Analysis

Learning Objectives

- Convert financial statements to common-sized financial statements 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.

Chapter Outline

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. They can also be used by executives and managers to determine trends and find trouble spots that need changes to improve the financial health of the organization. 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. Executives and managers can use this analysis to identify possible issues and make changes to pricing, purchasing, staffing, credit rules, and many other aspects of a business to improve profitability and liquidity. 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.

8.1 Common-Size Financial Statements

The concept of **common-size financial statements** relates to converting 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 8.1 is a comparative income statement for ABC Medical Clinic for 2 consecutive years. This is the traditional format that you are already well acquainted with.

Exhibit 8.1: A comparative income statement

ABC Medical Clinic 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. Although it is 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.

Vertical Analysis

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. For example, to calculate Cost of Goods Sold, you would divide $100,000 (CGS) by $250,000 = 0.4. Then you convert that to a percentage by multiplying 0.4 by 100 = 40%. The vertical analysis in Exhibit 8.2 reveals how each line item component of income relates to revenue, on a percentage basis.

Exhibit 8.2: An income statement showing a vertical analysis

ABC Medical Clinic 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.

Horizontal Analysis

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 8.3 and the comments that follow.

Exhibit 8.3: An income statement showing a horizontal analysis

ABC Medical Clinic 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 8.3 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 as radar, constantly scanning financial reports for emerging storm clouds! Examine the balance sheets in Exhibits 8.4, 8.5, and 8.6 and see what trends that you can identify.

Exhibit 8.4: A comparative balance sheet

Base Hospital Corporation
Comparative Balance Sheets
December 31, 20X5 and 20X6

	20X6	20X5
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	$ 2,335,000	$ 2,139,000
Accounts payable	$ 143,000	$ 85,000
Notes payable	790,000	810,000
Total liabilities	$ 933,000	$ 895,000
Common stock	$ 500,000	$ 500,000
Retained earnings	902,000	744,000
Total equity	$ 1,402,000	$ 1,244,000
Total liabilities and equity	$ 2,335,000	$ 2,139,000

Exhibit 8.5: A balance sheet showing a vertical analysis

Base Hospital Corporation Balance Sheet December 31, 20X6 and 20X5		
	20X6	20X5
Cash	4.28%	3.74%
Accounts receivable	9.64%	6.31%
Inventory	7.49%	9.82%
Investments	23.70%	23.38%
Land	8.14%	29.17%
Buildings (net)	26.12%	8.88%
Equipment (net)	18.63%	18.70%
Total assets	100.00%	100.00%
Accounts payable	3.97%	3.97%
Notes payable	37.87%	37.87%
Total liabilities	41.84%	41.84%
Common stock	23.38%	23.38%
Retained earnings	34.78%	34.78%
Total equity	58.16%	58.16%
Total liabilities and equity	100.00%	100.00%

Exhibit 8.6: A balance sheet showing a horizontal analysis

Base Hospital Corporation Balance Sheet Horizontal Common-Size Report December 31, 20X6 and 20X5	
	20X6
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	109.16%
Retained earnings	109.16%
Total equity	109.16%
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.

8.2 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, rpm, and so forth are factors 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, executives, managers, 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.

8.3 Liquidity Analysis

Executives, managers, investors, and creditors must be vigilant to monitor a company's **liquidity**, or ability to meet short-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 Clinics 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. Most medical practices have very little invested in inventory, but may have a long waiting time to get paid cash on receivables because insurance companies can be slow payers. Careful budgeting needs to be conducted to ensure that enough cash is available to pay the bills even if payments on receivables are slow.

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 in which a business operates. 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. Some medical facilities may face primarily inventory issues, others may face both inventory and receivables issues, and a third group may only face issues related to receivables. A practice that must keep a lot of supplies on hand, such as a dialysis center or cancer treatment center that must keep expensive medicines or medical supplies well stocked, may need access to more working capital, as the centers wait for cash payment from insurance companies. A small medical practice may not have inventory concerns, but slow-paying insurance companies could create a cash flow problem.

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:

Current Ratio = Current Assets/Current Liabilities.

Based on the information provided in Table 8.1, 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.

Table 8.1: Ashcroft's current assets and liabilities

Current Assets		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	200,000	Taxes payable	140,000
	$1,000,000		$400,000

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 a 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:

Quick Ratio = (Cash + Accounts Receivable)/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 it 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. An as executive or manager, you would have information about ongoing obligations, such as a janitorial contract, so it can be easier for you to do this analysis using expected future expenses or incomes not yet shown on the income statement. Usually this is done using a budget versus actual spreadsheet, which would show the expected expenses budgeted for the year versus the actual expenses already incurred. Budgeting will be examined in greater detail in Chapter 12.

8.4 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:

Debt-to-Total-Assets Ratio = Total Debt/Total Assets.

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

Debt-to-Equity Ratio = Total Debt/Total Equity.

Both of these ratios are carefully monitored by investors 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 in which a business operates. 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. Medical organizations require significant debt loads to pay for the expensive facilities and medical equipment needed to provide services. Given these capital expenditures, debt loads can be high in this industry as well.

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 may 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:

> Times-Interest-Earned Ratio =
> Income Before Income Taxes and Interest/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. For example, a creditor may require an organization to secure the debt with additional collateral.

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 necessary.

8.5 Activity Analysis

Some analysis is used to measure the level of activity and how that activity impacts the company's liquidity and profitability. Two key activities we review here are accounts receivable turnover, which measures how quickly bills are paid, and supplies or inventory turnover, which measures how long supplies or inventory sit on the shelves.

One of the more dreadful problems a business can encounter is selling on credit and then not being able to collect amounts due, which can be common in the healthcare industry, as providers wait for insurance reimbursements. 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. Executives, managers, investors, and creditors can sometimes get an advance hint about such problems by performing turnover analysis.

Accounts Receivable Turnover

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 attract new patients. Many healthcare organizations require that co-payments and deductibles be paid at the time of service to avoid collection problems related to patient bills. When the out-of-pocket costs are too high, some practices will even assist patients with an application to a medical credit account to enable the collection of payment at time of service. Other businesses require customers to prepare a credit application, check credit references, and obtain credit reports. Some types of businesses require a security deposit or bank guarantee to reduce credit risk, but this is rare in the healthcare industry.

Managing accounts receivable turnover can be critical in a healthcare environment, where there could be several payers for one patient: The patient pays his or her share, an insurance company pays another portion, and a third party (such as secondary insurer) pays another portion. For example, a patient will pay his or her share, the primary payer will pay its share, and possibly a secondary insurer policy may pay its share. Another example could be multiple billings for the same patient, such as a billing for the physician's fees, a second billing for laboratory testing, and a third billing for radiology. Multiple billings can be common in the healthcare industry.

The collection rate, particularly from insurers, 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 (the amount due from insurers in account receivables) are divided by the average net accounts receivable:

Accounts-Receivable-Turnover Ratio =
Net Credit Sales/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:

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

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 Days/Accounts-Receivable-Turnover Ratio = Days Outstanding Ratio

$365/12.5 = 29.2$.

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 or Supplies Turnover

Inventory-turnover ratios are very similar in nature. Inventory can be expensive for healthcare facilities, and much of it, such as medications, is subject to obsolescence, damage, and spoilage. In healthcare, inventory often is found on the income statement as a supplies expense. 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 Lowe's, which has a slightly lower inventory turnover ratio of 5 to 6. In other words, The Home Depot usually turns its inventory faster than Lowe's. The inventory-turnover ratio is calculated via the following formula:

Inventory-Turnover Ratio = Cost of Goods Sold/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 observing 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 versus weighted average) can cause distortions in comparative analysis.

8.6 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.

Margin Ratios

To begin, two key ratios are the **gross-profit-margin ratio** and **net-profit-margin ratio**:

Gross-Profit-Margin Ratio = Gross Profit/Net Sales

Net-Profit-Margin Ratio = Net Income/Net Sales.

Both ratios examine profitability in relation to sales. The gross-profit-margin ratio examines the proportion of sales that is left over 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 Hospital 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) ÷ $5,000,000], and its net profit margin would be 10% ($500,000 ÷ $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.)

Return-on-Assets Ratio

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:

Return-on-Assets Ratio = (Net Income + Interest Expense)/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 cost 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.

Return-on-Equity Ratio

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

Return-on-Equity Ratio = Net Income/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 funds 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.

8.7 Recap and Summary Illustration

Many new concepts were introduced in this chapter. Table 8.2 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 8.2: 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-receivable-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

Exhibit 8.7 shows comprehensive financial statements for Mossman Clinics. This information will be used to demonstrate the calculation of all ratios introduced in this chapter, as shown in Table 8.3. 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 8.7: Financial statements for Mossman Clinics

Mossman Clinics Comparative Balance Sheets December 31, 20X7 and 20X6				
Assets		20X7		20X6
Current assets				
Cash	$	1,800,000	$	1,275,000
Accounts receivable		600,000		550,000
Inventories		200,000		175,000
Total current assets	$	2,600,000	$	2,000,000
Property, plant, & equipment				
Land		750,000		750,000
Building		925,000		925,000
Equipment		750,000		700,000
	$	2,425,000	$	2,375,000
Less: Accumulated depreciation		(425,000)		(360,000)
Total property, plant & equipment	$	2,000,000	$	2,015,000
Total assets	$	4,600,000	$	4,015,000
Liabilities				
Current liabilities	$	1,160,000	$	750,000
Accounts payable		80,000		600,000
Wages payable	$	1,240,000	$	1,350,000
Total current liabilities				
Long-term liabilities		725,000		750,000
Long-term loan payable	$	1,965,000	$	2,100,000
Total liabilites				
Stockholders' Equity				
Capital stock	$	800,000	$	800,000
Retained earnings		1,835,000		1,115,000
Total stockholders' equity	$	2,635,000	$	1,915,000
Total liabilities and equity	$	4,600,000	$	4,015,000

(continued)

Exhibit 8.7: Financial statements for Mossman Clinics *(continued)*

Mossman Clinics Income Statement For the Year Ending December 31, 20X7		
Revenues		$ 3,000,000
Cost of goods sold		1,160,000
Gross profit		$ 1,840,000
Operating expenses		
Wages	$ 400,000	
Interest	48,000	
Depreciation	65,000	
Other operating expenses	135,000	(648,000)
Income before income taxes		$ 1,192,000
Less: Income taxes		422,000
Net income		$ 770,000

Mossman Clinics Statement of Retained Earnings For the Year Ending December 31, 20X7	
Beginning retained earnings, January 1	$ 1,115,000
Plus: Net income	770,000
	$ 1,885,000
Less: Dividends	50,000
Ending retained earnings, December 31	$ 1,835,000

Table 8.3: Calculations of ratios

Ratio Type	Calculation	Mossman Clinics
Current ratio	Current assets/current liabilities	$2,600,000 ÷ $1,240,000 = 2.1
Quick ratio	(Cash + short-term investments + accounts receivable)/current liabilities	$2,400,000 ÷ $1,240,000 = 1.94
Debt-to-total assets ratio	Total debt/total assets	$1,965,000 ÷ $4,600,000 = 0.43
Debt-to-equity ratio	Total debt/total equity	$1,965,000 ÷ $2,635,000 = 0.75
Times-interest-earned ratio	Income before income taxes and interest/interest charges	$1,240,000 ÷ $48,000 = 26
Accounts-receivable-turnover ratio	Net credit sales/average net accounts receivable	$3,000,000 ÷ $575,000 = 5.2

Table 8.3: Calculations of ratios *(continued)*

Ratio Type	Calculation	Mossman Clinics
Inventory-turnover ratio	Cost of goods sold/average inventory	$1,160,00 ÷ $187,500 = 6.2
Net-profit-margin ratio	Net income/net sales	$770,000 ÷ $3,000,000 = 26%
Gross-profit-margin ratio	Gross profit/net sales	$1,840,000 ÷ $3,000,000 = 61%
Return-on-assets ratio	(Net income + interest expense)/average assets	$818,000 ÷ $4,307,500 = 19%
Return-on-equity ratio	Net income/average common equity	$770,00 ÷ $2,275,00 = 34%

Case Study: Lucky Hospital, Inc.

The Comptroller of Lucky Hospital has been asked to prepare financial statements for the Board of Directors projecting the likely financial results for the hospital at the end of December 31, 20X3. He started the calculations and asked his senior accountant to complete the task because he needs to take care of other business matters.

The senior accountant finds the follow information, presented in Exhibits 8.8 and 8.9, has been collected so far by the comptroller:

Exhibit 8.8: An incomplete income statement

Lucky Hospital, 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	$?

(continued)

Case Study: Lucky Hospital, Inc. *(continued)*

Exhibit 8.9: An incomplete balance sheet

Lucky Hospital, Inc. **Balance Sheet** **December 31, 20X3**		
Assets		
Cash	$	?
Accounts receivable		?
Inventory		?
Property, plant, and equipment		8,000,000
Total assets		$ 24,000,000
Liabilities and stockholders' equity		
Accounts payable	$	?
Notes payable: short-term		**600,000**
Bonds payable		**4,600,000**
Common stock		**2,000,000**
Retained earnings		?
Total liabilities and stockholders' equity		$ 24,000,000

The senior accountant knows that:

- 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.

Case Study Exercise

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

Key Terms

accounts-receivable-turnover ratio The number of times a firm's receivables are converted to cash during a year: Accounts-Receivable-Turnover Ratio = Net Credit Sales/Average Net Accounts Receivable.

common-size financial statement Relates to scaling the dollar amounts within financial statements to percentage terms.

current ratio Reveals the relative amount of working capital by dividing current assets by current liabilities: Current Ratio = Current Assets/Current Liabilities.

days outstanding ratio Reveals how many days sales are carried in the receivables category: Days Outstanding = 365 Days/Accounts-Receivable-Turnover Ratio.

debt-to-equity ratio Compares total debt to total equity: Debt-to-Equity Ratio = Total Debt/Total Equity.

debt-to-total-assets ratio Evaluates the proportion of the asset pool that is financed with debt: Debt-to-Total-Assets Ratio = Total Debt/Total Assets.

gross-profit-margin ratio Examines the proportion of sales that is left over, taking into account only the cost of the units sold: Gross Profit/Net Sales.

horizontal analysis Used to compare data from two or more periods, side by side.

inventory-turnover ratio Reveals the number of times that a firm's inventory balance is turned over or sold during a particular year: Inventory-Turnover Ratio = Cost of Goods Sold/Average Inventory.

liquidity The ability to meet short-term obligations as they mature.

net-profit-margin ratio Reflects the final residual amount: Net Profit on Sales = Net Income/Net Sales.

quick ratio A stringent liquidity that is calculated by dividing "quick assets" by current liabilities: Quick Ratio = ("Cash" + Accounts Receivable)/Current Liabilities.

return-on-assets (ROA) ratio Measures profitability from a given level of asset investment. Calculated by dividing income before interest cost by the average assets used in the business: Return-on-Assets Ratio = (Net Income + Interest Expense)/Average Assets.

return-on-equity (ROE) ratio Evaluates income in relation to the amount of invested common shareholder equity: Return-on-Equity Ratio = Net Income/Average Common Equity.

solvency The ability to satisfy a long-term structural debt.

times-interest-earned ratio Shows how many times a company's income stream will cover its interest obligation: Times-Interest-Earned Ratio = Income Before Income Taxes and Interest/Interest Charges.

vertical analysis Results when each expense category is expressed as a percentage of sales.

working capital The amount of current assets minus current liabilities.

Review Questions

The following questions relate to several issues raised in the chapter. Test your knowledge of these issues by selecting the best answer. (The odd-numbered answers appear in the answer appendix.)

1. Vertical analysis

    a. cannot be used to compare companies of different size.
    b. provides information about the magnitude, direction, and relative importance of changes in individual financial statement items.
    c. is needed to assess the coverage of obligations.
    d. results in common-size financial statements.

2. London Corporation paid $1,000 of accounts payable with cash on the last day of the month. The company had a current ratio of 4 before the disbursement. As a result of this payment, the current ratio will

    a. increase.
    b. decrease.
    c. remain unchanged.
    d. fluctuate, but the direction of the change depends on unstated facts.

3. Annual reports

    a. are issued to corporate managers but not to stockholders.
    b. contain a corporation's financial statements, accompanying notes, and various other management disclosures.
    c. contain a corporation's financial statements but not the auditor's report.
    d. focus more on marketing the corporation's products than on disclosing financial information.

4. Distinguish between horizontal analysis and vertical analysis. Which type of analysis results in common-size financial statements?

5. What is one of the basic benefits associated with the use of common-size financial statements?

6. A student once noted, "This ratio stuff is great. It's unbelievable how ratios can tell the complete story behind the problems of a business." Comment on the student's observation.

7. Briefly describe the following types of ratios and identify the financial statement users most interested in each type.

    a. liquidity ratios
    b. activity ratios
    c. profitability ratios

8. What is the current ratio? Present a short critique of this widely used financial measure.

9. Why do many analysts prefer the quick ratio to the current ratio for judging debt-paying ability?

10. What insight can be provided by the accounts-receivable-turnover ratio? The inventory-turnover ratio?

Exercises

1. **Horizontal analysis**. Mary Lynn Clinics has been operating for several years. Selected data from the 20X1 and 20X2 financial statements follow.

	20X2	20X1
Current assets	$ 76,000	$ 80,000
Property, plant, and equipment (net)	99,000	90,000
Intangibles	25,000	50,000
Current liabilities	40,800	48,000
Long-term liabilities	143,000	160,000
Stockholders' equity	16,200	12,000
Net patient revenues	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 Clinic 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 Clinics 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 Medical Supplies, 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.

5. **Evaluation of selected ratios**. Selected ratios of Glenwood Pharmaceutical Company and averages for the pharmaceutical industry follow:

	Glenwood	Industry
Current ratio	2.21	1.75
Average collection period of receivables	39 days	35 days
Inventory turnover	4.1	2.5
Net-profit-margin ratio	12.5%	17.5%
Return on assets	16.2%	15.4%
Debt-to-total assets	43.5%	49.2%

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

a. Glenwood has better debt-paying ability than the "average" company in the medical equipment industry.

b. Glenwood is performing below average in managing its inventories.

c. The amount of income generated, given the company's resources, exceeds that produced by the industry.

d. Glenwood may need to improve its management of credit and customer collections.

e. 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 Medical Clinic:

Waterloo Medical Clinic 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	3,750	3,750
Total current assets	$ 72,000	$ 76,250
Property, plant, and equipment		
Buildings (net)	$102,750	$101,250
Equipment (net)	28,500	30,000
Vehicles (net)	32,000	40,000
Total property, plant, and equipment	$163,250	$171,250
Trademarks (net)	$ 14,750	$ 2,500
Total assets	$250,000	$250,000
Liabilities and stockholders' equity		
Current liabilities		
Accounts payable	$ 49,000	$ 70,000
Notes payable	13,500	40,000
Federal taxes payable	2,500	25,000
Total current liabilities	$ 65,000	$135,000
Long-term debt	$ 50,000	$ 25,000
Total liabilities	$115,000	$160,000
Stockholders' equity		
Common stock, $10 par	$ 25,000	$ 25,000
Retained earnings	110,000	65,000
Total stockholders' equity	$135,000	$ 90,000
Total liabilities and stockholders' equity	$250,000	$250,000

Waterloo Medical Clinic Comparative Income Statements For the Years Ending December 31, 20X5 and 20X4		
	20X5	**20X4**
Net sales	$550,000	$500,000
Cost of goods sold	330,000	250,000
Gross profit	$220,000	$250,000
Operating expense	132,500	100,000
Income before interest and taxes	$ 87,500	$150,000
Interest expense	12,500	3,000
Income before taxes	75,000	147,000
Income tax expense	30,000	58,800
Net income	$ 45,000	$ 88,200

Instructions

a. 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.
b. Prepare a vertical analysis of the income statement by relating each item to net sales.
c. Briefly comment on the results of your analysis.

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

Lone Pine Medical Supply 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	2,000	2,200
Total current assets	$5,400	$5,200
Property, plant, and equipment		
Land	$1,700	$ 600
Buildings and equipment (net)	1,500	1,000
Total property, plant, and equipment	$3,200	$1,600
Total assets	$8,600	$6,800

Lone Pine Medical Supply Company
Comparative Balance Sheets
December 31, 20X2 and 20X1 ($000 Omitted)

	20X2	20X1
Liabilities and stockholders' equity		
Current liabilities		
Accounts payable	$1,800	$1,700
Notes payable	1,100	1,900
Total current liabilities	$2,900	$3,600
Long-term liabilities		
Bonds payable	4,100	2,100
Total liabilities	$ 7,000	$5,700
Stockholders' equity		
Common stock	$ 200	$ 200
Retained earnings	1,400	900
Total stockholders' equity	$1,600	$1,100
Total liabilities and stockholders' equity	$8,600	$6,800

Lone Pine Medical Supply 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	2,000	32,400
Net income		$ 3,600
Retained earnings, Jan. 1		900
		$ 4,500
Cash dividends declared and paid		3,100
Retained earnings, Dec. 31		$ 1,400

*All sales are on account.

Instructions

Compute the following items for Lone Pine Medical Supply 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. debt-to-total assets
h. number of times that interest is earned