40. What profit margin must the firm achieve?
- 39. Market Value Ratios.** Nelson and St. Lawrence had the following numbers (in millions) for 2007. Calculate the earnings per share, market-to-book ratio, and price-earnings ratio for each company.

	Nelson	St. Lawrence
Net income	\$216.38	\$ 63.28
Shares outstanding	92.78	70.63
Stock price	50.12	22.16
Total equity	669.33	926.74

- 40. Growth and Assets.** A firm wishes to maintain an internal growth rate of 5 percent and a dividend payout ratio of 60 percent. The current profit margin is 9 percent and the firm uses no external financing sources. What must total asset turnover be?
- 41. Sustainable Growth.** Based on the following information, calculate the sustainable growth rate for Santana, Inc.:
- Profit margin = 7.5%
 Total asset turnover = 1.25
 Total debt ratio = .40
 Payout ratio = 30%
- What is the ROA here?

- 42. Sustainable Growth and Outside Financing.** You've collected the following information about Fox, Inc.:

Sales = \$125,000
 Net income = \$8,000
 Dividends = \$3,400
 Total debt = \$49,000
 Total equity = \$33,000

What is the sustainable growth rate for Fox, Inc.? If it does grow at this rate, how much new borrowing will take place in the coming year, assuming a constant debt-equity ratio? What growth rate could be supported with no outside financing at all?

- 43. Constraints on Growth.** Bridal Gear, Inc., wishes to maintain a growth rate of 13 percent per year and a debt-equity ratio of .25. The profit margin is 7 percent, and total asset turnover is constant at 1.10. Is this growth rate possible? To answer, determine what the dividend payout ratio must be. How do you interpret the result?

Challenge
(Questions 44–46)

- 44. Internal and Sustainable Growth Rates** Best Buy reported the following numbers (in millions) for the years ending February 2004 and 2005. What are the internal and sustainable growth rates? What are the internal and sustainable growth rates using $ROE \times b$ ($ROA \times b$) and the end of period equity (assets)? What are the growth rates if you use the beginning of period equity in this equation? Why aren't the growth rates the same? What is your best estimate of the internal and sustainable growth rates?

	2004	2005
Net income		\$984.00
Dividends		99.08
Total assets	\$8,652	10,294
Total equity	3,422	4,449

- 45. Expanded Du Pont Identity.** Canadian Tire Corp. reported the following income statement and balance sheet (in millions) for 2005. Construct the expanded Du Pont identity similar to Figure 3.1. What is the company's return on equity?

FINANCIAL STATEMENTS FOR CANADIAN TIRE					
For the year ended December 31, 2005					
(All numbers are in millions)					
Income Statement			Balance Sheet		
Sales	\$7,775	Current assets		Current liabilities	
CoGS	6,978	Cash	\$ 838	Accounts payable	\$1,546
Depreciation	<u>185</u>	Accounts receivable	1,467	Other	<u>275</u>
EBIT	\$ 612	Inventory	<u>676</u>		
Interest	<u>92</u>	Total	\$2,981	Total	\$1,821
EBT	\$ 520	Fixed assets	<u>\$2,975</u>	Total long-term debt	\$1,624
Taxes	<u>190</u>	Total assets	<u>\$5,956</u>	Total equity	<u>\$2,511</u>
Net income	<u>\$ 330</u>			Total liabilities and equity	<u>\$5,956</u>

46. Financial Ratios. The McMaster Corporation has depreciation expenses of \$300,000, fixed assets of \$2,500,000, and equity of \$5,400,000. Given the following ratios, fill in the missing entries.

Current ratio	3.2
Quick ratio	1.4
Cash ratio	1.2
Times interest earned ratio	6
Inventory turnover	1.92
Days' sales in receivables	20 days
Total asset turnover	1
Profit margin	0.08
Return on equity (ROE)	0.15

Income Statement		Balance Sheet			
Sales	\$ _____	Current assets		Current liabilities	\$ _____
CoGS	_____	Cash	\$ _____		
Depreciation	300,000	Accounts receivable	_____		
EBIT	\$ _____	Inventory	_____		
Interest	_____	Total	\$ _____	Total	\$ _____
EBT	\$ _____	Fixed assets	\$2,500,000	Total long-term debt	_____
Taxes	_____	Total assets	\$ _____	Total equity	\$5,400,000
Net income	\$ _____			Total liabilities and equity	\$ _____

WHAT'S ON THE WEB?



3.1 Standardized Financial Statements. Go to the “Investor Centre” link for Suncor Energy located at www.suncor.ca, and follow the “Financial Reports” link. You should find the annual reports with consolidated income statements and balance

sheets at this link. Using this information, prepare the common-size income statements and balance sheets for the two most recent years.

- 3.2 Ratio Analysis.** You want to examine the financial ratios for TransCanada Corporation. Go to today.reuters.com and type in the ticker symbol for the company (TRP). Next, go to the “Ratios” link. You should find financial ratios for TransCanada and the industry, sector, and S&P 500 averages for each ratio.
- What do TTM and MRQ mean?
 - How do TransCanada’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 TransCanada: the industry, sector, or S&P 500 averages? Why?
 - In what areas does TransCanada seem to outperform its competitors based on the financial ratios? Where does TransCanada seem to lag behind its competitors?
- 3.3 Asset Utilization Ratios.** Find the most recent financial statements for two companies headquartered in Quebec: Hart Stores, general merchandise retailer, at www.hartstores.com and Bombardier, aircraft and train manufacturer, at www.bombardier.com. Calculate the asset utilization ratio for these two companies. What does this ratio measure? Is the ratio similar for both companies? Why or why not?
- 3.4 Du Pont Identity.** You can find financial reports for Shaw Communications Inc. on the “Investor Relations” link at Shaw Communications’ home page, www.shaw.ca. For the three most recent years, calculate the Du Pont identity for Shaw Communications. How has ROE changed over this period? How have

MINI-CASE

RATIOS AND FINANCIAL PLANNING
AT CANADIAN AIR, INC.

Chris Guthrie was recently hired by Canadian Air, Inc., to assist the company with its financial planning, and to evaluate the company's performance. Chris graduated from college five years ago with a finance degree. He has been employed in the finance department of a FP500 company since then.

Canadian Air was founded 10 years ago by friends Mark Sexton and Todd Story. The company has manufactured and sold light airplanes over this period, and the company's products have received high reviews for safety and reliability. The company has a niche market in that it sells primarily to individuals who own and fly their own airplanes. The company has two models, the Birdie, which sells for \$53,000, and the Eagle, which sells for \$78,000.

While the company manufactures aircraft, its operations are different from commercial aircraft companies. Canadian Air builds aircraft to order. By using prefabricated parts, the company is able to complete the manufacture of an airplane in only five weeks. The company also receives a deposit on each order, as well as another partial payment before the order is

complete. In contrast, a commercial airplane may take one-and-one-half to two years to manufacture once the order is placed.

Mark and Todd have provided the following financial statements. Chris has gathered the industry ratios for the light airplane manufacturing industry.

Canadian Air, Inc.
2007 Income Statement

Sales	\$12,870,000
Cost of goods sold	9,070,000
Other expenses	1,538,000
Depreciation	<u>420,000</u>
EBIT	\$ 1,842,000
Interest	<u>231,500</u>
Taxable income	\$ 1,610,500
Taxes (40%)	<u>644,200</u>
Net income	<u>\$ 966,300</u>
Dividends	\$289,890
Add. to retained earnings	676,410

Canadian Air, Inc.
2007 Balance Sheet

Assets		Liabilities & Equity	
Current assets		Current liabilities	
Cash	\$ 234,000	Accounts payable	\$ 497,000
Accounts receivable	421,000	Notes payable	<u>1,006,000</u>
Inventory	<u>472,000</u>	Total current liabilities	<u>\$1,503,000</u>
Total current assets	<u>\$1,127,000</u>		
Fixed assets		Long-term debt	
Net plant and equipment	<u>\$7,228,000</u>	Shareholder equity	
		Common stock	\$ 100,000
		Retained earnings	<u>4,157,000</u>
		Total equity	<u>\$4,257,000</u>
Total assets	<u>\$8,355,000</u>	Total liabilities & equity	<u>\$8,355,000</u>

Light Airplane Industry Ratios			
	Lower Quartile	Median	Upper Quartile
Current ratio	0.50	1.43	1.89
Quick ratio	0.21	0.38	0.62
Cash ratio	0.08	0.21	0.39
Total asset turnover	0.68	0.85	1.38
Inventory turnover	4.89	6.15	10.89
Receivables turnover	6.27	9.82	14.11
Total debt ratio	0.44	0.52	0.61
Debt-equity ratio	0.79	1.08	1.56
Equity multiplier	1.79	2.08	2.56
Times interest earned	5.18	8.06	9.83
Cash coverage ratio	5.84	8.43	10.27
Profit margin	4.05%	6.98%	9.87%
Return on assets	6.05%	10.53%	13.21%
Return on equity	9.93%	16.54%	26.15%

QUESTIONS

- Calculate the following ratios for Canadian Air: current ratio, quick ratio, cash ratio, total asset turnover, inventory turnover, receivables turnover, total debt ratio, debt-equity ratio, equity multiplier, times interest earned, cash coverage ratio, profit margin, return on assets, and return on equity.
- Mark and Todd agree that a ratio analysis can provide a measure of the company's performance. They have chosen Boeing as an aspirant company. Would you choose Boeing as an aspirant company? Why or why not?
- Compare the performance of Canadian Air to the industry. 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 by inventory divided by current liabilities. How do you think Canadian Air's ratio would compare to the industry average?
- Calculate the internal growth rate and sustainable growth rate for Canadian Air. What do these numbers mean?