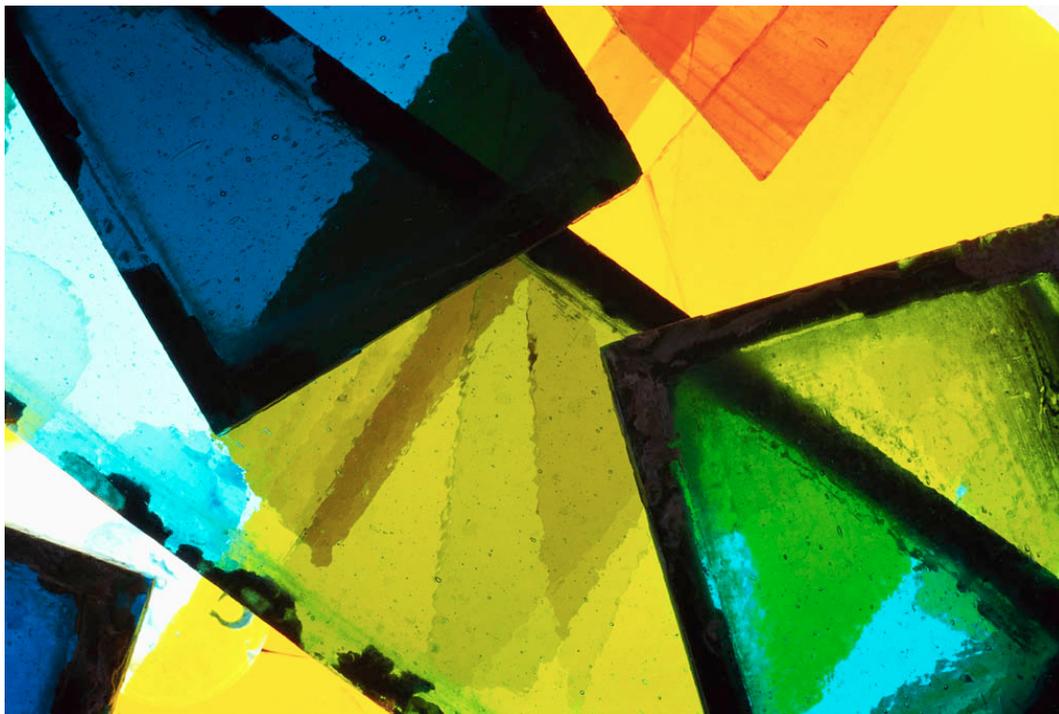


Chapter 9

Analysis



Corbis/AP Images

Learning Goals

- Convert financial statements to a common size and perform trend analysis.
- Perform liquidity analysis by evaluating working capital, the current ratio, and the quick ratio.
- Perform debt service analysis via the debt-to-assets, debt-to-equity, and times interest-earned ratios.
- Evaluate accounts receivable and inventory turnover.
- Analyze trends in profitability through examining margins and rates of return.
- Calculate earnings per share and book value per share.

Ch. 9 Introduction

By now, you have developed an appreciation for the basic principles and practices used to develop key financial reports. As noted many times, financial statements are intended to benefit investors and creditors in their quest to make informed decisions about buying stock from or lending money to a company. The focus now turns to the analytical process by which information extracted from an accounting system can be examined in a thoughtful and systematic fashion.

Users of financial statements often engage in comparative analysis; that is, they have choices. They can make either equity investments or loans, and they likely have multiple firms to choose from. Clearly, the goal is to maximize anticipated returns based on the risk level that they are willing to entertain. Common-size financial statements and ratio analysis are tools that can facilitate this process.

9.1 Common-Size Financial Statements

The concept of **common-size financial statements** relates to scaling the dollar amounts within financial statements to percentage terms. The purpose of the scaling process is to facilitate comparisons across firms and/or time. There are many ways in which this scaling can occur. The following examples will illustrate a few of the possible scenarios and are sufficient to provide you with a conceptual understanding that you can then adapt to almost any type of evaluation.

Exhibit 9.1 is a comparative income statement for Ace Company for 2 consecutive years. This is the traditional format that you are already well acquainted with.

Exhibit 9.1: A comparative income statement

Ace Company Income Statement For the years ending December 31		
	20X3	20X2
Sales	\$ 250,000	\$ 225,000
Cost of goods sold	100,000	95,000
Gross profit	\$ 150,000	\$ 130,000
Operating expenses	80,000	88,000
Income before tax	\$ 70,000	\$ 42,000
Income taxes	22,000	18,000
Net Income	\$ 48,000	\$ 24,000

The 20X3 income statement reveals a profit of \$48,000, based on \$250,000 in sales. Net income doubled from the prior year's \$24,000 amount; sales did not. Though apparent that income increased significantly, it is not readily apparent why. The cause for the doubling in income can be clarified via both vertical and horizontal analyses.

A **vertical analysis** of income results when each expense category is expressed as a percentage of sales. In other words, each item within the vertical column of data is expressed in relation to (as a percentage of) the top item in the column: sales. The vertical analysis in Exhibit 9.2 reveals how each line item component of income relates to revenue, on a percentage basis.

Exhibit 9.2: An income statement showing a vertical analysis

Ace Company Income Statement Vertical Common Size Report For the years ending December 31		
	20X3	20X2
Sales	100.00%	100.00%
Cost of goods sold	40.00%	42.22%
Gross profit	60.00%	57.78%
Operating expenses	32.00%	39.11%
Income before tax	28.00%	18.67%
Income taxes	8.80%	8.00%
Net Income	19.20%	10.67%

By reviewing this vertical analysis of income, you can readily see that cost of goods sold is about 40% of sales. The remaining gross profit of around 60% is allocated to operating expenses, taxes, and net income. On a relative basis, you can also tell that most expenses were at a fairly steady percentage of sales for both years, with a noted exception for the decrease in operating expenses; indeed, a large portion of the increase in income appears to be due to the reduction in the operating expense proportion.

A **horizontal analysis** can be used to compare data from within two or more periods, side-by-side. In other words, it is intended to show the change in certain accounts from two separate accounting periods. Horizontal analysis can be very helpful in looking for trends in a company's income. Consider Exhibit 9.3 and the comments that follow.

Exhibit 9.3: An income statement showing a horizontal analysis

Ace Company Income Statement Horizontal Common Size Report 20X3 Change Over 20X2		
Sales	+	11%
Cost of goods sold	+	5%
Gross profit	+	15%
Operating expenses	–	9%
Income before tax	+	67%
Income taxes	+	22%
Net Income	+	100%

The horizontal analysis in Exhibit 9.3 shows that sales increased by only 11%, but gross profit increased by 15%. This is reflective of the slightly reduced cost of goods sold percentage. Operating expenses decreased by 9%, notwithstanding the increase in overall sales. The impacts of the slight improvement in gross profit, coupled with the decrease in operating expenses, resulted in a dramatic rise in income. This type of analysis is not complex or brilliant, but it is illuminating. It will definitely cause you to focus on changes that need to be monitored closely.

Vertical and horizontal analyses are also applicable to balance sheet presentations. These analyses can be used to pinpoint shifts in key business elements, such as a buildup of inventory, capital investments, changing debt levels, and so forth. Many of these important trends are additionally monitored by ratios that are discussed later in this chapter. But, the common-size financial statements can cause important trends or problems to "pop off the page" and be noticed. You can almost think of this technique like radar, constantly scanning financial reports for emerging storm clouds! Examine the balance sheets in Exhibits 9.4, 9.5, and 9.6 and see what trends that you can identify.

Exhibit 9.4: A comparative balance sheet

Base Corporation Comparative Balance Sheets December 31, 20X5 and X6		
	<u>20X6</u>	<u>20X5</u>
Cash	\$ 100,000	\$ 80,000
Accounts receivable	225,000	135,000
Inventory	175,000	210,000
Investments	600,000	500,000
Land	190,000	190,000
Buildings (net)	610,000	624,000
Equipment (net)	435,000	400,000
Total Assets	<u>\$ 2,335,000</u>	<u>\$ 2,139,000</u>
Accounts payable	\$ 143,000	\$ 85,000
Notes payable	790,000	810,000
Total liabilities	<u>\$ 933,000</u>	<u>\$ 895,000</u>
Common stock	\$ 500,000	\$ 500,000
Retained earnings	902,000	744,000
Total equity	<u>\$ 1,402,000</u>	<u>\$ 1,244,000</u>
Total liabilities and equity	<u>\$ 2,335,000</u>	<u>\$ 2,139,000</u>

Exhibit 9.5: A balance sheet showing a vertical analysis

Base Corporation Balance Sheet December 31, 20X6 and X5		
	<u>20X6</u>	<u>20X5</u>
Cash	4.28%	3.74%
Accounts receivable	9.64%	6.31%
Inventory	7.49%	9.82%
Investments	25.70%	23.38%
Land	8.14%	8.88%
Buildings (net)	26.12%	29.17%
Equipment (net)	18.63%	18.70%
Total Assets	100.00%	100.00%
Accounts payable	3.97%	6.12%
Notes payable	37.87%	33.83%
Total liabilities	41.84%	39.96%
Common stock	23.38%	21.41%
Retained earnings	34.78%	38.63%
Total equity	58.16%	60.04%
Total liabilities and equity	100.00%	100.00%

Exhibit 9.6: A balance sheet showing a horizontal analysis

Base Corporation Balance Sheet Horizontal Common Size Report December 31, 20X6 and X5	
	<u>20X6</u>
Cash	125.00%
Accounts receivable	166.67%
Inventory	83.33%
Investments	120.00%
Land	100.00%
Buildings (net)	97.76%
Equipment (net)	108.75%
Total Assets	109.16%
Accounts payable	168.24%
Notes payable	97.53%
Total liabilities	104.25%
Common stock	100.00%
Retained earnings	121.24%
Total equity	121.70%
Total liabilities and equity	109.16%

Common-size financial statements are often reported on investment research websites, in reports prepared by financial statement analysts, and others. The company itself typically does not present them. It is essential that financial statement users and others do their own research and analysis, and converting published financial statements to common-size reports is an excellent starting point.

9.2 Ratio Analysis

An automobile is a complex machine. Think of all the data you must monitor to know that it is functioning correctly. Tire pressure, speed, water temperature, voltage, rpms, and so forth are numbers that you may constantly monitor. Numbers that are out of the normal operating range can serve as early warning signs that something is going wrong. For instance, if the water temperature gauge is rising above 200 degrees, you may suspect that trouble is coming; perhaps your car is losing water from a broken hose. So you fix the minor problem before it becomes major and requires a costly solution. In the same way, investors and creditors may develop their own ratios and keep a watchful eye for trouble. The ratios are divisible into categories related to liquidity measures, debt service, turnover, and profitability. In addition, a host of other measures may be of great interest.

9.3 Liquidity Analysis

Investors and creditors must be vigilant to monitor a company's **liquidity**, or ability to meet near-term obligations as they mature. A company with a strong balance sheet and robust sales can still find itself in deep trouble by running out of cash. This can happen when resources become bound up in receivables, inventory, and plant assets. Therefore, management, investors, and creditors will all follow a company's liquidity trends and condition. Two ratios, the current and quick ratios, are particularly intended to signal the potential for liquidity challenges.

First, to understand liquidity better, you also need to become familiar with the concept of **working capital**. It is the amount of current assets minus current liabilities. Assume that Ashcroft Company has current assets of \$1,000,000 and current liabilities of \$400,000; the working capital is \$600,000. Normally, one hopes to find that a company has a significantly positive amount of working capital. Having positive working capital can provide some comfort that the company has sufficient access to assets that are readily convertible to cash and will therefore be able to meet liabilities as they come due.

The preceding generalization is sometimes not true, however. A firm's current assets could be invested in slow-moving inventory. These goods would be of little value in meeting obligations. Indeed, the obligations may have arisen upon purchase of the goods. The seller of the goods would hardly be interested in receiving them back; they expect to be paid in cash. Conversely, some businesses manage cash flow very effectively. They may provide goods and services and have little invested in inventory or receivables. A restaurant is an excellent example.

A restaurant may have a relatively small (fresh food) inventory, and customers may all pay with cash or credit cards. The restaurant may purchase their supplies on extended credit terms. The profits and free cash flows that are generated may be constantly pulled from operations and channeled into new locations and facilities. Thus, it is not particularly relevant that the working capital is small (or even negative) at a particular time. Nonetheless, careful budgeting needs to be conducted to ensure that too much cash is not redirected from operations because the existing payables do need to be satisfied at some point.

How much working capital is enough? The answer to this question is partially answered by giving consideration to the issues raised in the preceding paragraphs. However, you also need to know about the size of the business. A small business may function well with \$100,000 of working capital, while a large business may run short with \$100,000,000 of working capital. Therefore, working capital is sensitive to the size of the business. You must also give consideration to the industry that a business operates in. An automobile manufacturer can be expected to have significant amounts of inventory, and this leads to an ordinary condition of a large amount of current assets and working capital. On the other hand, inventory may be totally lacking in service businesses, and they may have a much reduced level of working capital as a result.

Analysts may scale the evaluation of working capital to a ratio that relates current assets to current liabilities. The **current ratio** reveals the relative amount of working capital by dividing current assets by current liabilities:

$$\text{Current Ratio} = \text{Current Assets} / \text{Current Liabilities}$$

Table 9.1 lists Ashcroft's current assets and current liabilities.

Cash	\$ 150,000	Accounts Payable	\$ 50,000
Accounts Receivable	250,000	Wages Payable	125,000
Inventory	400,000	Interest Payable	85,000
Prepaid Assets	<u>200,000</u>	Taxes Payable	<u>140,000</u>
	<u>\$1,000,000</u>		<u>\$400,000</u>

Ashcroft's current ratio is 2.5:1 (\$1,000,000 ÷ \$400,000). This ratio does not seem to indicate any particular problem with liquidity. One thing you do need to consider is that companies may be able to manipulate their current ratio. For instance, suppose Ashcroft's bank required them to maintain at least a 3:1 current ratio. Using existing resources, how could this be accomplished? The answer is easier than you might think. If Ashcroft used \$100,000 of cash to immediately pay \$100,000 of taxes payable, total current assets would be reduced to \$900,000 and total current liabilities would be reduced to \$300,000. This changes the ratio to the target of 3:1. While this might help the current ratio, it could actually restrict the company's financial flexibility by immediately forgoing part of its cash supply. Although ratios may be subject to short-term manipulation, they are nonetheless highly indicative of business performance, and this limitation should not dissuade you from proper use of these popular techniques for financial statement analysis.

It was already pointed out that current assets include inventory and prepaids that are of little use in satisfying current debts. Therefore, it is also helpful to calculate a more stringent liquidity measure known as the **quick ratio**. This ratio is calculated by dividing quick assets by current liabilities. *Quick assets* are cash and other assets that are readily and quickly converted to cash. The latter includes short-term investments and accounts receivable. The following formula is used to calculate the quick ratio:

$$\text{Quick Ratio} = (\text{Cash} + \text{Accounts Receivable}) / \text{Current Liabilities}$$

Ashcroft's quick ratio is 1:1 (\$400,000 of cash and receivables divided by \$400,000 of current liabilities). By removing the inventory and prepaids, you may gain greater insight into the ability of a firm to be truly ready to meet maturing financial obligations.

Before moving on the next category of ratios, consider that obligations that are not yet reflected as current liabilities may also be looming. Suppose the company has a contract that requires them to make monthly payments to a janitorial firm. The commitment is real, but the future services have not yet been received. Thus, neither the expense nor liability is as yet reported. Still, these types of contractual commitments may entail a firm a duty to pay and are sometimes reported in notes to the financial statements. This example provides further evidence that ratio analysis must be used with caution. An informed investor or creditor should thoroughly research not only the ratios but also all available information.

9.4 Debt Service Analysis

The current and quick ratios provide insight on immediate liquidity issues. There is another set of issues related to a company's broader **solvency**, or the ability to satisfy long-term structural debt. Even if debt is not due to be repaid in the near term, interest payments must be made. Then, at the time of a long-term obligation's maturity, it must be paid or refinanced. Thus, users of financial statements have developed another family of ratios and analysis techniques designed to evaluate a company's ability to service its debt. One such ratio is the **debt-to-total-assets ratio**. This ratio evaluates the proportion of the asset pool that is financed with debt:

$$\text{Debt-to-Total-Assets Ratio} = \text{Total Debt} / \text{Total Assets}$$

A variation of this ratio is the **debt-to-equity ratio** that compares total debt to total equity:

$$\text{Debt-to-Equity Ratio} = \text{Total Debt} / \text{Total Equity}$$

Both of these ratios are carefully monitored by investors, creditors, and analysts. Generalizing, it is difficult to go broke when a business has manageable debt loads, as reflected by small values for these ratios. However, comparative analysis requires careful consideration of the industry that a business operates in. Some industries, like public utilities, are customarily financed by large pools of debt financing. Their regulated rates are generally set at a level that is high enough to provide comfort about their debt-serving ability. This is true despite those businesses being highly leveraged with debt.

At other times, even a small amount of debt can become a problem when a business's future looks bleak. Banks and other creditors may be interested in getting their money back and be unwilling to renew or extend debt financing that would otherwise be a routine transaction. Another challenge in interpreting the ratios is when a company has a large amount of intangible assets. Those assets can be difficult or impossible to convert to cash. Nevertheless, they impact the ratio calculations in a way that paints a picture of financial health. You are likely getting the message again: Ratio analysis is helpful in assessing a company, but only when done with great care.

The **times-interest-earned ratio** is also used to evaluate debt service capacity. It shows how many times that a company's income stream will cover its interest obligation:

$$\text{Times-Interest-Earned Ratio} = \text{Income Before Income Taxes and Interest} / \text{Interest Charges}$$

When this number drops to a small value, it signals that the company's operating results may become insufficient to cover interest obligations. When that happens, creditors may force foreclosure of assets or other remedies that threaten the company's ability to exist.

The following list provides facts for Brynn Corporation, followed by calculations of these key debt service indicators.

Total assets	\$800,000
Total liabilities	200,000
Total equity	600,000
Net income	60,000
Income taxes	40,000
Interest expense	20,000

Brynn's debt-to-total-assets ratio is 0.25, calculated by dividing \$200,000 in debt by \$800,000 in assets. The debt-to-equity ratio is 0.333, calculated by dividing \$200,000 in debt by \$600,000 in equity. The times-interest-earned factor is 6, calculated as \$120,000 (income before interest and taxes: \$60,000 + \$40,000 + \$20,000) divided by \$20,000 in interest. You may wonder why back taxes and interest are included in calculating the latter ratio. The reason is that the interest reduces both income and taxes, and knowing how many times interest can be paid before incurring those costs is wanted.

9.5 Turnover Analysis

One of the more dreadful problems a business can encounter is selling on credit and then not being able to collect amounts due. A similar problem is building up inventory and being unable to sell it at all. Either of these situations can eventually prove fatal to a business. Management must take great care to avoid this outcome. Both investors and creditors can sometimes get an advance hint about such problems by performing turnover analysis.

First, focus on accounts receivable. You already know that much attention is devoted to accounting for bad debts. A company must minimize bad debts by monitoring credit policies, considering the credit history of potential customers, and being certain not to abandon good sense in trying to generate all possible sales. A business should require customers to prepare a credit application, check credit references, and obtain credit reports. If possible, a security deposit or bank guarantee may significantly reduce credit risk.

The collection rate must also be monitored. A large sum of money is sometimes nested in accounts receivable, and liquidity is impacted if receivables are not actively managed. The **accounts-receivable-turnover ratio** is a useful tool in this regard. It shows the number of times a firm's receivables are converted to cash during a year. This tool is useful in signaling if a company is having trouble collecting receivables on a timely basis. If the turnover pace is slowing, it may signal impending collection risks or a general business slowdown. It is also helpful for comparing one business to another because it provides insight into the degree to which credit is extended and monitored. Net credit sales are divided by the average net accounts receivable:

$$\text{Accounts-Receiveable-Turnover Ratio} = \text{Net Credit Sales} / \text{Average Net Accounts Receivable}$$

One method for finding the average net accounts receivable balance is to divide the sum of the beginning and ending receivables balances by 2. For example, assume that Zollinger had annual net credit sales of \$10,000,000, beginning accounts receivable of \$600,000, and ending accounts receivable of \$1,000,000. Zollinger's turnover ratio is calculated as follows:

$$\$10,000,000 \div [(\$600,000 + \$1,000,000) \div 2] = 12.5$$

A derivative calculation is the **days outstanding ratio**. It reveals how many days sales are carried in the receivables category. Zollinger's days outstanding are 29.2, calculated as follows:

$$365 \text{ Days} \div \text{Accounts-Receiveable-Turnover Ratio} = \text{Days Outstanding Ratio}$$

$$365 \div 12.5 = 29.2$$

The significance of values like 12.5 or 29.2 can only be considered in context. They must be compared to industry trends and prior years as well as credit terms used by the company. Changes in values may provide signs of looming problems, such as a weakening economy or bad business decision making.

Inventory-turnover ratios are very similar in nature. Inventory is expensive and subject to obsolescence, damage, and spoilage. It is costly to store and involves a potentially huge commitment of financial capital. It is a delicate balance to maintain levels to adequately support key customers but avoid overstock. Equilibrium in inventory levels is delicate and easily lost. The inventory-turnover ratio is used to maintain focus on proper inventory management and to signal failings in this regard. This ratio reveals the number of times that a firm's inventory balance is turned over or sold during a particular year.

For example, The Home Depot turns its inventory about six to seven times per year, which is a turnover ratio of 6 to 7. This means the "average" item of inventory will sit on the shelf for slightly less than 60 days before finding a buyer. By itself, this datum is interesting but, when used to compare activity from year to year, it can signal improving or worsening economic conditions. It can also be compared to other companies, like Lowes, which has a slightly lower inventory turnover ratio of 5 to 6. In other words, The Home Depot usually turns its inventory faster than Lowes. The inventory-turnover ratio is calculated via the following formula:

$$\text{Inventory-Turnover Ratio} = \text{Cost of Goods Sold} / \text{Average Inventory}$$

Notice that this calculation bears a striking resemblance to the accounts-receivable-turnover ratio. The average inventory balance can be found by dividing the sum of the beginning and ending inventory balances by 2. When a company's average inventory is \$2,500,000 and cost of goods sold is \$25,000,000, the inventory turnover ratio is 10. This means that the inventory stock is turning over about once every 36.5 days (365 divided by 10). The meaningfulness of this information must again be considered in context. A car dealer might be very pleased with this number, whereas a vegetable supplier might find this to be disastrously poor. Probably more important than fixating on the value is to observe the trend in this number. The objective is to detect emerging challenges that might be signified by changes in these numbers. Further, if you are comparing inventory-turnover ratios for competing firms, be sure to note that the choice of inventory methods (e.g., FIFO vs. weighted average) can cause distortions in comparative analysis.

9.6 Profitability Analysis

Investors are especially interested in knowing that businesses that they invest in are capable of producing an eventual profit. As a very broad generalization (and therefore subject to many exceptions), the more profitable a firm is, the more valuable it is. Owning 10% of a business making a total profit of \$1,000,000, rather than 1% of a business making \$2,000,000 in profits, is more desirable. Thus, it is necessary to evaluate profitability not only in the aggregate but also on a scale, or ratio, basis. There are many ways to perform profit analysis. To begin, two key ratios are the **gross-profit-margin ratio** and **net-profit-margin ratio**:

$$\text{Gross-Profit-Margin Ratio} = \text{Gross Profit} / \text{Net Sales}$$

$$\text{Net-Profit-Margin Ratio} = \text{Net Income} / \text{Net Sales}$$

Both ratios examine profitability in relation to sales. The gross-profit-margin ratio examines the proportion of sales that is leftover after taking into account only the cost of the units sold. This proportion is then used to absorb selling, general, and administrative costs. The net-profit-margin ratio reflects the final residual amount. If Mega Corporation had sales of \$5,000,000, cost of goods sold of \$2,000,000, and net income of \$500,000, its gross profit margin would be 60% $[(\$5,000,000 - \$2,000,000) \div \$5,000,000]$, and its net profit margin would be 10% $(\$500,000 \div \$5,000,000)$. As you can see, calculating these two ratios is very simple and based on information prominently appearing on the income statement. Comparing profits rates over time and across companies is perhaps among the most common form of financial statement analysis. Both rates are important to monitor because they provide signals about business scalability and sustainability, regardless of firm size. (These issues are examined in more detail in a managerial accounting course.)

Another way to examine profitability is to compare profits to invested assets and equity. Here, the goal is to compute how effectively assets and equity are being used to generate profits. The **return-on-assets (ROA) ratio** is calculated by dividing income before interest cost by the average assets used in the business:

$$\text{Return-on-Assets Ratio} = (\text{Net Income} + \text{Interest Expense}) / \text{Average Assets}$$

The ROA ratio is an attempt to focus attention on the amount of income, before financing costs, that is generated by the business's assets. In other words, looking at how much the assets earned, exclusive of what it costs to finance them. In some ways, this reflects management's stewardship and skill at using business assets in an effective and efficient way. The next ratio looks at net income in comparison to invested capital and takes into account the business's financing costs.

The **return-on-equity (ROE) ratio** evaluates income in relation to the amount of invested common shareholder equity:

$$\text{Return-on-Equity Ratio} = \text{Net Income} / \text{Average Common Equity}$$

The ROE ratio evaluates management effectiveness at using shareholder equity. The ratio implicitly recognizes that a business might borrow substantial funds to acquire assets and deploy those assets to earn at a rate that is higher (positive leverage) or lower (negative leverage) than the cost of borrowed funds. In other words, leverage relates to the use of borrowed fund in an attempt to amplify returns to owner-provided capital. To the extent that a business decides to use debt to finance assets, it becomes very important to assess how effective that decision is, and the ROE ratio provides a signal about that effort.

There are alternative theories about the best ways in which to calculate ROA and ROE ratios, but they all share the same goal. The goal is to assess management's stewardship (i.e., ability to generate returns) with respect to assets and equity; in particular, it provides a basis for knowing whether debt is being managed in a way that is accretive or dilutive to the shareholders' best interests. One hopes to find that the ROE ratio is at least equal to and hopefully greater than the ROA ratio.

The summary illustration at the end of this chapter shows complete data sufficient to calculate both ratios. When you review that, be sure to take note that the ROE ratio is greater than the ROA ratio. This means that the company is using its borrowing effectively to increase overall firm earnings. If the company had instead relied solely on equity financing for its assets, the overall rate of return on shareholder investments would be lower.

9.7 Other Measures

In the preceding discussion on profitability analysis, you were cautioned that evaluations of profitability need to take into account the firm size. Public corporations are those that have shares of stock that are easily bought and sold by individual investors over organized stock exchanges such as the NYSE or NASDAQ. Publicly traded companies are required to present **earnings-per-share (EPS)** information. This is perhaps the most popular "scaled" profitability measure. It allows investors to compare the income of a large corporation having hundreds of millions of shares to the income of a smaller company having perhaps less than 1 million shares of stock. The larger company would perhaps produce a greater amount of overall profit, but it is possible that the smaller company might be doing better on an EPS basis.

EPS data is widely followed. Press releases and business news outlets focus heavily on this number, often comparing actual EPS to projected EPS. Because stock is priced on a per-share basis, it is only logical to expect that earnings are also monitored on a per-share basis. This number is important, but you should be careful not to fixate on a single indicator. EPS data often includes the impacts of nonrecurring transactions and events. A detailed income statement will usually include operating details about income from continuing operations, segregated from the effects of other special events impacting income. Similarly, EPS data is often subdivided into special components, and one must look very closely at the specific composition of each period's EPS data.

In its simplest form, EPS data is just a fraction determined by dividing income by the number of shares outstanding. EPS can be calculated based on any time period but is most often reported on a quarterly and annual basis. One potential complication arises when the number of shares of stock changes during a period. For instance, a company may issue additional shares during the period, in which case the EPS calculation is based on the weighted-average shares outstanding for the period (*not* the number outstanding at the end of the period). The following formula summarizes the basic mathematics for simple EPS:

$$\text{Income Available to Common Shares} / \text{Weighted-Average Number of Common Shares}$$

To illustrate, assume that Brooklyn Corporation had an annual net income of \$2,400,000. Brooklyn started the calendar year with 600,000 shares outstanding but issued an additional 300,000 shares for cash on May 1. The EPS is \$3. Determining this value begins with calculating the weighted-average number of shares outstanding. Brooklyn had 600,000 shares outstanding for the first 4 months of the year (or one third of the year) and 900,000 shares outstanding for the last 8 months of the year (or two thirds of the year). Thus,

$$\text{Weighted-Average Number of Shares} = 800,000 [600,000 \times (1 \div 3)] + [900,000 \times (2 \div 3)]$$

and the EPS is calculated as \$2,400,000 \div 800,000 shares.

EPS calculations can quickly grow cumbersome. Later, you will learn that a company may have several types of capital stock. Some shares are called common stock, and other shares may be designated as preferred stock. Common stock is the residual interest in the business. Preferred stock has some advantages, usually in the form of a guaranteed dividend and liquidation preferences. As such, it has first claims on earnings up to the amount of a stated dividend rate. Common shares only stand to benefit to the extent that earnings exceed the preferential dividend. To be more technically precise, EPS is really earnings available per common share. Thus, the proper formulation of calculating EPS would really consist of net income minus any preferred dividends.

The "basic" EPS number may be all that a company is required to report. At other times, a complex company may find it necessary to also report a diluted EPS amount. Some companies may have issued more exotic financial instruments, such as options on stock or debt that can be converted into stock. When this condition is encountered, accountants are required to assess the potential effect on EPS, as if the options were exercised and conversion occurred. When the hypothetical issuance of additional shares causes a reduction (a *dilution*) in EPS, it typically becomes required to report this second EPS measure. The idea of this expanded reporting is to alert shareholders to the impacts on EPS of the potential issue of additional shares.

If you have even a passing familiarity with stock investing, you probably have some knowledge of the **price-to-earnings (P/E) ratio**. This number is often reported in analysts' reports and even in newspaper listings of stock prices. As its name suggests, the P/E ratio is calculated as follows:

$$\text{Price-to-Earnings Ratio} = \text{Market Price per Share} / \text{Earnings per Share}$$

If a stock is currently selling at \$25 per share and has an EPS of \$2, then its P/E ratio would be 12.5. Low P/E ratios are sometimes indicators of good investment values and vice versa, but this is not always the case. As already noted, earnings measures are subject to nonrecurring distortions of long-term trends. Further, some businesses may be underperforming in the near term but have excellent long-term prospects. Think of the P/E ratio like a pulse rate; the same person can have a fluctuating pulse based on his or her current status (sleeping, running, etc.), and a full assessment of health requires knowledge of that status. Only a negligent doctor would prescribe a treatment plan based solely on a pulse rate. A similar comparison can be made to investment decisions tied only to the P/E ratio.

Not all companies pay dividends. Some companies may prefer to reinvest earnings to expand business operations. For many years, Apple did not pay dividends, choosing instead to reinvest in new product development. Other businesses may not have sufficient earnings to support dividends. But, mature businesses may generate more than enough cash to support ongoing business needs, and those companies will often return profits to shareholders. In recent years, Apple's successful products were so profitable that the company accumulated an abundance of cash and began to pay dividends.

Another number that you might wish to calculate is the dividend rate. This number is also known as the **dividend yield** and is determined by dividing the annual cash dividend by the market price per share of the stock.

Assume that Delta Company pays annual dividends of \$0.40 per share. If its stock sells for \$8.00 per share, the yield would be 5% (\$0.40 \div \$8.00). Investors may wonder if Delta can sustain this dividend rate. To make this assessment, they would likely examine the Delta's dividend history and cash supply. These two factors

may help predict the future dividend stream. However, it is also important to make sure that ongoing operations can continue to support the dividend. Thus, the **dividend payout rate** should also be calculated. Its value is determined by dividing the annual cash dividend by the EPS. If Delta earned \$1.00 per share, its payout ratio is 0.40 ($\$0.40 \div \1.00).

Investors may also look at the **book value per share**. This is the amount of stockholders' equity represented by each share of common stock. You should be extremely careful in thinking about book value per share. It is based on the reported amount of stockholders' equity. Remember the fundamental accounting equation: Assets = Liabilities + Equity. Many assets are listed at their cost, not their value. This is a double-edged sword. Some assets may be worth more than their cost and vice versa. This is especially true for recorded and unrecorded intangible assets. Thus, the residual reported equity may not be very reflective of the intrinsic firm value, and calculations of book value per share may be far afield from what the stock would be valued at on a per-share basis. Nevertheless, it is a popular measure. Some investors look to this number as the floor price below which the stock is seen as a bargain. You are cautioned against jumping to this conclusion.

As with EPS, book value is a per share of common stock concept. For companies with complex capital structures involving preferred stocks, stock options, convertible securities, and so forth, a number of adjustments may be necessary. Because book value per share is a number that is calculated by analysts (i.e., it is not reported by the company's accountants), there is no generally accepted accounting principle that describes exactly how those adjustments should occur. Generalizing, the idea is to distill the total equity down to a hypothetical amount that would remain after liquidating all noncommon share interests in the company. The remaining equity is then divided by the number of common shares outstanding to find the book value per share of common stock.

9.8 Recap and Summary Illustration

Many new concepts were introduced in this chapter. Table 9.2 summarizes the various ratios and calculations that you were exposed to. The final column includes typical acceptable values for the indicated ratios. However, as noted throughout the chapter, it is impossible to stipulate universal generalizations for the values of these ratios, and the last column should not be given undue weightings. Each situation can vary.

Table 9.2: Ratios and calculations			
Liquidity			
Current Ratio	Current Assets / Current Liabilities	A measure of liquidity; the ability to meet near-term obligations	2:1 or greater
Quick Ratio	(Cash + Short-Term Investments + Accounts Receivable) / Current Liabilities	A narrow measure of liquidity; the ability to meet near-term obligations	1.25:1 or greater
Debt Service			
Debt-to-Total-Assets Ratio	Total Debt / Total Assets	Percentage of assets financed by long-term and short-term debt	0.5 or less
Debt-to-Equity Ratio	Total Debt / Total Equity	Proportion of financing that is debt related	1:1 or less
Times-Interest-Earned Ratio	Income Before Income Taxes and Interest / Interest Charges	Ability to meet interest obligations	8 or higher
Turnover Ratios			
Accounts-Receiveable-Turnover Ratio	Net Credit Sales / Average Net Accounts Receivable	Frequency of collection cycle; to monitor credit policies	9 or higher
Inventory-Turnover Ratio	Cost of Goods Sold / Average Inventory	Frequency of inventory rotation; to monitor inventory management	6 or higher
Profitability Ratios			
Gross-Profit-Margin Ratio	Gross Profit / Net Sales	Gross profit rate; for comparison and trend analysis	50% or higher
Net-Profit-Margin Ratio	Net Income / Net Sales	Profitability on sales; for comparison and trend analysis	5% or higher
Return-on-Assets Ratio	(Net Income + Interest Expense) / Average Assets	Asset utilization in producing returns	10% or higher
Return-on-Equity Ratio	Net Income / Average Common Equity	Effectiveness of equity investment in producing returns	10% or higher
Other Measures			
Earnings per Share	Income Available to Common / Weighted-Average Number of Common Shares	Amount of earnings attributable to each share of common stock	Positive and increasing over time
Price-to-Earnings Ratio	Market Price per Share / Earnings Per Share	The price of the stock in relation to earnings per share	15 or lower
Dividend Yield	Annual Cash Dividend / Market Price per Share	Direct yield to investors through dividend payments	2.5% or higher
Dividend Payout Rate	Annual Cash Dividend / Earnings per Share	Proportion of earnings distributed as dividends	40% or less
Book Value per Share	"Common" Equity / Common Shares Outstanding	The amount of stockholders' equity per common share outstanding	Positive and increasing over time

Exhibit 9.7 shows comprehensive financial statements for Mossman Company. This information will be used to demonstrate the calculation of all ratios introduced in this chapter, as shown in Table 9.3. The value of Mossman's stock was \$20 per share throughout the year, and there were 500,000 shares outstanding. All sales were on account.

Exhibit 9.7: Financial statement for Mossman Company

**Mossman Company
Income Statement
For the Year Ending December 31, 20X7**

Revenues		\$ 3,000,000
Cost of goods sold		1,160,000
Gross profit		<u>\$ 1,840,000</u>
Operating expenses		
Wages	\$ 400,000	
Interest	48,000	
Depreciation	65,000	
Other operating expenses	<u>135,000</u>	<u>(648,000)</u>
Income before income taxes		\$ 1,192,000
Less: Income taxes		<u>422,000</u>
Net income		<u><u>770,000</u></u>

**Mossman Company
Statement of Retained Earnings
For the Year Ending December 31, 20X7**

Beginning retained earnings, January 1	\$ 1,115,000
Plus: Net income	<u>770,000</u>
	\$ 1,885,000
Less: Dividends	<u>50,000</u>
Ending retained earnings, December 31	<u><u>\$ 1,835,000</u></u>

Mossman Company Comparative Balance Sheets December 31, 20X7 and 20X6		
ASSETS	<u>20X7</u>	<u>20X6</u>
Current Assets		
Cash	\$ 1,800,000	\$ 1,275,000
Accounts receivable	600,000	550,000
Inventories	<u>200,000</u>	<u>175,000</u>
Total current assets	<u>\$ 2,600,000</u>	<u>\$ 2,000,000</u>
Property, Plant, & Equipment		
Land	750,000	750,000
Building	925,000	925,000
Equipment	<u>750,000</u>	<u>700,000</u>
	\$ 2,425,000	\$ 2,375,000
Less: Accumulated depreciation	<u>(425,000)</u>	<u>(360,000)</u>
Total property, plant & equipment	<u>\$ 2,000,000</u>	<u>\$ 2,015,000</u>
Total Assets	<u>\$ 4,600,000</u>	<u>\$ 4,015,000</u>
LIABILITIES		
Current liabilities		
Accounts payable	<u>80,000</u>	<u>600,000</u>
Wages payable	\$ 1,240,000	\$ 1,350,000
Total current liabilities		
Long-term liabilities	<u>725,000</u>	<u>750,000</u>
Long-term loan payable	<u>\$ 1,965,000</u>	<u>\$ 2,100,000</u>
Total liabilities		
STOCKHOLDERS' EQUITY		
Capital stock	\$ 800,000	\$ 800,000
Retained earnings	<u>\$ 1,835,000</u>	<u>\$ 1,115,000</u>
Total stockholders' equity	<u>\$ 2,635,000</u>	<u>\$ 1,915,000</u>
Total liabilities and equity	<u>\$ 4,600,000</u>	<u>\$ 4,015,000</u>

Table 9.3 Calculation of ratios		
Current Ratio	Current Assets / Current Liabilities	$\$2,600,000 \div \$1,240,000 = 2.1$
Quick Ratio	(Cash + Short-Term Investments + Accounts Receivable) / Current Liabilities	$\$2,400,000 \div \$1,240,000 = 1.94$
Debt-to-Total-Assets Ratio	Total Debt / Total Assets	$\$1,965,000 \div \$4,600,000 = 0.43$
Debt-to-Equity Ratio	Total Debt / Total Equity	$\$1,965,000 \div \$2,635,000 = 0.75$
Times-Interest-Earned Ratio	Income Before Income Taxes and Interest / Interest Charges	$\$ 1,240,000 \div \$48,000 = 26$
Accounts-Receiveable-Turnover Ratio	Net Credit Sales / Average Net Accounts Receivable	$\$ 3,000,000 \div \$575,000 = 5.2$
Inventory-Turnover Ratio	Cost of Goods Sold / Average Inventory	$\$ 1,160,000 \div \$187,500 = 6.2$
Net-Profit-Margin Ratio	Net Income / Net Sales	$\$ 770,000 \div \$3,000,000 = 26\%$
Gross-Profit-Margin Ratio	Gross Profit / Net Sales	$\$1,840,000 \div \$3,000,000 = 61\%$
Return-on-Assets Ratio	(Net Income + Interest Expense) / Average Assets	$\$ 818,000 \div \$4,307,500 = 19\%$

Return-on-Equity Ratio	(Net Income - Preferred Dividends)/ Average Common Equity	$\$ 770,000 \div 2,275,000 = 34\%$
Earnings per Share	Income Available to Common / Weighted-Average Number of Common Shares	$\$ 770,000 \div 500,000 = \1.54
Price-to-Earnings Ratio	Market Price per Share / Earnings per Share	$\$ 20 \div \$1.54 = 13$
Dividend Yield	Annual Cash Dividend / Market Price per Share	$\$ 0.10 \div \$20 = 0.5\%$
Dividend Payout Rate	Annual Cash Dividend / Earnings per Share	$\$ 0.10 \div \$1.54 = 6.5\%$
Book Value per Share	"Common" Equity / Common Shares Outstanding	$\$ 2,635,000 \div 500,000 = \5.27

Net Sales	500,000	500,000
Cost of Goods Sold	332,500	350,000
Operating Expenses	93,500	85,000

Prepare a horizontal analysis for 20X1 and 20X2. Briefly comment on the results of your work.

2. **Vertical analysis.** Study the data pertaining to Mary Lynn Corporation that appear in Exercise 1. Prepare a vertical analysis for 20X1 and 20X2 and briefly evaluate the results of your work.
3. **Liquidity ratios.** Edison, Stagg, and Thornton have the following financial information at the close of business on July 10:

	Edison	Stagg	Thornton
Cash	\$4,000	\$2,500	\$1,000
Short-Term Investments	3,000	2,500	2,000
Accounts Receivable	2,000	2,500	3,000
Inventory	1,000	2,500	4,000
Prepaid Expenses	800	800	800
Accounts Payable	200	200	200
Notes Payable: Short-Term	3,100	3,100	3,100
Accrued Payables	300	300	300
Long-Term Liabilities	3,800	3,800	3,800

- a. Compute the current and quick ratios for each of the three companies. (Round calculations to two decimal places.) Which firm is the most liquid? Why?
- b. Suppose Thornton is using FIFO for inventory valuation and Edison is using LIFO. Comment on the comparability of information between these two companies.
- c. If all short-term notes payable are due on July 11 at 8 a.m., comment on each company's ability to settle its obligation in a timely manner.
4. **Computation and evaluation of activity ratios.** The following data relate to Alaska Products Inc.:

	20X5	20X4
Net Credit Sales	\$832,000	\$760,000
Cost of Goods Sold	440,000	350,000
Cash, Dec. 31	125,000	110,000
Accounts Receivable, Dec. 31	180,000	140,000
Inventory, Dec. 31	70,000	50,000
Accounts Payable, Dec. 31	115,000	108,000

The company is planning to borrow \$300,000 via a 90-day bank loan to cover short-term operating needs.

- a. Compute the accounts-receivable and inventory-turnover ratios for 20X5. Alaska rounds all calculations to two decimal places.
- b. Study the ratios from part (a) and comment on the company's ability to repay a bank loan in 90 days.
- c. Suppose that Alaska's major line of business involves the processing and distribution of fresh and frozen fish throughout the United States. Do you have any concerns about the company's inventory-turnover ratio? Briefly discuss.
5. **Profitability ratios, trading on the equity.** Digital Relay has both preferred and common stock outstanding. The company reported the following information for 20X7:

Net sales	\$1,500,000
Interest Expense	120,000
Income Tax Expense	80,000
Preferred Dividends	25,000
Net Income	130,000
Average Assets	1,100,000
Average Common Stockholders' Equity	400,000

- a. Compute the net-profit-margin ratio and the rates of return on assets and common stockholders' equity, rounding calculations to two decimal places.
- b. Does the firm have positive or negative financial leverage? Briefly explain.
6. **Evaluation of selected ratios.** Selected ratios of Glenwood Power Equipment Company and averages for the power equipment industry follow:

	Glenwood	Industry
Current ratio	2.21	1.63
Average collection period of receivables	39 days	21 days
Inventory turnover	4.1	1.9
Net-profit-margin	7.0%	8.8%
Return on assets	10.0%	9.5%
Debt-to-total assets	31.7%	39.8%

Evaluate these ratios and determine whether you agree or disagree with the following statements:

- Glenwood has better debt-paying ability than the "average" company in the power equipment industry.
- Glenwood is performing below average in managing its inventories.
- The amount of income generated, given the company's resources, exceeds that produced by the industry.
- Glenwood may need to improve its management of credit and customer collections.
- In view of the company's revenues, Glenwood's ability to produce earnings is significantly below the industry norm.

Problems

1. **Horizontal and vertical analysis.** The following financial statements pertain to Waterloo Corporation:

WATERLOO CORPORATION Comparative Balance Sheets December 31, 20X5 and 20X4		
	20X5	20X4
Assets		
Current Assets		
Cash	\$ 11,250	\$ 12,500
Accounts Receivable (net)	18,500	25,000
Inventories	38,500	35,000
Prepaid Expense	<u>3,750</u>	<u>3,750</u>
Total Current Assets	<u>\$ 72,000</u>	<u>\$ 76,250</u>
Property, Plant, and Equipment		
Buildings (net)	\$ 102,750	\$ 101,250
Equipment (net)	28,500	30,000
Vehicles (net)	<u>32,000</u>	<u>40,000</u>
Total Property, Plant, and Equipment	<u>\$ 163,250</u>	<u>\$ 171,250</u>
Trademarks (net)	<u>\$ 14,750</u>	<u>\$ 2,500</u>
Total assets	<u>\$ 250,000</u>	<u>\$ 250,000</u>
Liabilities and Stockholders' Equity		
Current Liabilities		
Accounts Payable	\$ 49,000	\$ 70,000
Notes Payable	13,500	40,000
Federal Taxes Payable	<u>2,500</u>	<u>25,000</u>
Total Current Liabilities	<u>\$ 65,000</u>	<u>\$ 135,000</u>
Long-Term Debt	<u>\$ 50,000</u>	<u>\$ 25,000</u>
Total Liabilities	<u>\$ 115,000</u>	<u>\$ 160,000</u>
Stockholders' Equity		
Common Stock, \$10 par	\$ 25,000	\$ 25,000

Retained Earnings	<u>110,000</u>	<u>65,000</u>
Total Stockholders' Equity	<u>\$ 135,000</u>	<u>\$ 90,000</u>
Total Liabilities and Stockholders' Equity	<u>\$ 250,000</u>	<u>\$ 250,000</u>

WATERLOO CORPORATION
Comparative Income Statements
For the Years Ending December 31, 20X5 and 20X4

	20X5	20X4
Net Sales	\$ 550,000	\$500,000
Cost of Goods Sold	<u>330,000</u>	<u>250,000</u>
Gross Profit	\$ 220,000	\$250,000
Operating Expense	<u>132,500</u>	<u>100,000</u>
Income Before Interest and Taxes	\$ 87,500	\$150,000
Interest Expense	<u>12,500</u>	<u>3,000</u>
Income Before Taxes	\$ 75,000	\$147,000
Income Tax Expense	<u>30,000</u>	<u>58,800</u>
Net Income	<u>\$ 45,000</u>	<u>\$ 88,200</u>

Instructions

- Prepare a horizontal analysis of the balance sheet, showing dollar and percentage changes. Round all calculations in parts (a) and (b) to two decimal places.
- Prepare a vertical analysis of the income statement by relating each item to net sales.
- Briefly comment on the results of your analysis.

2. **Ratio computation.** The financial statements of the Lone Pine Company follow.

LONE PINE COMPANY
Comparative Balance Sheets
December 31, 20X2 and 20X1 (\$000 Omitted)

	20X2	20X1
Assets		
Current Assets		
Cash and Short-Term Investments	\$ 400	\$ 600
Accounts Receivable (net)	3,000	2,400
Inventories	<u>2,000</u>	<u>2,200</u>
Total Current Assets	<u>\$5,400</u>	<u>\$5,200</u>
Property, Plant, and Equipment		
Land	\$1,700	\$ 600
Buildings and Equipment (net)	<u>1,500</u>	<u>1,000</u>
Total Property, Plant, and Equipment	<u>\$3,200</u>	<u>\$1,600</u>
Total Assets	<u>\$8,600</u>	<u>\$6,800</u>
Liabilities and Stockholders' Equity		
Current Liabilities		
Accounts Payable	\$1,800	\$1,700
Notes Payable	<u>1,100</u>	<u>1,900</u>
Total Current Liabilities	\$2,900	\$3,600
Long-Term Liabilities		

Bonds Payable	<u>4,100</u>	<u>2,100</u>
Total Liabilities	<u>\$7,000</u>	<u>\$5,700</u>
Stockholders' Equity		
Common Stock	\$ 200	\$ 200
Retained Earnings	<u>1,400</u>	<u>900</u>
Total Stockholders' Equity	<u>\$1,600</u>	<u>\$1,100</u>
Total Liabilities and Stockholders' Equity	<u>\$8,600</u>	<u>\$6,800</u>

LONE PINE COMPANY
Statement of Income and Retained Earnings
For the Year Ending December 31, 20X2 (\$000 Omitted)

Net Sales*		\$36,000
Less: Cost of Goods Sold	\$20,000	
Selling Expense	6,000	
Administrative Expense	4,000	
Interest Expense	400	
Income Tax Expense	<u>2,000</u>	<u>32,400</u>
Net Income		\$ 3,600
Retained Earnings, Jan. 1		<u>900</u>
		\$ 4,500
Cash Dividends Declared and Paid		<u>3,100</u>
Retained Earnings, Dec. 31		<u>\$ 1,400</u>
*All sales are on account.		

Instructions

Compute the following items for Lone Pine Company for 20X2, rounding all calculations to two decimal places when necessary:

- a. Quick ratio
- b. Current ratio
- c. Inventory-turnover ratio
- d. Accounts-receivable-turnover ratio
- e. Return-on-assets ratio
- f. Net-profit-margin ratio
- g. Return-on-common-stockholders' equity
- h. Debt-to-total assets
- i. Number of times that interest is earned
- j. Dividend payout rate

3. **Financial statement construction via ratios.** Incomplete financial statements of Lock Box Inc. are presented as follows:

LOCK BOX INC. Income Statement For the Year Ending December 31, 20X3		
Sales	\$?	
Cost of Goods Sold	?	
Gross Profit	\$ 15,000,000	
Operating Expenses and Interest	?	
Income Before Taxes	\$?	
Income taxes, 40%	?	
Net income	<u>\$?</u>	

LOCK BOX INC.
Balance Sheet
December 31, 20X3

Assets	
Cash	\$?
Accounts Receivable	?
Inventory	?
Property, Plant, and Equipment	<u>8,000,000</u>
Total assets	<u>\$ 24,000,000</u>
Liabilities and Stockholders' Equity	
Accounts Payable	\$?
Notes Payable: Short-Term	600,000
Bonds Payable	4,600,000
Common Stock	2,000,000
Retained Earnings	<u>?</u>
Total Liabilities and Stockholders' Equity	<u>\$ 24,000,000</u>

Further information is the following:

- Cost of goods sold is 60% of sales. All sales are on account.
- The company's beginning inventory is \$5 million; inventory-turnover ratio is 4.
- The debt-to-total-assets ratio is 70%.
- The profit margin on sales is 6%.
- The firm's accounts-receivable-turnover ratio is 5. Receivables increased by \$400,000 during the year.

Instructions

Using the preceding data, complete the income statement and the balance sheet.