CHAPTER 4

Financial Statement Analysis Tools

After studying this chapter, you should be able to:

1. Describe the purpose of financial ratios and who uses them.
2. Define the five major categories of ratios (liquidity, efficiency, leverage, coverage, and profitability).
3. Calculate the common ratios for any firm by using income statement and balance sheet data.
4. Use financial ratios to assess a firm’s past performance, identify its current problems, and suggest strategies for dealing with these problems.
5. Calculate the economic profit earned by a firm.

In previous chapters we have seen how the firm’s basic financial statements are constructed. In this chapter we will see how financial analysts can use the information contained in the income statement and balance sheet for various purposes.

Many tools are available for use when evaluating a company, but some of the most valuable are financial ratios. Ratios are an analyst’s microscope; they allow us to get a better view of the firm’s financial health than just looking at the raw financial statements. A ratio is simply a comparison of two numbers by division. We could also compare numbers by subtraction, but a ratio is superior in most cases because it is a measure of relative size. Relative measures
are more easily compared to previous time periods or other firms than changes in dollar amounts.

Ratios are useful to both internal and external analysts of the firm. For internal purposes, ratios can be useful in planning for the future, setting goals, and evaluating the performance of managers. External analysts use ratios to decide whether or not to grant credit, to monitor financial performance, to forecast financial performance, and to decide whether to invest in the company.

We will look at many different ratios, but you should be aware that these are, of necessity, only a sampling of the ratios that might be useful. Furthermore, different analysts may calculate ratios slightly differently, so you will need to know exactly how the ratios are calculated in a given situation. The keys to understanding ratio analysis are experience and an analytical mind.

We will divide our discussion of the ratios into five categories based on the information provided:

1. **Liquidity ratios** describe the ability of a firm to meet its short-term obligations. They compare current assets to current liabilities.
2. **Efficiency ratios** describe how well the firm is using its investment in various types of assets to produce sales. They may also be called asset management ratios.
3. **Leverage ratios** reveal the degree to which debt has been used to finance the firm’s asset purchases. These ratios are also known as debt management ratios.
4. **Coverage ratios** are similar to liquidity ratios in that they describe the ability of a firm to pay certain expenses.
5. **Profitability ratios** provide indications of how profitable a firm has been over a period of time.

Before we begin the discussion of individual financial ratios, open your Elvis Products International workbook from Chapter 2 and add a new worksheet named “Ratios.”

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**Liquidity Ratios**

The term “liquidity” refers to the speed with which an asset can be converted into cash without large discounts to its value. Some assets, such as accounts receivable, can easily be converted into cash with only small discounts. Other assets, such as buildings, can be converted into cash very quickly only if large price concessions are given. We therefore say that accounts receivable are more liquid than buildings.
All other things being equal, a firm with more liquid assets will be more able to meet its maturing obligations (e.g., its accounts payable and other short-term debts) than a firm with fewer liquid assets. As you might imagine, creditors are particularly concerned with a firm’s ability to pay its bills. To assess this ability, it is common to use the current ratio and/or the quick ratio.

**The Current Ratio**

Generally, a firm’s current assets are converted to cash (e.g., collecting on accounts receivable or selling its inventories) and this cash is used to retire its current liabilities. Therefore, it is logical to assess a firm’s ability to pay its bills by comparing the size of its current assets to the size of its current liabilities. The current ratio does exactly this. It is defined as:

\[
\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}
\]  

(4-1)

Obviously, the higher the current ratio, the higher the likelihood that a firm will be able to pay its bills. So, from the creditor’s point of view, higher is better. However, from a shareholder’s point of view this is not always the case. Current assets usually have a lower expected return than do fixed assets, so the shareholders would like to see that only the minimum amount of the company’s capital is invested in current assets. Of course, too little investment in current assets could be disastrous for both creditors and owners of the firm.

We can calculate the current ratio for 2011 for EPI by looking at the balance sheet (Exhibit 2-2, page 51). In this case, we have:

\[
\text{Current Ratio} = \frac{1,290.00}{540.20} = 2.39 \text{ times}
\]

meaning that EPI has 2.39 times as many current assets as current liabilities. We will determine later whether this is sufficient or not.

Exhibit 4-1 shows the beginnings of our “Ratios” worksheet. Enter the labels as shown. We can calculate the current ratio for 2011 in B5 with the formula: = 'Balance Sheet'!B8/ 'Balance Sheet'!B17. After formatting to show two decimal places, you will see that the current ratio is 2.39. Copy the formula to C5.
Notice that we have applied a custom number format (see page 51 to refresh your memory) to the result in B5. In this case, the custom format is 0.00"x". Any text that you include in quotes will be shown along with the number. However, the presence of the text in the display does not affect the fact that it is still a number and may be used for calculations. As an experiment, in B6 enter the formula: =B5*2. The result will be 4.78 just as if we had not applied the custom format. Now, in B7 type: 2.39x and then copy the formula from B6 to B8. You will get a #VALUE error because the value in B7 is a text string, not a number. This is one of the great advantages to custom number formatting: We can have both text and numbers in a cell and still use the number for calculations. Delete B6:B8 so that we can use the cells in the next section.

The Quick Ratio

Inventories are often the least liquid of the firm’s current assets.\(^1\) For this reason, many believe that a better measure of liquidity can be obtained by excluding inventories. The result is known as the quick ratio (sometimes called the acid-test ratio) and is calculated as:

\[
\text{Quick Ratio} = \frac{\text{Current Assets} - \text{Inventories}}{\text{Current Liabilities}}
\]

For EPI in 2011 the quick ratio is:

\[
\text{Quick Ratio} = \frac{1,290.00 - 836.00}{540.20} = 0.84 \text{ times}
\]

Notice that the quick ratio will always be less than the current ratio. This is by design. However, a quick ratio that is too low relative to the current ratio may indicate that

\(^1\) That is why you so often see 50% off sales when firms are going out of business.
Efficiency ratios, also called asset management ratios, provide information about how well the company is using its assets to generate sales. For example, if two firms have the same level of sales, but one has a lower investment in inventories, we would say that the firm with lower inventories is more efficient with respect to its inventory management.

There are many different types of efficiency ratios that could be defined. However, we will illustrate five of the most common.

**Inventory Turnover Ratio**

The inventory turnover ratio measures the number of dollars of sales that are generated per dollar of inventory. It can also be interpreted as the number of times that a firm replaces its inventories during a year. It is calculated as:

\[
\text{Inventory Turnover Ratio} = \frac{\text{Cost of Goods Sold}}{\text{Inventory}}
\] (4-3)

Note that it is also common to use sales in the numerator. Because the only difference between sales and cost of goods sold is a markup (i.e., profit margin), this causes no problems. In addition, you will frequently see the average level of inventories throughout the year in the denominator. Whenever using ratios, you need to be aware of the method of calculation to be sure that you are comparing “apples to apples.”

For 2011, EPI’s inventory turnover ratio was:

\[
\text{Inventory Turnover Ratio} = \frac{3,250.00}{836.00} = 3.89 \text{ times}
\]

meaning that EPI replaced its inventories about 3.89 times during the year. Alternatively, we could say that EPI generated $3.89 in sales for each dollar invested in inventories. Both interpretations are valid, though the latter is probably more generally useful.
To calculate the inventory turnover ratio for EPI, enter the formula: =\text{Income Statement}!B6/\text{Balance Sheet}!B7 into B8 and copy this formula to C8. Notice that this ratio has deteriorated somewhat from 4 times in 2010 to 3.89 times in 2011. Generally, high inventory turnover is considered to be good because it means that the opportunity costs of holding inventory are low, but if it is too high the firm may be risking inventory outages and the loss of customers.

**Accounts Receivable Turnover Ratio**

Businesses grant credit to customers for one main reason: to increase sales. It is important, therefore, to know how well the firm is managing its accounts receivable. The accounts receivable turnover ratio (and the average collection period) provides us with this information. It is calculated by:

\[
\text{Accounts Receivable Turnover Ratio} = \frac{\text{Credit Sales}}{\text{Accounts Receivable}} \tag{4-4}
\]

For EPI, the 2011 accounts receivable turnover ratio is (assuming that all sales are credit sales):

\[
\text{Accounts Receivable Turnover Ratio} = \frac{3,850.00}{402.00} = 9.58 \text{ times}
\]

So each dollar invested in accounts receivable generated $9.58 in sales. In cell B9 of your worksheet, enter: =\text{Income Statement}!B5/\text{Balance Sheet}!B6. The result is 9.58, which is the same as we found above. Copy this formula to C9 to get the 2010 accounts receivable turnover ratio.

Whether or not 9.58 is a good accounts receivable turnover ratio is difficult to know at this point. We can say that higher is generally better, but too high might indicate that the firm is denying credit to creditworthy customers (thereby losing sales). If the ratio is too low, it would suggest that the firm might be having difficulty collecting on its sales. We would have to see if the growth rate in accounts receivable exceeds the growth rate in sales to determine whether the firm is having difficulty in this area.

**Average Collection Period**

The average collection period (also known as days sales outstanding, or DSO) tells us how many days, on average, it takes to collect on a credit sale. It is calculated as follows:

\[
\text{Average Collection Period} = \frac{\text{Accounts Receivable}}{\text{Credit Sales}/360} \tag{4-5}
\]
Note that the denominator is simply credit sales per day.\(^2\) In 2011, it took EPI an average of 37.59 days to collect on their credit sales:

\[
\text{Average Collection Period} = \frac{402.00}{3,850.00/360} = 37.59 \text{ days}
\]

We can calculate the 2011 average collection period in B10 with the formula: ="Balance Sheet"!B6/("Income Statement"!B5/360). Copy this to C10 to find that in 2010 the average collection period was 36.84 days, which was slightly better than in 2011.

Note that this ratio actually provides us with the same information as the accounts receivable turnover ratio. In fact, it can easily be demonstrated by simple algebraic manipulation:

\[
\text{Accounts Receivable Turnover Ratio} = \frac{360}{\text{Average Collection Period}}
\]

Or alternatively:

\[
\text{Average Collection Period} = \frac{360}{\text{Accounts Receivable Turnover Ratio}}
\]

Because the average collection period is (in a sense) the inverse of the accounts receivable turnover ratio, it should be apparent that the inverse criteria apply to judging this ratio. In other words, lower is usually better, but too low may indicate lost sales.

Many firms offer a discount for fast payment in order to get customers to pay more quickly. For example, the credit terms on an invoice might specify 2/10n30, which means that there is a 2% discount for paying within 10 days otherwise the entire balance is due in 30 days. Such a discount is very attractive for customers, but whether it makes sense for a particular firm is for them to decide. Remember that accounts receivable represents short-term loans made to customers, and those funds have an opportunity cost. Regardless, offering a discount will almost certainly reduce the average collection period and increase the accounts receivable turnover.

**Fixed Asset Turnover Ratio**

The fixed asset turnover ratio describes the dollar amount of sales that are generated by each dollar invested in fixed assets. It is given by:

\[
\text{Fixed Asset Turnover Ratio} = \frac{\text{Sales}}{\text{Average Fixed Assets}}
\]

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\(^2\) The use of a 360-day year dates back to the days before computers. It was derived by assuming that there are 12 months, each with 30 days (known as a “Banker’s Year”). You may also use 365 days; the difference is irrelevant as long as you are consistent.
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For EPI, the 2011 fixed asset turnover is:

\[
\text{Fixed Asset Turnover} = \frac{\text{Sales}}{\text{Net Fixed Assets}} \tag{4-6}
\]

For EPI, the 2011 fixed asset turnover is:

\[
\text{Fixed Asset Turnover} = \frac{3,850.00}{360.80} = 10.67 \text{ times}
\]

So, EPI generated $10.67 in revenue for each dollar invested in fixed assets. In your “Ratios” worksheet, entering: ='Income Statement'!B5/'Balance Sheet'!B11 into B11 will confirm that the fixed asset turnover was 10.67 times in 2011. Again, copy this formula to C11 to get the 2010 ratio.

**Total Asset Turnover Ratio**

Like the other ratios discussed in this section, the total asset turnover ratio describes how efficiently the firm is using all of its assets to generate sales. In this case, we look at the firm’s total asset investment:

\[
\text{Total Asset Turnover} = \frac{\text{Sales}}{\text{Total Assets}} \tag{4-7}
\]

In 2011, EPI generated $2.33 in sales for each dollar invested in total assets:

\[
\text{Total Asset Turnover} = \frac{3,850.00}{1,650.80} = 2.33 \text{ times}
\]

This ratio can be calculated in B12 on your worksheet with: ='Income Statement'!B5/'Balance Sheet'!B12. After copying this formula to C12, you should see that the 2010 value was 2.34, essentially the same as 2011.

We can interpret the asset turnover ratios as follows: Higher turnover ratios indicate more efficient usage of the assets and are therefore preferred to lower ratios. However, you should be aware that some industries will naturally have lower turnover ratios than others. For example, a consulting business will almost surely have a very small investment in fixed assets and therefore a high fixed asset turnover ratio. On the other hand, an electric utility will have a large investment in fixed assets and a low fixed asset turnover ratio. This does not mean, necessarily, that the utility company is more poorly managed than the consulting firm. Rather, each is simply responding to the demands of their very different industries.
At this point, your worksheet should resemble the one in Exhibit 4-2. Notice that we have applied the custom format, discussed above, to most of these ratios. In B10 and C10, however, we used the custom format \(0.00'' \text{days}''\) because the average collection period is measured in days.

**Leverage Ratios**

In physics, leverage refers to a multiplication of force. Using a lever and fulcrum, you can press down on one end of a lever with a given force and get a larger force at the other end. The amount of leverage depends on the length of the lever and the position of the fulcrum. In finance, leverage refers to a multiplication of changes in profitability measures. For example, a 10% increase in sales might lead to a 20% increase in net income. The amount of leverage depends on the amount of debt that a firm uses to finance its operations, so a firm that uses a lot of debt is said to be “highly leveraged.”

Leverage ratios describe the degree to which the firm uses debt in its capital structure. This is important information for creditors and investors in the firm. Creditors might be concerned that a firm has too much debt and will therefore have difficulty in repaying loans. Investors might be concerned because a large amount of debt can lead to a large amount of volatility in the firm’s earnings. However, most firms use some debt. This is because the tax

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3. As we will see in Chapter 6, this would mean that the degree of combined leverage is 2.
deductibility of interest can increase the wealth of the firm’s shareholders. We will examine several ratios that help to determine the amount of debt that a firm is using. How much is too much depends on the nature of the business.

**The Total Debt Ratio**

The total debt ratio measures the total amount of debt (long-term and short-term) that the firm uses to finance its assets:

\[ \text{Total Debt Ratio} = \frac{\text{Total Liabilities}}{\text{Total Assets}} = \frac{\text{Total Assets} - \text{Total Equity}}{\text{Total Assets}} \]  

(4-8)

Calculating the total debt ratio for EPI, we find that debt financing makes up about 58.45% of the firm’s capital structure:

\[
\text{Total Debt Ratio} = \frac{964.81}{1,650.80} = 58.45\%
\]

The formula to calculate the total debt ratio in B14 is: = 'Balance Sheet'!B19/ 'Balance Sheet'!B12. The result for 2011 is 58.45%, which is higher than the 54.81% in 2010.

**The Long-Term Debt Ratio**

Many analysts believe that it is more useful to focus on just the long-term debt (LTD) instead of total debt. The long-term debt ratio is the same as the total debt ratio, except that the numerator includes only long-term debt:

\[ \text{Long-Term Debt Ratio} = \frac{\text{Long-Term Debt}}{\text{Total Assets}} \]  

(4-9)

EPI’s long-term debt ratio is:

\[
\text{Long-Term Debt Ratio} = \frac{424.61}{1,650.80} = 25.72\%
\]

In B15, the formula to calculate the long-term debt ratio for 2011 is: = 'Balance Sheet'!B18/ 'Balance Sheet'!B12. Copying this formula to C15 reveals that in 2010 the ratio was only 22.02%. Obviously, EPI has increased its long-term debt at a faster rate than it has added assets.
The Long-Term Debt to Total Capitalization Ratio

Similar to the previous two ratios, the long-term debt to total capitalization ratio tells us the percentage of long-term sources of capital that is provided by long-term debt (LTD). It is calculated by:

\[
\text{LTD to Total Capitalization} = \frac{\text{LTD}}{\text{LTD} + \text{Preferred Equity} + \text{Common Equity}} \tag{4-10}
\]

For EPI, we have:

\[
\text{LTD to Total Capitalization} = \frac{424.61}{424.61 + 685.99} = 38.23\% 
\]

Because EPI has no preferred equity, its total long-term debt and common equity. Note that common equity is the total of common stock and retained earnings. We can calculate this ratio in B16 of the worksheet with: ="Balance Sheet"!B18/("Balance Sheet"!B18+"Balance Sheet"!B22). In 2010 this ratio was only 32.76%.

The Debt to Equity Ratio

The debt to equity ratio provides exactly the same information as the total debt ratio, but in a slightly different form that some analysts prefer:

\[
\text{Debt to Equity} = \frac{\text{Total Debt}}{\text{Total Equity}} \tag{4-11}
\]

For EPI, the debt to equity ratio is:

\[
\text{Debt to Equity} = \frac{964.81}{685.99} = 1.41 \text{ times}
\]

In B17, this is calculated as: ="Balance Sheet"!B19/"Balance Sheet"!B22. Copy this to C17 to find that the debt to equity ratio in 2010 was 1.21 times.

To see that the total debt ratio and the debt to equity ratio provide the same information, realize that:

\[
\frac{\text{Total Debt}}{\text{Total Equity}} = \frac{\text{Total Debt}}{\text{Total Assets} \times \text{Total Equity}} \times \frac{\text{Total Assets}}{\text{Total Equity}} \tag{4-12}
\]

but from rearranging equation (4-8) we know that:
so, by substitution we have:

\[
\frac{\text{Total Debt}}{\text{Total Equity}} = \frac{\text{Total Debt}}{\text{Total Assets}} \times \frac{1}{1 - \text{Total Debt Ratio}}
\] (4-14)

We can convert the total debt ratio into the debt to equity ratio without any additional information (the result is not exact due to rounding):

\[
\frac{\text{Total Debt}}{\text{Total Equity}} = 0.5845 \times \frac{1}{1 - 0.5845} = 1.41
\]

**The Long-Term Debt to Equity Ratio**

Once again, many analysts prefer to focus on the amount of long-term debt that a firm carries. For this reason, many analysts like to use the long-term debt to total equity ratio:

\[
\text{Long-Term Debt to Equity} = \frac{\text{LTD}}{\text{Preferred Equity} + \text{Common Equity}}
\] (4-15)

EPI’s long-term debt to equity ratio is:

\[
\text{Long-Term Debt to Equity} = \frac{424.61}{685.99} = 61.90\%
\]

The formula to calculate EPI’s 2011 long-term debt to equity ratio in B18 is: = 'Balance Sheet' !B18 / 'Balance Sheet' !B22. After copying this formula to C18, note that the ratio was only 48.73% in 2010.

At this point, your worksheet should look like the one in Exhibit 4-3.

**Coverage Ratios**

The coverage ratios are similar to liquidity ratios in that they describe the quantity of funds available to “cover” certain expenses. We will examine two very similar ratios that describe the firm’s ability to meet its interest payment obligations. In both cases, higher ratios are desirable to a degree. However, if they are too high, it may indicate that the firm is under-utilizing its debt capacity and therefore not maximizing shareholder wealth.
The Times Interest Earned Ratio

The times interest earned ratio measures the ability of the firm to pay its interest obligations by comparing earnings before interest and taxes (EBIT) to interest expense:

\[
\text{Times Interest Earned} = \frac{\text{EBIT}}{\text{Interest Expense}}
\]  

(4-16)

For EPI in 2011 the times interest earned ratio is:

\[
\text{Times Interest Earned} = \frac{149.70}{76.00} = 1.97 \text{ times}
\]

In your worksheet, the times interest earned ratio can be calculated in B20 with the formula: ="Income Statement"!B11/"Income Statement"!B12. Copy the formula to C20 and notice that this ratio has declined rather precipitously from 3.35 in 2010.
The Cash Coverage Ratio

EBIT does not really reflect the cash that is available to pay the firm’s interest expense. That is because a noncash expense (depreciation) has been subtracted in the calculation of EBIT. To correct for this deficiency, some analysts like to use the cash coverage ratio instead of times interest earned. The cash coverage ratio is calculated as:

\[
\text{Cash Coverage Ratio} = \frac{\text{EBIT} + \text{Noncash Expenses}}{\text{Interest Expense}}
\]

The calculation for EPI in 2011 is:

\[
\frac{149.70 + 20.00}{76.00} = 2.23 \text{ times}
\]

Note that the cash coverage ratio will always be higher than the times interest earned ratio. The difference depends on the amount of depreciation expense and therefore the amount and age of fixed assets.

The cash coverage ratio can be calculated in cell B21 of your “Ratios” worksheet with: `=('Income Statement'!B11+'Income Statement'!B10)/'Income Statement'!B12. In 2010, the ratio was 3.65.

Profitability Ratios

Investors, and therefore managers, are particularly interested in the profitability of the firms that they own. As we’ll see, there are many ways to measure profits. Profitability ratios provide an easy way to compare profits to earlier periods or to other firms. Furthermore, by simultaneously examining the first three profitability ratios, an analyst can discover categories of expenses that may be out of line.

Profitability ratios are the easiest of all the ratios to analyze. Without exception, high ratios are preferred. However, the definition of high depends on the industry in which the firm operates. Generally, firms in mature industries with lots of competition will have lower profitability measures than firms in faster growing industries with less competition. For example, grocery stores will have lower profit margins than computer software companies. In the grocery business, a net profit margin of 3% would be considered quite good. That same margin would be abysmal in the software business, where 15% or higher is common.
The Gross Profit Margin

The gross profit margin measures the gross profit relative to sales. It indicates the amount of funds available to pay the firm’s expenses other than its cost of sales. The gross profit margin is calculated by:

\[
\text{Gross Profit Margin} = \frac{\text{Gross Profit}}{\text{Sales}} \tag{4-18}
\]

In 2011, EPI’s gross profit margin was:

\[
\text{Gross Profit Margin} = \frac{600.00}{3,850.00} = 15.58\%
\]

which means that cost of goods sold consumed about 84.42% (= 1 – 0.1558) of sales revenue. We can calculate this ratio in B23 with: ="Income Statement"!B7/"Income Statement"!B5. After copying this formula to C23, you will see that the gross profit margin has declined from 16.55% in 2010.

The Operating Profit Margin

Moving down the income statement, we can calculate the profits that remain after the firm has paid all of its operating (nonfinancial) expenses.

The operating profit margin is calculated as:

\[
\text{Operating Profit Margin} = \frac{\text{Net Operating Income}}{\text{Sales}} \tag{4-19}
\]

For EPI in 2011:

\[
\text{Operating Profit Margin} = \frac{149.70}{3,850.00} = 3.89\%
\]

The operating profit margin can be calculated in B24 with the formula: ="Income Statement"!B11/"Income Statement"!B5. Note that this is significantly lower than the 6.09% from 2010, indicating that EPI seems to be having problems controlling its operating costs.

The Net Profit Margin

The net profit margin relates net income to sales. Because net income is profit after all expenses, the net profit margin tells us the percentage of sales that remains for the shareholders of the firm:
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The net profit margin for EPI in 2011 is: 

\[
\text{Net Profit Margin} = \frac{\text{Net Income}}{\text{Sales}} \tag{4-20}
\]

which can be calculated on your worksheet in B25 with: = 'Income Statement'!B15/'Income Statement'!B5. This is lower than the 2.56% in 2010. If you take a look at the common-size income statement (Exhibit 2-5, page 56), you can see that profitability has declined because cost of goods sold, SG&A expense, and interest expense have risen more quickly than sales.

Taken together, the three profit margin ratios that we have examined show a company that may be losing control over its costs. Of course, high expenses mean lower returns for investors, and we’ll see this confirmed by the next three profitability ratios.

**Return on Total Assets**

The total assets of a firm are the investment that the shareholders have made. Much like you might be interested in the returns generated by your investments, analysts are often interested in the return that a firm is able to get from its investments. The return on total assets is: 

\[
\text{Return on Total Assets} = \frac{\text{Net Income}}{\text{Total Assets}} \tag{4-21}
\]

In 2011, EPI earned about 2.68% on its assets:

\[
\text{Return on Total Assets} = \frac{44.22}{1650.80} = 2.68\%
\]

For 2011, we can calculate the return on total assets in cell B26 with the formula: = 'Income Statement'!B15/'Balance Sheet'!B12. Notice that this is more than 50% lower than the 5.99% recorded in 2010. Obviously, EPI’s total assets increased in 2011 at a faster rate than its net income (which actually declined).
**Return on Equity**

While total assets represent the total investment in the firm, the owners’ investment (common stock and retained earnings) usually represent only a portion of this amount (some is debt). For this reason, it is useful to calculate the rate of return on the shareholder’s invested funds. We can calculate the return on (total) equity as:

\[
\text{Return on Equity} = \frac{\text{Net Income}}{\text{Total Equity}}
\]  
(4-22)

Note that if a firm uses no debt, then its return on equity will be the same as its return on assets. The more debt a firm uses, the higher its return on equity will be relative to its return on assets (see Du Pont Analysis on page 122).

In 2011, EPI’s return on equity was:

\[
\text{Return on Equity} = \frac{44.22}{685.99} = 6.45\%
\]

which can be calculated in B27 with: =Income Statement!B15/Balance Sheet!B22. Again, copying this formula to C27 reveals that this ratio has declined from 13.25% in 2010.

**Return on Common Equity**

For firms that have issued preferred stock in addition to common stock, it is often helpful to determine the rate of return on just the common stockholders’ investment:

\[
\text{Return on Common Equity} = \frac{\text{Net Income Available to Common}}{\text{Common Equity}}
\]  
(4-23)

Net income available to common is net income less preferred dividends. In the case of EPI, this ratio is the same as the return on equity because it has no preferred shareholders:

\[
\text{Return on Common Equity} = \frac{44.22 - 0}{685.99} = 6.45\%
\]

For EPI, the worksheet formula for the return on common equity is exactly the same as for the return on equity.
Du Pont Analysis

The return on equity (ROE) is important to both managers and investors. The effectiveness of managers is often measured by changes in ROE over time, and their compensation may be tied to ROE-based goals. Therefore, it is important that they understand what they can do to improve the firm’s ROE and that requires knowledge of what causes changes in ROE over time. For example, we can see that EPI’s return on equity dropped precipitously from 2010 to 2011. As you might imagine, both investors and managers are probably trying to figure out why this happened. The Du Pont system is one way to look at this problem.

The Du Pont system is a way to break down the ROE into its components so that management can understand how to improve the firm’s ROE. Let’s first take another look at the return on assets (ROA):

\[
\text{ROA} = \frac{\text{Net Income}}{\text{Total Assets}} = \frac{\text{Net Income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total Assets}} \tag{4-24}
\]

So, the ROA shows the combined effects of profitability (as measured by the net profit margin) and the efficiency of asset usage (the total asset turnover). Therefore, ROA could be improved by increasing profitability or by using assets more efficiently.

As mentioned earlier, the amount of leverage that a firm uses is the link between ROA and ROE. Specifically:

\[
\text{ROE} = \frac{\text{Net Income}}{\text{Equity}} = \frac{\text{Net Income}}{\text{Total Assets}} \times \frac{\text{Total Assets}}{\text{Equity}} \tag{4-25}
\]

Note that the second term in (4-25) is sometimes called the “equity multiplier” and from (4-13) we know it is equal to:

\[
\frac{\text{Total Assets}}{\text{Total Equity}} = \frac{1}{1 - \text{Total Debt Ratio}} = \frac{1}{1 - \frac{\text{Total Debt}}{\text{Total Assets}}} \tag{4-26}
\]

Substituting (4-26) into (4-25) and rearranging we have:

\[
\text{ROE} = \frac{\text{Net Income}}{\text{Total Assets}} \times \left(1 - \frac{\text{Total Debt}}{\text{Total Assets}}\right) \tag{4-27}
\]

We can now see that the ROE is a function of the firm’s ROA and the total debt ratio. If two firms have the same ROA, the one using more debt will have a higher ROE.

We can make one more substitution to completely break down the ROE into its components. Because the first term in (4-27) is the ROA, we can replace it with (4-24):
Profitability Ratios

\[
\text{ROE} = \frac{\text{Net Income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total Assets}} \times \frac{\text{Total Assets}}{1 - \frac{\text{Total Debt}}{\text{Total Assets}}}
\]

(4-28)

Or, to simplify it somewhat:

\[
\text{ROE} = \frac{\text{Net Profit Margin} \times \text{Total Asset Turnover}}{1 - \text{Total Debt Ratio}}
\]

(4-29)

To prove this to yourself, in A30 enter the label: Du Pont ROE. Now, in B30 enter the formula: \(= (B25*B12) / (1-B14)\). The result will be 6.45% as we found earlier. Note that if a firm uses no debt then the denominator of equation (4-29) will be 1, and the ROE will be the same as the ROA.

Analysis of EPI’s Profitability Ratios

Obviously, EPI’s profitability has slipped rather dramatically in the past year. The sources of these declines can be seen most clearly if we look at all of EPI’s ratios. At this point, your worksheet should resemble the one in Exhibit 4-4.

The gross profit margin in 2011 is lower than in 2010, but not significantly (at least compared to the declines in the other ratios). The operating profit margin, however, is significantly lower in 2011 than in 2010. This indicates potential problems in controlling the firm’s operating expenses, particularly SG&A expenses. The other profitability ratios are lower than in 2010 partly because of the “trickle down” effect of the increase in operating expenses. However, they are also lower because EPI has taken on a lot of extra debt in 2011, resulting in interest expense increasing faster than sales. This can be confirmed by examining EPI’s common-size income statement (Exhibit 2-5, page 56).

Finally, the Du Pont analysis of the firm’s ROE has shown us that it could be improved by any of the following: (1) increasing the net profit margin; (2) increasing the total asset turnover; or (3) increasing the amount of debt relative to equity. Our ratio analysis has shown that operating expenses have grown considerably, leading to the decline in the net profit margin. Reducing these expenses should be the primary objective of management. Because the total asset turnover ratio is near the industry average, as we’ll soon see, it may be difficult to increase this ratio. However, the firm’s inventory turnover ratio is considerably below the industry average and inventory control may provide one method of improving the total asset turnover. An increase in debt is not called for because the firm already has somewhat more debt than the industry average.
Financial Distress Prediction

The last thing that any investor wants to do is to invest in a firm that is nearing a bankruptcy filing or about to suffer through a period of severe financial distress. Starting in the late 1960s and continuing today, scholars and credit analysts have spent considerable time and effort trying to develop models that could identify such companies in advance. The best-known of these models was created by Professor Edward Altman in 1968. We will discuss Altman’s original model and a later one developed for privately held companies.
The Original Z-Score Model

The Z-score model was developed using a statistical technique known as multiple discriminant analysis. This technique creates a quantitative model that places a company into one of two (or more) groups depending on the score. If the score is below the cutoff point, it is placed into group 1 (soon to be bankrupt), otherwise it is placed into group 2. In fact, Altman also identified a third group that fell into a so-called “gray zone.” These companies could go either way, but should definitely be considered greater credit risks than those in group 2. Generally, the lower the Z-score, the higher the risk of financial distress or bankruptcy.

The original Z-score model for publicly traded companies is:

\[
Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + X_5
\]  

(4-30)

where the variables are the following financial ratios:

\[
X_1 = \text{net working capital/total assets}
\]

\[
X_2 = \text{retained earnings/total assets}
\]

\[
X_3 = \text{EBIT/total assets}
\]

\[
X_4 = \text{market value of all equity/book value of total liabilities}
\]

\[
X_5 = \text{sales/total assets}
\]

Altman reports that this model is 80–90% accurate if we use a cutoff point of 2.675. That is, a firm with a Z-score below 2.675 can reasonably be expected to experience severe financial distress, and possibly bankruptcy, within the next year. The predictive ability of the model is even better if we use a cutoff point of 1.81. There are, therefore, three ranges of Z-scores:

\[
\begin{align*}
Z < 1.81 & \quad \text{Bankruptcy predicted within one year} \\
1.81 < Z < 2.675 & \quad \text{Financial distress, possible bankruptcy} \\
Z > 2.675 & \quad \text{No financial distress predicted}
\end{align*}
\]

We can easily apply this model to EPI in the Ratios worksheet. However, first note that we haven’t supplied information regarding the market value of EPI’s common stock. In A31, enter the label: Market Value of Equity and in B31 enter 884,400. The market value of the equity is found by multiplying the share price by the number of shares outstanding. Next, enter Z-Score

into A32, and in B32 enter the formula:

If you’ve entered the equation correctly, you will find that EPI’s Z-score in 2011 is 3.92, which is safely above 2.675, so bankruptcy isn’t predicted.

The Z-Score Model for Private Firms

Because variable \( X_4 \) in equation (4-30) requires knowledge of the firm’s market capitalization (including both common and preferred equity), we cannot easily use the model for privately held firms. Estimates of the market value of these firms can be made, but the result is necessarily very uncertain. Alternatively, we could substitute the book value of equity for its market value, but that wouldn’t be correct. Most publicly traded firms trade for several times their book value, so such a substitution would seem to call for a new coefficient for \( X_4 \). In fact, all of the coefficients in the model changed when Altman reestimated it for privately held firms.

The new model for privately held firms is:

\[
Z' = 0.717X_1 + 0.847X_2 + 3.107X_3 + 0.420X_4 + 0.998X_5
\]  

(4-31)

where all of the variables are defined as before, except that \( X_4 \) uses the book value of equity instead of market value. Altman reports that this model is only slightly less accurate than the one for publicly traded firms when we use the new cutoff points shown below.

\[
egin{align*}
Z' &< 1.21 & \text{Bankruptcy predicted within one year} \\
1.23 &< Z' < 2.90 & \text{Financial distress, possible bankruptcy} \\
Z' &> 2.90 & \text{No financial distress predicted}
\end{align*}
\]

If we treat EPI as a privately held firm, its Z-score for 2011 is 3.35 and for 2010 is 3.55. These scores show that EPI is not likely to file for bankruptcy anytime soon.

Using Financial Ratios

Calculating financial ratios is a pointless exercise unless you understand how to use them. One overriding rule of ratio analysis is this: *A single ratio provides very little information and may be misleading.* You should never draw conclusions from a single ratio. Instead, several ratios, and other information, should support any conclusions that you make.
With that precaution in mind, there are several ways that ratios can be used to draw important conclusions.

**Trend Analysis**

Trend analysis involves the examination of ratios over time. Trends, or the lack of trends, can help managers gauge their progress toward a goal. Furthermore, trends can highlight areas in need of attention. While we don’t really have enough information on Elvis Products International to perform a trend analysis, it is obvious that many of its ratios are moving in the wrong direction.

For example, all of EPI’s profitability ratios have declined in 2011 relative to 2010, some rather dramatically. Management should immediately try to isolate the problem areas. For example, the gross profit margin has declined only slightly, indicating that increasing materials costs are not a major problem, though a price increase may be called for. The operating profit margin has fallen by about 36%, and since we can’t blame increasing costs of goods sold, we must conclude that operating costs have increased at a more rapid rate than revenues. The common-size income statement (Exhibit 2-5, page 56) shows that the culprit is SG&A expense. This increase in operating costs has led, to a large degree, to the decline in the other profitability ratios.

One potential problem area for trend analysis is seasonality. We must be careful to compare similar time periods. For example, many firms generate most of their sales during the holidays in the fourth quarter of the year. For this reason they may begin building inventories in the third quarter when sales are low. In this situation, comparing the third-quarter inventory turnover ratio to the fourth-quarter inventory turnover would be misleading.

**Comparing to Industry Averages**

Aside from trend analysis, one of the most beneficial uses of financial ratios is to compare similar firms within a single industry. This can be done by comparing to industry average ratios, which are published by organizations such as the Risk Management Association (RMA) and Standard & Poor’s. Industry averages provide a standard of comparison so that we can determine how well a firm is performing relative to its peers.

Consider Exhibit 4-5, which shows EPI’s ratios and the industry averages for 2011. You can enter the industry averages into your worksheet starting in D3 with the label: *Industry 2011*. Now select D5:D28, type 2.70 into D5, and then press the Enter key. Notice that the active cell will change to D6 as soon as the Enter key is pressed. This is an efficient method of entering a lot of numbers because your fingers never have to leave the number keypad. This technique is especially helpful when entering numbers into multiple columns and discontiguous cells.
It should be obvious that EPI is not being managed as well as the average firm in the industry. From the liquidity ratios we can see that EPI is less able to meet its short-term obligations than the average firm, though they are probably not in imminent danger of missing payments. The efficiency ratios show us that EPI is not managing its assets as well as would be expected, especially inventories. It is also obvious that EPI is using substantially more debt than its peers. The coverage ratios indicate that EPI has less cash to pay its interest expense than the industry average. This is due to carrying more than average debt. Finally, all of these problems have led to subpar profitability measures, which seem to be getting worse, rather than better.

It is important to note that industry averages may not be appropriate in all cases. In many cases, it is probably more accurate to define the “industry” as the target company’s most
closely related competitors. This group is probably far smaller (maybe only three to five companies) than the entire industry as defined by the 4-digit SIC code. The newer 6-digit NAICS codes improves, but doesn’t eliminate, this situation.

**Company Goals and Debt Covenants**

Financial ratios are often the basis of company goal setting. For example, a CEO might decide that one goal of the firm should be to earn at least 15% on equity (ROE = 15%). Obviously, whether or not this goal is achieved can be determined by calculating the return on equity. Further, by using trend analysis, managers can gauge progress toward meeting goals, and they can determine whether the goals are realistic or not.

Another use of financial ratios can be found in covenants loan to contracts. When companies borrow money, the lenders (bondholders, banks, or other lenders) place restrictions on the company, very often tied to the values of certain ratios. For example, the lender may require that the borrowing firm maintain a current ratio of at least 2.0. Or, it may require that the firm’s total debt ratio not exceed 40%. Whatever the restrictions, it is important that the firm monitor its ratios for compliance, or the loan may be due immediately.

**Automating Ratio Analysis**

Ratio analysis is as much art as science, and different analysts are likely to render somewhat different judgements on a firm. Nonetheless, you can have Excel do a rudimentary analysis for you. Actually, the analysis could be made quite sophisticated if you are willing to put in the effort. The technique that we will illustrate is analogous to creating an expert system, though we wouldn’t call it a true expert system at this point.

An expert system is a computer program that can diagnose problems or provide an analysis by using the same techniques as an expert in the field. For example, a medical doctor might use an expert system to diagnose a patient’s illness. The doctor would tell the system about the symptoms and the expert system would consult its rules to generate a likely diagnosis.

Building a true ratio analysis expert system in Excel would be very time consuming, and there are better tools available. However, we can build a very simple system using only a few functions. Our system will analyze each ratio separately and will only determine whether a ratio is “Good,” “Ok,” or “Bad.” To be really useful, the system would need to consider the interrelationships between the ratios, the industry that the company is in, and so on. We leave it to you to improve the system.

---

5. North American Industry Classification System. This system was created by the U.S. Census Bureau and its Canadian and Mexican counterparts in 1997 and is replacing the SIC codes. See http://www.census.gov/eos/www/naics/ for more information.
As a first step in developing our expert system, we need to specify the rules that will be used to categorize the ratios. In most cases, we have seen that the higher the ratio the better. Therefore, we would like to see that the ratio is higher in 2011 than in 2010 and that the 2011 ratio is greater than the industry average.

We can use Excel’s built-in IF statement to implement our automatic analysis. Recall that the IF statement returns one of two values, depending on whether a statement is true or false:

\[
\text{IF}(\text{LOGICAL TEST}, \text{VALUE IF TRUE, VALUE IF FALSE})
\]

Where LOGICAL_TEST is any statement which can be evaluated as true or false, and VALUE_IF_TRUE and VALUE_IF_FALSE are the return values which depend on whether LOGICAL_TEST was true or false.

We actually want to make two tests to determine whether a ratio is “Good,” “Ok,” or “Bad.” First, we will test to see if the 2011 ratio is greater than the 2010 ratio. To do this, we divide the 2011 value by the 2010 value. If the result is greater than one, then the 2011 ratio is greater than the 2010 ratio. Using only this test, our formula for the current ratio would be: \(=\text{IF}(B5/C5>=1, \text{"Good"}, \text{"Bad"})\) in E5. In this case, the result should be “Good” because the 2011 value is greater than the 2010 value. If you copy this formula to E6, the result will be “Bad” because the 2011 quick ratio is lower than the 2010 quick ratio.

We can modify this formula to also take account of the industry average. If the 2011 ratio is greater than the 2010 ratio and the 2011 ratio is greater than the industry average, then the ratio is “Good.” To accomplish this we need to use the AND function. This function will return true only if all arguments are true:

\[
\text{AND}(\text{LOGICAL1, LOGICAL2,\ldots})
\]

In this function, LOGICAL1 and LOGICAL2 are the two required arguments that can each be evaluated to be either true or false. You can have up to 255 arguments, but only two are required. The modified function in E5 is now: \(=\text{IF}(\text{AND}(B5/C5>=1,B5/D5>=1), \text{"Good"}, \text{"Bad"})\). Now, the ratio will only be judged as “Good” if both conditions are true. Note that they are not for the current ratio, so the result is “Bad.”

One final improvement can be made by adding “Ok” to the possible outcomes. We will say that the ratio is “Ok” if the 2011 value is greater than the 2010 value, or the 2011 value is greater than the industry average. We can accomplish this by nesting a second IF statement inside the first in place of “Bad.” For the second IF statement, we need to use Excel’s OR function:

\[
\text{OR}(\text{LOGICAL1, LOGICAL2,\ldots})
\]
This function is identical to the \texttt{AND} function, except that it returns true if any of its arguments are true. The final form of our equation is: 
\[
=\text{IF}(\text{AND}(B5/C5 \geq 1, B5/D5 \geq 1), \text{"Good"}, \text{IF}(\text{OR}(B5/D5 \geq 1, B5/C5 \geq 1), \text{"Ok"}, \text{"Bad"})).
\]
For the current ratio, this will evaluate to “Ok.” You can now evaluate all of EPI’s ratios by copying this formula to E6:E28.

One more change is necessary. Recall that for leverage ratios, lower is generally better. Therefore, change all of the “\textgreater=” to “\textless=” in E14:E18. You also need to make the same change in E10 for the average collection period. Your worksheet should now resemble that shown in Exhibit 4-6.

\begin{center}
\textbf{EXHIBIT 4-6}
\end{center}
\begin{center}
\textbf{EPI’S RATIOS WITH AUTOMATIC ANALYSIS}
\end{center}

You should see that nearly all of EPI’s ratios are judged to be “Bad.” This is exactly what our previous analysis has determined, except that Excel has done it automatically. There are
many changes that could be made to improve on this simple ratio analyzer, but we will leave
that job as an exercise for you.

Economic Profit Measures of Performance

Economic profit is the profit earned in excess of the firm’s costs, including its implicit
opportunity costs (primarily its cost of capital). Accounting profit (net income), however,
measures profit as revenues minus all of the firm’s explicit costs. It takes into account a
firm’s cost of debt capital (interest expense), but it ignores the implicit cost of the firm’s
equity capital. The concept of economic profit is an old one, but it has been revived in the
past few years by consulting firms promising to improve the financial performance and
executive compensation practices of their clients.  

Many large firms have switched to
various measures of economic profit—some with good results and some not. In any case, the
method has generated a lot of interest, and we will include a short discussion of measuring
economic profit in this section.

The basic idea behind economic profit measures is that the firm cannot increase shareholder
wealth unless it makes a profit in excess of its cost of capital. Because we will be taking
account of the cost of capital explicitly, we cannot use the normal accounting measures of
profit directly. The adjustments to the financial statements vary depending on the firm and
who is doing the calculations. At the moment, there is no completely accepted standard.
With this in mind, we will present a simplified economic profit calculation.

Mathematically, economic profit is:

\[
\text{Economic Profit} = \text{NOPAT} - \text{After-tax cost of operating capital}
\]

\[
= \text{NOPAT} - (\text{Total Net Operating Capital} \times \text{WACC})
\]

where NOPAT is net operating profit after taxes. The after-tax cost of operating capital is the
dollar cost of all interest-bearing debt instruments (i.e., bonds and notes payable) plus the
dollar cost of preferred and common equity. Generally, the firm’s after-tax cost of capital (a
percentage amount) is calculated and then multiplied by the amount of operating capital to
obtain the dollar cost.

6. The leader in this effort is the consulting firm Stern Stewart and Company who refer to economic
profit by the copyrighted name Economic Value Added (EVA).

7. Economic profit is also measured by NPV, which is introduced in Chapter 11. The primary
difference is that in this chapter we are trying to calculate the actual economic profit that was
earned over some previous time period (usually the previous year). NPV measures the expected
economic profit of a future investment.
To calculate the economic profit, we must first calculate NOPAT, total operating capital, and the firm’s cost of capital. For our purposes in this chapter, the cost of capital will be given (see Chapter 10 for the calculations). NOPAT is the after-tax operating profit of the firm:

\[
\text{NOPAT} = \text{EBIT} (1 - \text{tax rate})
\]  
(4-33)

Note that the NOPAT calculation does not include interest expense because it will be explicitly accounted for when we subtract the cost of all capital.

Total operating capital is the sum of noninterest-bearing current assets and net fixed assets, less noninterest-bearing current liabilities. We ignore interest-bearing current assets because they are not operating assets, and we ignore interest-bearing current liabilities (e.g., notes payable) because the cost of these liabilities is included in the cost of capital.

We will demonstrate the calculation of economic profit using the Elvis Products International data for 2010 and 2011. Make sure that the workbook containing EPI’s financial statements is open, and insert a new worksheet for our economic profit calculations. Set up your new worksheet as shown in Exhibit 4-7 and rename the sheet “Economic Profit.”

**EXHIBIT 4-7**

**ECONOMIC PROFIT CALCULATION FOR EPI**

Note that we are assuming that the firm’s cost of capital is 13%, and the tax rate should be pulled from the income statement with the formula: = 'Income Statement'!$B18. All of the other numbers must be calculated as discussed above.

Recall that NOPAT is simply EBIT times 1 - the tax rate, so in B5 enter the formula: = 'Income Statement'!B11*(1-B4). You should see that EPI has generated an after-tax operating profit of $89,820 in 2011. Copy this formula to C5 to get the NOPAT for 2010.

The next step is to calculate the amount of operating capital. Because EPI has no short-term investments, we merely add current assets to net fixed assets and then subtract current
liabilities less notes payable. In B6 enter the formula: ="Balance Sheet'!B8+'Balance Sheet'!B11-('Balance Sheet'!B17-'Balance Sheet'!B15). Your result should show that the total operating capital for 2011 was $1,335,600. Copy the formula to C6.

To calculate the dollar cost of capital in B8, enter the formula: =B7*B6; copy this to C8. Recall that economic profit is simply NOPAT minus the dollar cost of capital, so we can calculate the economic profit in B9 with the formula: =B5-B8. You should find that EPI earned an economic profit of –$83,808 in 2011. Copy this formula to C9 and you will see that EPI’s economic profit in 2010 was –$28,876.

This example shows how misleading accounting measures of profit (particularly net income) can be. In this case, EPI reported profits in both 2010 and 2011, but it was actually reducing shareholder wealth over the past two years. This mirrors the results from our ratio analysis. EPI’s management has not been doing a good job, at least over this period. Your economic profit worksheet should now look like the one shown in Exhibit 4-8.

**EXHIBIT 4-8**

**EPI’S COMPLETED ECONOMIC PROFIT WORKSHEET**

---

**Summary**

In this chapter, we have seen how various financial ratios can be used to evaluate the financial health of a company and therefore the performance of the managers of the firm. You have also seen how Excel can make the calculation of ratios quicker and easier than doing it manually. We looked at five categories of ratios: *Liquidity ratios* measure the ability of a firm to pay its bills; *efficiency ratios* measure how well the firm is making use of its assets to generate sales; *leverage ratios* describe how much debt the firm is using to finance
its assets; *coverage ratios* tell how much cash the firm has available to pay specific expenses; and *profitability ratios* measure how profitable the firm has been over a period of time.

We have also seen how Excel can be programmed to do a rudimentary ratio analysis automatically, using only a few of the built-in logical functions. Table 4-1 provides a summary of the ratio formulas presented in this chapter. Finally, we looked at the concept of economic profit and how it can give a much clearer picture of a firm’s financial health than traditional accounting profit measures.

### Table 4-1
**Summary of Financial Ratios**

<table>
<thead>
<tr>
<th>Name of Ratio</th>
<th>Formula</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Liquidity Ratios</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Current Ratio          | \[
\frac{\text{Current Assets}}{\text{Current Liabilities}}\] | 107  |
| Quick Ratio            | \[
\frac{\text{Current Assets – Inventories}}{\text{Current Liabilities}}\] | 108  |
| **Efficiency Ratios**  |                                              |      |
| Inventory Turnover     | \[
\frac{\text{Cost of Goods Sold}}{\text{Inventory}}\] | 109  |
| Accounts Receivable    | \[
\frac{\text{Credit Sales}}{\text{Accounts Receivable}}\] | 110  |
| Turnover               |                                              |      |
| Average Collection     | \[
\frac{\text{Accounts Receivable}}{\text{Annual Credit Sales/360}}\] | 110  |
| Period                 |                                              |      |
| Fixed Asset Turnover   | \[
\frac{\text{Sales}}{\text{Net Fixed Assets}}\] | 112  |
| Total Asset Turnover   | \[
\frac{\text{Sales}}{\text{Total Assets}}\] | 112  |
| **Leverage Ratios**    |                                              |      |
| Total Debt Ratio       | \[
\frac{\text{Total Debt}}{\text{Total Assets}}\] | 114  |
| Long-Term Debt Ratio   | \[
\frac{\text{Long-Term Debt}}{\text{Total Assets}}\] | 114  |
<table>
<thead>
<tr>
<th>Name of Ratio</th>
<th>Formula</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTD to Total Capitalization</td>
<td>( \frac{\text{LTD}}{\text{LTD} + \text{Preferred Equity} + \text{Common Equity}} )</td>
<td>115</td>
</tr>
<tr>
<td>Debt to Equity</td>
<td>( \frac{\text{Total Debt}}{\text{Total Equity}} )</td>
<td>115</td>
</tr>
<tr>
<td>LTD to Equity</td>
<td>( \frac{\text{LTD}}{\text{Preferred Equity} + \text{Common Equity}} )</td>
<td>116</td>
</tr>
<tr>
<td><strong>Coverage Ratios</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Times Interest Earned</td>
<td>( \frac{\text{EBIT}}{\text{Interest Expense}} )</td>
<td>117</td>
</tr>
<tr>
<td>Cash Coverage Ratio</td>
<td>( \frac{\text{EBIT} + \text{Noncash Expenses}}{\text{Interest Expense}} )</td>
<td>118</td>
</tr>
<tr>
<td><strong>Profitability Ratios</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross Profit Margin</td>
<td>( \frac{\text{Gross Profit}}{\text{Sales}} )</td>
<td>119</td>
</tr>
<tr>
<td>Operating Profit Margin</td>
<td>( \frac{\text{Net Operating Income}}{\text{Sales}} )</td>
<td>119</td>
</tr>
<tr>
<td>Net Profit Margin</td>
<td>( \frac{\text{Net Income}}{\text{Sales}} )</td>
<td>120</td>
</tr>
<tr>
<td>Return on Total Assets</td>
<td>( \frac{\text{Net Income}}{\text{Total Assets}} )</td>
<td>120</td>
</tr>
<tr>
<td>Return on Equity</td>
<td>( \frac{\text{Net Income}}{\text{Total Equity}} )</td>
<td>121</td>
</tr>
<tr>
<td>Return on Common Equity</td>
<td>( \frac{\text{Net Income Available to Common Equity}}{\text{Common Equity}} )</td>
<td>121</td>
</tr>
<tr>
<td>Du Pont Analysis of ROE</td>
<td>( \frac{\text{Net Profit Margin} \times \text{Total Asset Turnover}}{1 - \text{Total Debt Ratio}} )</td>
<td>123</td>
</tr>
</tbody>
</table>
1. Copy the Stetson Skydiving Adventures financial statements from Problem 1 in Chapter 2 into a new workbook.

   a. Set up a ratio worksheet similar to the one in Exhibit 4-4, page 124, and calculate all of the ratios for Stetson Skydiving Adventures.

   b. Identify at least two areas of potential concern using the ratios. Identify at least two areas that have shown improvement.

   c. In 2011 Stetson Skydiving Adventures’s ROE increased. Explain, in words, why this increase occurred using the Du Pont method as shown in equation (4-29).

   d. Stetson Skydiving Adventures has shown an accounting profit in each of the past two years. Calculate their economic profit for these years and compare it to net income. Assume that the weighted average cost of capital is 11%.

   e. Using Altman’s model for privately held firms, calculate the Z-score for Stetson Skydiving Adventures. Does it appear that the firm is in imminent danger of bankruptcy?
2. A computer problem at Castle Rock Appliance Repair has resulted in incomplete financial statements. Management of the company has asked you to see if you can fill in the missing data.

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
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<tbody>
<tr>
<td>Sales</td>
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<tr>
<td>Operating Expenses</td>
<td>Forma</td>
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<tr>
<td>Gross Profit</td>
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<tr>
<td>Earnings Before Interest and Taxes</td>
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<td>Interest Expense</td>
<td>Ratio</td>
</tr>
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<td>Earnings Before Taxes</td>
<td>Ratio</td>
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<tr>
<td>Taxes</td>
<td>Ratio</td>
</tr>
<tr>
<td>Net Income</td>
<td>Ratio</td>
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<tr>
<td>Notes: Tax Rate</td>
<td>30%</td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Assets</td>
<td></td>
</tr>
<tr>
<td>Cash</td>
<td>500</td>
</tr>
<tr>
<td>Accounts Receivable</td>
<td></td>
</tr>
<tr>
<td>Inventories</td>
<td>45,500</td>
</tr>
<tr>
<td>Total Current Assets</td>
<td></td>
</tr>
<tr>
<td>Gross Fixed Assets</td>
<td>126,000</td>
</tr>
<tr>
<td>Accumulated Depreciation</td>
<td></td>
</tr>
<tr>
<td>Net Fixed Assets</td>
<td></td>
</tr>
<tr>
<td>Ratio</td>
<td></td>
</tr>
<tr>
<td>Total Assets</td>
<td>150,000</td>
</tr>
</tbody>
</table>

| Liabilities and Owner's Equity |       |
| Accounts Payable             | 22,000|
| Short-term Bank Notes        |       |
| Total Current Liabilities    |       |
| Long-term Debt               |       |
| Common Equity                |       |
| Total Liabilities and Equity |       |

3. a. Recreate the financial statements as shown using formulas with the ratios given below to fill in the cells with the word “Ratio.” Use the ROUND function to round each of these answers to the nearest $10.

<table>
<thead>
<tr>
<th>Ratio</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Ratio</td>
<td>0.898550</td>
</tr>
<tr>
<td>Inventory Turnover*</td>
<td>2.109890</td>
</tr>
<tr>
<td>A/R Turnover</td>
<td>10.000000</td>
</tr>
<tr>
<td>Fixed Asset Turnover</td>
<td>1.818180</td>
</tr>
<tr>
<td>LTD To Equity</td>
<td>0.395350</td>
</tr>
<tr>
<td>Times Interest Earned</td>
<td>2.786890</td>
</tr>
<tr>
<td>Net Profit Margin</td>
<td>0.047688</td>
</tr>
<tr>
<td>Return on Total Assets</td>
<td>0.050870</td>
</tr>
<tr>
<td>Return on Equity</td>
<td>0.131440</td>
</tr>
</tbody>
</table>

* Uses Cost of Goods Sold in numerator.

b. Complete the financial statements by using formulas that refer to existing data to fill in the remaining cells.
**Internet Exercise**

1. Choose your own company and repeat the analysis from Problem 1. You can get the data from MSN Money at [http://money.msn.com/investing](http://money.msn.com/investing). To retrieve the data for your company, enter the ticker symbol to get a quote. Now choose Financials and then select the statements. Display the annual income statement, select the entire data section and copy. Now paste this data directly into a new worksheet. The data will be pasted in HTML format. In Excel 2010, a Smart Tag will appear that will allow you to either “Keep Source Formatting” or “Match Destination Formatting.” Experiment to see which one you like best. Repeat these steps for the balance sheet.

(Note: At the time of this writing, MSN Money uses data from Thomson Reuters. The data have been consolidated into consistent categories for easy comparison of different companies. However, there are sometimes mistakes and repeated data, which you may need to clean up. If you need error-free data, you should use a source such as Standard & Poor’s Compustat or the SEC’s Edgar database.)
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