3 Working with Financial Statements

THE PRICE OF A SHARE OF COMMON STOCK in cell phone service provider T-Mobile closed at about $78 on May 22, 2020. At that price, T-Mobile had a price-earnings (PE) ratio of 23. That is, investors were willing to pay $23 for every dollar in income earned by T-Mobile. At the same time, investors were willing to pay $116, $28, and $12 for each dollar earned by Amazon, LVMH, and Progressive, respectively. At the other extreme were Slack and Lyft. Both had negative earnings for the previous year, yet Slack was priced at about $32 per share and Lyft at about $31 per share. Because they had negative earnings, their PE ratios would have been negative, so they were not reported. At the time, the typical stock in the S&P 500 Index of large company stocks was trading at a PE of about 21, or about 21 times earnings, as they say on Wall Street.

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

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

- **LO1** Standardize financial statements for comparison purposes.
- **LO2** Compute and, more importantly, interpret some common ratios.
- **LO3** Name the determinants of a firm's profitability.
- **LO4** Explain some of the problems and pitfalls in financial statement analysis.

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In Chapter 2, we discussed some of the essential concepts of financial statements and cash flow. Part 2, this chapter and the next, continues where our earlier discussion left off. Our goal here is to expand your understanding of the uses (and abuses) of financial statement information.

Financial statement information will crop up in various places in the remainder of our book. A good working knowledge of financial statements is desirable because such statements, and numbers derived from those statements, are the primary means of communicating financial information both within the firm and outside the firm. In short, much of the language of corporate finance is rooted in the ideas we discuss in this chapter.

Furthermore, as we will see, there are many different ways of using financial statement information and many different types of users. This diversity reflects the fact that financial statement information plays an important part in many types of decisions.

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

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

Clearly, one important goal of the accountant is to report financial information to the user in a form useful for decision making. Ironically, the information frequently does not come to the user in such a form. In other words, financial statements don't come with a user's guide. This chapter and the next are first steps in filling this gap.

3.1 Cash Flow and Financial Statements: A Closer Look

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At the most fundamental level, firms do two different things: They generate cash and they spend it. Cash is generated by selling a product, an asset, or a security. Selling a security involves either borrowing or selling an equity interest (shares of stock) in the firm. Cash is spent in paying for materials and labor to produce a product and in purchasing assets. Payments to creditors and owners also require the spending of cash.

In Chapter 2, we saw that the cash activities of a firm could be summarized by a simple identity:

Cash flow from assets = Cash flow to creditors + Cash flow to owners

This cash flow identity summarizes the total cash result of all transactions a firm engages in during the year. In this section, we return to the subject of cash flow by taking a closer look at the cash events during the year that led to these total figures.

SOURCES AND USES OF CASH

sources of cash
A firm's activities that generate cash.

uses of cash
A firm's activities in which cash is spent. Also called *applications of cash.*

Activities that bring in cash are called **sources of cash**. Activities that involve spending cash are called **uses** (or *applications)* **of cash**. What we need to do is to trace the changes in the firm's balance sheet to see how the firm obtained and spent its cash during some period.

To get started, consider the balance sheets for the Prufrock Corporation in Table 3.1. Notice that we have calculated the change in each of the items on the balance sheets.

Looking over the balance sheets for Prufrock, we see that quite a few things changed during the year. For example, Prufrock increased its net fixed assets by $149 and its inventory by $29. (Note that, throughout, all figures are in millions of dollars.) Where did the money come from? To answer this and related questions, we need to first identify those changes that used up cash (uses) and those that brought in cash (sources).

A little common sense is useful here. A firm uses cash by either buying assets or making payments. So, loosely speaking, an increase in an asset account means the firm, on a net basis, bought some assets—a use of cash. If an asset account went down, then on a net basis, the firm sold some assets. This would be a net source. Similarly, if a liability account goes down, then the firm has made a net payment—a use of cash.

TABLE 3.1

PRUFROCK CORPORATION 2020 and 2021 Balance Sheets (in millions)			
	2020	2021	Change
Assets			
Current assets			
Cash	$ 84	$ 146	+$ 62
Accounts receivable	165	188	+ 23
Inventory	393	422	+ 29
Total	$ 642	$ 756	+$114
Fixed assets			
Net plant and equipment	$2,731	$2,880	+$149
Total assets	$3,373	$3,636	+$263
Liabilities and Owners' Equity			
Current liabilities			
Accounts payable	$ 312	$ 344	+$ 32
Notes payable	231	196	− 35
Total	$ 543	$ 540	−$ 3
Long-term debt	$ 531	$ 457	−$ 74
Owners' equity			
Common stock and paid-in surplus	$ 500	$ 550	+$ 50
Retained earnings	1,799	2,089	+ 290
Total	$2,299	$2,639	+$340
Total liabilities and owners' equity	$3,373	$3,636	+$263

Given this reasoning, there is a simple, albeit mechanical, definition you may find useful. An increase in a left-side (asset) account or a decrease in a right-side (liability or equity) account is a use of cash. Likewise, a decrease in an asset account or an increase in a liability (or equity) account is a source of cash.

Looking again at Prufrock, we see that inventory rose by $29. This is a net use of cash because Prufrock effectively paid out $29 to increase inventories. Accounts payable rose by $32. This is a source of cash because Prufrock effectively has borrowed an additional $32 payable by the end of the year. Notes payable, on the other hand, went down by $35, so Prufrock effectively paid off $35 worth of short-term debt—a use of cash.

Based on our discussion, we can summarize the sources and uses of cash from the balance sheet as follows:

Sources of cash:	
Increase in accounts payable	$ 32
Increase in common stock	50
Increase in retained earnings	290
Total sources	$372
Uses of cash:	
Increase in accounts receivable	$ 23
Increase in inventory	29
Decrease in notes payable	35
Decrease in long-term debt	74
Net fixed asset acquisitions	149
Total uses	$310
Net addition to cash	$ 62

Company financial information can be found in many places on the web, including **finance.yahoo.com**, **finance.google.com**, and **money.msn.com**.

TABLE 3.2

PRUFROCK CORPORATION 2021 Income Statement (in millions)		
Sales		$2,311
Cost of goods sold		1,344
Depreciation		276
Earnings before interest and taxes		$ 691
Interest paid		141
Taxable income		$ 550
Taxes (21%)		116
Net income		$ 435
Dividends	$145	
Addition to retained earnings	290	

The net addition to cash is the difference between sources and uses, and our $62 result here agrees with the $62 change shown on the balance sheet.

This simple statement tells us much of what happened during the year, but it doesn't tell the whole story. For example, the increase in retained earnings is net income (a source of funds) less dividends (a use of funds). It would be more enlightening to have these reported separately so we could see the breakdown. Also, we have considered only net fixed asset acquisitions. Total or gross spending would be more interesting to know.

To further trace the flow of cash through the firm during the year, we need an income statement. For Prufrock, the results for the year are shown in Table 3.2.

Notice here that the $290 addition to retained earnings we calculated from the balance sheet is the difference between the net income of $435 and the dividends of $145.

THE STATEMENT OF CASH FLOWS

statement of cash flows
A firm's financial statement that summarizes its sources and uses of cash over a specified period.

There is some flexibility in summarizing the sources and uses of cash in the form of a financial statement. However it is presented, the result is called the **statement of cash flows**.

We present a particular format for this statement in Table 3.3. The basic idea is to group all the changes into three categories: operating activities, financing activities, and investment activities. The exact form differs in detail from one preparer to the next.

Don't be surprised if you come across different arrangements. The types of information presented will be similar; the exact order can differ. The key thing to remember in this case is that we started out with $84 in cash and ended up with $146, for a net increase of $62. We're trying to see what events led to this change.

Going back to Chapter 2, we note that there is a slight conceptual problem here. Interest paid should really go under financing activities, but unfortunately that's not the way the accounting is handled. The reason, you may recall, is that interest is deducted as an expense when net income is computed. Also, notice that the net purchase of fixed assets was $149. Because Prufrock wrote off $276 worth of assets (the depreciation), it must have actually spent a total of $149 + 276 = $425 on fixed assets.

Once we have this statement, it might seem appropriate to express the change in cash on a per-share basis, much as we did for net income. Ironically, despite the interest we might have in some measure of cash flow per share, standard accounting practice expressly prohibits reporting this information. The reason is that accountants feel that cash flow (or some component of cash flow) is not an alternative to accounting income, so only earnings per share are to be reported.

As shown in Table 3.4, it is sometimes useful to present the same information a bit differently. We will call this the "sources and uses of cash" statement. There is no such

TABLE 3.3

PRUFROCK CORPORATION 2021 Statement of Cash Flows (in millions)	
Cash, beginning of year	$ 84
Operating activity	
Net income	$435
Plus:	
Depreciation	276
Increase in accounts payable	32
Less:	
Increase in accounts receivable	– 23
Increase in inventory	– 29
Net cash from operating activity	$691
Investment activity	
Fixed asset acquisitions	–$425
Net cash from investment activity	–$425
Financing activity	
Decrease in notes payable	–$ 35
Decrease in long-term debt	– 74
Dividends paid	– 145
Increase in common stock	50
Net cash from financing activity	–$204
Net increase in cash	$ 62
Cash, end of year	$146

TABLE 3.4

PRUFROCK CORPORATION 2021 Sources and Uses of Cash (in millions)	
Cash, beginning of year	$ 84
Sources of cash	
Operations:	
Net income	$435
Depreciation	276
	$711
Working capital:	
Increase in accounts payable	$ 32
Long-term financing:	
Increase in common stock	50
Total sources of cash	$793
Uses of cash	
Working capital:	
Increase in accounts receivable	$ 23
Increase in inventory	29
Decrease in notes payable	35
Long-term financing:	
Decrease in long-term debt	74
Fixed asset acquisitions	425
Dividends paid	145
Total uses of cash	$731
Net addition to cash	$ 62
Cash, end of year	$146

statement in financial accounting, but this arrangement resembles one used many years ago. As we will discuss, this form can come in handy, but we emphasize again that it is not the way this information is normally presented.

Now that we have the various cash pieces in place, we can get a good idea of what happened during the year. Prufrock's major cash outlays were fixed asset acquisitions and cash dividends. It paid for these activities primarily with cash generated from operations.

Prufrock also retired some long-term debt and increased current assets. Finally, current liabilities were not greatly changed, and a relatively small amount of new equity was sold. Altogether, this short sketch captures Prufrock's major sources and uses of cash for the year.

Concept Questions

3.1a What is a source of cash? Give three examples.

3.1b What is a use, or application, of cash? Give three examples.

3.2 Standardized Financial Statements

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The next thing we might want to do with Prufrock's financial statements is compare them to those of other similar companies. We would immediately have a problem, however. It's almost impossible to directly compare the financial statements for two companies because of differences in size.

For example, Ford and GM are serious rivals in the auto market, but GM is bigger (in terms of market share), so it is difficult to compare them directly. For that matter, it's difficult even to compare financial statements from different points in time for the same company if the company's size has changed. The size problem is compounded if we try to compare GM and, say, Toyota. If Toyota's financial statements are denominated in yen, then we have size *and* currency differences.

To start making comparisons, one obvious thing we might try to do is to somehow standardize the financial statements. One common and useful way of doing this is to work with percentages instead of total dollars. In this section, we describe two different ways of standardizing financial statements along these lines. The financial ratios we discuss area often considered **key performance indicators (KPI)**. A KPI is a measurable value that shows how effectively a company is achieving business objectives.

key performance indicators (KPI)
A measurable value that shows how a company is progressing toward achieving a key business objective.

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

COMMON-SIZE STATEMENTS

To get started, a useful way of standardizing financial statements is to express each item on the balance sheet as a percentage of assets and to express each item on the income statement as a percentage of sales. The resulting financial statements are called **common-size statements**. We consider these next.

Common-Size Balance Sheets One way, though not the only way, to construct a common-size balance sheet is to express each item as a percentage of total assets. Prufrock's 2020 and 2021 common-size balance sheets are shown in Table 3.5.

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

TABLE 3.5

PRUFROCK CORPORATION 2020 and 2021 Common-Size Balance Sheets			
	2020	2021	Change
Assets			
Current assets			
Cash	2.5%	4.0%	+1.5%
Accounts receivable	4.9	5.2	+ .3
Inventory	11.7	11.6	+ 0
Total	19.0	20.8	+1.8
Fixed assets			
Net plant and equipment	81.0	79.2	−1.8
Total assets	100.0%	100.0%	0
Liabilities and Owners' Equity			
Current liabilities			
Accounts payable	9.2%	9.5%	+ .2%
Notes payable	6.8	5.4	−1.5
Total	16.1	14.9	−1.2
Long-term debt	15.7	12.6	−3.2
Owners' equity			
Common stock and paid-in surplus	14.8	15.1	+ .3
Retained earnings	53.3	57.5	+4.1
Total	68.2	72.6	+4.4
Total liabilities and owners' equity	100.0%	100.0%	0

In this form, financial statements are relatively easy to read and compare. For example, looking at the two balance sheets for Prufrock, we see that current assets were 20.8 percent of total assets in 2021, up from 19.0 percent in 2020. Current liabilities declined from 16.1 percent to 14.9 percent of total liabilities and equity over that same time. Similarly, total equity rose from 68.2 percent of total liabilities and equity to 72.6 percent.

Overall, Prufrock's liquidity, as measured by current assets compared to current liabilities, increased over the year. Simultaneously, Prufrock's indebtedness diminished as a percentage of total assets. We might be tempted to conclude that the balance sheet has grown "stronger." We will say more about this later.

Common-Size Income Statements A useful way of standardizing the income statement is to express each item as a percentage of total sales, as illustrated for Prufrock in Table 3.6.

This income statement tells us what happens to each dollar in sales. For Prufrock, interest expense eats up $.061 out of every sales dollar and taxes take another $.05. When all is said and done, $.188 of each dollar flows through to the bottom line (net income), and that amount is split into $.125 retained in the business and $.063 paid out in dividends.

These percentages are useful in comparisons. For example, a relevant figure is the cost percentage. For Prufrock, $.582 of each $1 in sales goes to pay for goods sold. It would be interesting to compute the same percentage for Prufrock's main competitors to see how Prufrock stacks up in terms of cost control.

TABLE 3.6

PRUFROCK CORPORATION 2021 Common-Size Income Statement		
Sales		100.0%
Cost of goods sold		58.2
Depreciation		11.9
Earnings before interest and taxes		29.9
Interest paid		6.1
Taxable income		23.8
Taxes (21%)		5.0
Net income		18.8%
Dividends	6.3%	
Addition to retained earnings	12.5	

Common-Size Statements of Cash Flows Although we have not presented it here, it is also possible and useful to prepare a common-size statement of cash flows. Unfortunately, with the current statement of cash flows, there is no obvious denominator such as total assets or total sales. However, if the information is arranged in a way similar to that in Table 3.4, then each item can be expressed as a percentage of total sources (or total uses). The results can then be interpreted as the percentage of total sources of cash supplied or as the percentage of total uses of cash for a particular item.

COMMON-BASE YEAR FINANCIAL STATEMENTS: TREND ANALYSIS

Imagine we were given balance sheets for the last 10 years for some company and we were trying to investigate trends in the firm's pattern of operations. Does the firm use more or less debt? Has the firm grown more or less liquid? A useful way of standardizing financial statements in this case is to choose a base year and then express each item relative to the base amount. We will call the resulting statements **common-base year statements**.

common-base year statement
A standardized financial statement presenting all items relative to a certain base year amount.

For example, from 2020 to 2021, looking at Table 3.1, Prufrock's inventory rose from $393 to $422. If we pick 2020 as our base year, then we would set inventory equal to 1.00 for that year. For the next year, we would calculate inventory relative to the base year as $422/$393 = 1.07. In this case, we could say inventory grew by about 7 percent during the year. If we had multiple years, we would divide the inventory figure for each one by $393. The resulting series is easy to plot, and it is then easy to compare companies. Table 3.7 summarizes these calculations for the asset side of the balance sheet.

COMBINED COMMON-SIZE AND BASE YEAR ANALYSIS

The trend analysis we have been discussing can be combined with the common-size analysis discussed earlier. The reason for doing this is that as total assets grow, most of the other accounts must grow as well. By first forming the common-size statements, we eliminate the effect of this overall growth.

Looking at Table 3.7, we see that Prufrock's accounts receivable were $165, or 4.9 percent of total assets, in 2020. In 2021, they had risen to $188, which was 5.2 percent of total assets. If we do our analysis in terms of dollars, then the 2021 figure would be $188/$165 = 1.14, representing a 14 percent increase in receivables. However, if we work with the common-size statements, then the 2021 figure would be 5.2%/4.9% = 1.06. This tells us accounts receivable, as a percentage of total assets, grew by 6 percent. Roughly speaking, what we see is that of the 14 percent total increase, about 8 percent (= 14% − 6%) is attributable to growth in total assets.

TABLE 3.7

PRUFROCK CORPORATION
Summary of Standardized Balance Sheets
(Asset Side Only)

	Assets (in millions)		Common-Size Assets		Common-Base Year Assets	Combined Common-Size and Base Year Assets
	2020	2021	2020	2021	2021	2021
Current assets						
Cash	$ 84	$ 146	2.5%	4.0%	1.74	1.61
Accounts receivable	165	188	4.9	5.2	1.14	1.06
Inventory	393	422	11.7	11.6	1.07	1.00
Total current assets	$ 642	$ 756	19.0	20.8	1.18	1.09
Fixed assets						
Net plant and equipment	$2,731	$2,880	81.0	79.2	1.05	.98
Total assets	$3,373	$3,636	100.0%	100.0%	1.08	1.00

NOTE: The common-size numbers are calculated by dividing each item by total assets for that year. For example, the 2020 common-size cash amount is $84/$3,373 = .025, or 2.5%. The common-base year numbers are calculated by dividing each 2021 item by the base year (2020) dollar amount. The common-base year cash is thus $146/$84 = 1.74, representing a 74 percent increase. The combined common-size and base year figures are calculated by dividing each common-size amount by the base year (2020) common-size amount. The cash figure is therefore 4.0%/2.5% = 1.61, representing a 61 percent increase in cash holdings as a percentage of total assets. Columns may not total precisely due to rounding.

Concept Questions

3.2a Why is it often necessary to standardize financial statements?

3.2b Name two types of standardized statements and describe how each is formed.

Ratio Analysis 3.3

Another way of avoiding the problems involved in comparing companies of different sizes is to calculate and compare **financial ratios**. Such ratios are ways of comparing and investigating the relationships between different pieces of financial information. Using ratios eliminates the size problem because the size effectively divides out. We're then left with percentages, multiples, or time periods.

There is a problem in discussing financial ratios. Because a ratio is one number divided by another, and because there are so many accounting numbers out there, we could examine a huge number of possible ratios. Everybody has a favorite. We will restrict ourselves to a representative sampling.

In this section, we only want to introduce you to some commonly used financial ratios. These are not necessarily the ones we think are the best. In fact, some of them may strike you as illogical or not as useful as some alternatives. If they do, don't be concerned. As a financial analyst, you can always decide how to compute your own ratios.

What you do need to worry about is the fact that different people and different sources seldom compute these ratios in exactly the same way, and this leads to much confusion. The specific definitions we use here may or may not be the same as ones you have seen or will see elsewhere. If you are ever using ratios as a tool for analysis, you should be careful to document how you calculate each one. And if you are comparing your numbers to numbers from another source, be sure you know how those numbers have been computed.

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

We will defer much of our discussion of how ratios are used and some problems that come up with using them until later in the chapter. For now, for each of the ratios we discuss, we consider several questions:

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

Financial ratios are traditionally grouped into the following categories:

1. Short-term solvency, or liquidity, ratios.
2. Long-term solvency, or financial leverage, ratios.
3. Asset management, or turnover, ratios.
4. Profitability ratios.
5. Market value ratios.

We will consider each of these in turn. In calculating these numbers for Prufrock, we will use the ending balance sheet (2021) figures unless we say otherwise. Also notice that the various ratios are color keyed to indicate which numbers come from the income statement (blue) and which come from the balance sheet (green).

SHORT-TERM SOLVENCY, OR LIQUIDITY, MEASURES

As the name suggests, short-term solvency ratios as a group are intended to provide information about a firm's liquidity, and these ratios are sometimes called *liquidity measures*. The primary concern is the firm's ability to pay its bills over the short run without undue stress. Consequently, these ratios focus on current assets and current liabilities.

For obvious reasons, liquidity ratios are particularly interesting to short-term creditors. Because financial managers work constantly with banks and other short-term lenders, an understanding of these ratios is essential.

One advantage of looking at current assets and liabilities is that their book values and market values are likely to be similar. Often (though not always), these assets and liabilities don't live long enough for the two to get seriously out of step. On the other hand, like any type of near-cash, current assets and liabilities can and do change fairly rapidly, so today's amounts may not be a reliable guide to the future.

Go to **www.reuters.com** to examine ratios for a huge number of companies.

Current Ratio One of the best known and most widely used ratios is the *current ratio*. As you might guess, the current ratio is defined as follows:

3.1

$$\text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}}$$

Here is Prufrock's 2021 current ratio:

$$\text{Current ratio} = \frac{\$756}{\$540} = 1.40 \text{ times}$$

Because current assets and liabilities are, in principle, converted to cash over the following 12 months, the current ratio is a measure of short-term liquidity. The unit of measurement is either dollars or times. So, we could say Prufrock has $1.40 in current assets for every $1 in current liabilities, or we could say Prufrock has its current liabilities covered 1.40 times over.

To a creditor—particularly a short-term creditor such as a supplier—the higher the current ratio, the better. To the firm, a high current ratio indicates liquidity, but it also may indicate an inefficient use of cash and other short-term assets. Absent some extraordinary circumstances, we would expect to see a current ratio of at least 1 because a current ratio of less than 1 would mean that net working capital (current assets less current liabilities) is negative. This would be unusual in a healthy firm, at least for most types of businesses.

The current ratio, like any ratio, is affected by various types of transactions. Suppose the firm borrows over the long term to raise money. The short-run effect would be an increase in cash from the issue proceeds and an increase in long-term debt. Current liabilities would not be affected, so the current ratio would rise.

Finally, note that an apparently low current ratio may not be a bad sign for a company with a large reserve of untapped borrowing power.

Current Events

EXAMPLE 3.1

Suppose a firm pays off some of its suppliers and short-term creditors. What happens to the current ratio? Suppose a firm buys some inventory. What happens in this case? What happens if a firm sells some merchandise?

The first case is a trick question. What happens is that the current ratio moves away from 1. If it is greater than 1 (the usual case), it will get bigger. But if it is less than 1, it will get smaller. To see this, suppose the firm has $4 in current assets and $2 in current liabilities for a current ratio of 2. If we use $1 in cash to reduce current liabilities, then the new current ratio is ($4 − 1)/($2 − 1) = 3. If we reverse the original situation to $2 in current assets and $4 in current liabilities, then the change will cause the current ratio to fall to 1/3 from 1/2.

The second case is not quite as tricky. Nothing happens to the current ratio because cash goes down while inventory goes up—total current assets are unaffected.

In the third case, the current ratio will usually rise because inventory is normally shown at cost and the sale will normally be at something greater than cost (the difference is the markup). The increase in either cash or receivables is therefore greater than the decrease in inventory. This increases current assets, and the current ratio rises.

The Quick (or Acid-Test) Ratio Inventory is often the least liquid current asset. It's also the one for which the book values are least reliable as measures of market value because the quality of the inventory isn't considered. Some of the inventory may later turn out to be damaged, obsolete, or lost.

More to the point, relatively large inventories are often a sign of short-term trouble. The firm may have overestimated sales and overbought or overproduced as a result. In this case, the firm may have a substantial portion of its liquidity tied up in slow-moving inventory.

To further evaluate liquidity, the *quick,* or *acid-test, ratio* is computed just like the current ratio, except inventory is omitted:

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

Notice that using cash to buy inventory does not affect the current ratio, but it reduces the quick ratio. Again, the idea is that inventory is relatively illiquid compared to cash.

For Prufrock, this ratio for 2021 was:

$$\text{Quick ratio} = \frac{\$756 - 422}{\$540} = .62 \text{ times}$$

The quick ratio here tells a somewhat different story than the current ratio because inventory accounts for more than half of Prufrock's current assets. To exaggerate the point,

if this inventory consisted of, say, unsold nuclear power plants, then this would be a cause for concern.

To give an example of current versus quick ratios, based on recent financial statements, Walmart and ManpowerGroup had current ratios of .80 and 1.44, respectively. However, Manpower carries no inventory to speak of, whereas Walmart's current assets are virtually all inventory. As a result, Walmart's quick ratio was only .23, whereas ManpowerGroup's was 1.44, the same as its current ratio.

Other Liquidity Ratios We briefly mention three other measures of liquidity. A very short-term creditor might be interested in the *cash ratio*:

$$\text{Cash ratio} = \frac{\text{Cash}}{\text{Curent liabilities}} \tag{3.3}$$

You can verify that for 2021 this works out to be .27 times for Prufrock.

Because net working capital, or NWC, is frequently viewed as the amount of short-term liquidity a firm has, we can consider the ratio of *NWC to total assets*:

$$\text{Net working capital to total assets} = \frac{\text{Net working capital}}{\text{Total assets}} \tag{3.4}$$

A relatively low value might indicate relatively low levels of liquidity. Here, this ratio works out to be ($756 − 540)/$3,636 = .06 times.

Finally, imagine that Prufrock was facing a strike and cash inflows began to dry up. How long could the business keep running? One answer is given by the *interval measure*:

$$\text{Interval measure} = \frac{\text{Current assets}}{\text{Average daily operating costs}} \tag{3.5}$$

Total costs for the year, excluding depreciation and interest, were $1,344. The average daily cost was $1,344/365 = $3.68 per day.[1] The interval measure is thus $756/$3.68 = 205 days. Based on this, Prufrock could hang on for six months or so.[2]

The interval measure (or something similar) is also useful for newly founded or start-up companies that often have little in the way of revenues. For such companies, the interval measure indicates how long the company can operate until it needs another round of financing. The average daily operating cost for start-up companies is often called the *burn rate,* meaning the rate at which cash is burned in the race to become profitable.

Burn rates came into focus for established companies when the COVID-19 pandemic caused a massive revenue shock to the airline industry. Delta, for example, was burning through $100 million a day at the end of March 2020, a rate it expected to only halve by the end of the second quarter. United reported similar losses.

LONG-TERM SOLVENCY MEASURES

Long-term solvency ratios are intended to address the firm's long-term ability to meet its obligations, or, more generally, its financial leverage. These are sometimes called *financial leverage ratios* or *leverage ratios.* We consider three commonly used measures and some variations.

[1]For many of these ratios that involve average daily amounts, a 360-day year is often used in practice. This so-called banker's year has exactly four quarters of 90 days each and was computationally convenient in the days before pocket calculators. We'll use 365 days.

[2]Sometimes depreciation and/or interest is included in calculating average daily costs. Depreciation isn't a cash expense, so its inclusion doesn't make a lot of sense. Interest is a financing cost, so we excluded it by definition (we looked at only operating costs). We could, of course, define a different ratio that included interest expense.

Total Debt Ratio The *total debt ratio* takes into account all debts of all maturities to all creditors. It can be defined in several ways, the easiest of which is this:

$$\text{Total debt ratio} = \frac{\text{Total assets} - \text{Total equity}}{\text{Total assets}} = \frac{\$3{,}636 - 2{,}639}{\$3{,}636} = .27 \text{ times}$$

3.6

In this case, an analyst might say that Prufrock uses 27 percent debt.[3] Whether this is high or low or whether it even makes any difference depends on whether capital structure matters, a subject we discuss in Part 6.

Prufrock has $.27 in debt for every $1 in assets. Therefore, there is $.73 in equity (= $1 − .27) for every $.27 in debt. With this in mind, we can define two useful variations on the total debt ratio—the *debt-equity ratio* and the *equity multiplier*:

$$\text{Debt-equity ratio} = \text{Total debt/Total equity} = \$.27/\$.73 = .38 \text{ times}$$

3.7

$$\text{Equity multiplier} = \text{Total assets/Total equity} = \$1/\$.73 = 1.38 \text{ times}$$

3.8

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

$$\begin{aligned}\text{Equity multiplier} &= \text{Total assets/Total equity} = \$1/\$.73 = 1.38 \\ &= (\text{Total equity} + \text{Total debt})/\text{Total equity} \\ &= 1 + \text{Debt-equity ratio} = 1.38 \text{ times}\end{aligned}$$

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

A Brief Digression: Total Capitalization versus Total Assets Frequently, financial analysts are more concerned with a firm's long-term debt than its short-term debt because the short-term debt will be constantly changing. Also, a firm's accounts payable may reflect trade practice more than debt management policy. For these reasons, the *long-term debt ratio* is often calculated as follows:

Ratios used to analyze technology firms can be found at **www.chalfin.com** under the "Publications" link.

$$\text{Long-term debt ratio} = \frac{\text{Long-term debt}}{\text{Long-term debt} + \text{Total equity}} = \frac{\$457}{\$457 + 2{,}639} = \frac{\$457}{\$3{,}096} = .15 \text{ times}$$

3.9

The $3,096 in total long-term debt and equity is sometimes called the firm's *total capitalization,* and the financial manager will frequently focus on this quantity rather than on total assets.

To complicate matters, different people (and different books) mean different things by the term *debt ratio.* Some mean a ratio of total debt, some mean a ratio of long-term debt only, and, unfortunately, a substantial number are vague about which one they mean.

This is a source of confusion, so we choose to give two separate names to the two measures. The same problem comes up in discussing the debt-equity ratio. Financial analysts frequently calculate this ratio using only long-term debt.

[3]Total equity here includes preferred stock (discussed in Chapter 8 and elsewhere), if there is any. An equivalent numerator in this ratio would be Current liabilities + Long-term debt.

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

$$\text{Times interest earned ratio} = \frac{\text{EBIT}}{\text{Interest}} = \frac{\$691}{\$141} = 4.90 \text{ times} \quad (3.10)$$

As the name suggests, this ratio measures how well a company has its interest obligations covered, and it is often called the *interest coverage ratio.* For Prufrock, the interest bill is covered 4.90 times over.

Cash Coverage A problem with the TIE ratio is that it is based on EBIT, which is not really a measure of cash available to pay interest. The reason is that depreciation, a noncash expense, has been deducted out. Because interest is definitely a cash outflow (to creditors), one way to define the *cash coverage ratio* is:

$$\text{Cash coverage ratio} = \frac{\text{EBIT} + \text{Depreciation}}{\text{Interest}} = \frac{\$691 + 276}{\$141} = \frac{\$967}{\$141} = 6.86 \text{ times} \quad (3.11)$$

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

A common variation on EBITD is earnings before interest, taxes, depreciation, and amortization (EBITDA—say "ebbit-dah"). Here *amortization* refers to a noncash deduction similar conceptually to depreciation, except it applies to an intangible asset (such as a patent) rather than a tangible asset (such as a machine). Note that the word *amortization* here does not refer to the repayment of debt, a subject we discuss in a later chapter.

ASSET MANAGEMENT, OR TURNOVER, MEASURES

We next turn our attention to the efficiency with which Prufrock uses its assets. The measures in this section are sometimes called *asset utilization ratios.* The specific ratios we discuss can all be interpreted as measures of turnover. What they are intended to describe is how efficiently or intensively a firm uses its assets to generate sales. We first look at two important current assets: inventory and receivables.

Inventory Turnover and Days' Sales in Inventory During the year, Prufrock had a cost of goods sold of $1,344. Inventory at the end of the year was $422. With these numbers, *inventory turnover* can be calculated as follows:

$$\text{Inventory turnover} = \frac{\text{Cost of goods sold}}{\text{Inventory}} = \frac{\$1{,}344}{\$422} = 3.18 \text{ times} \quad (3.12)$$

In a sense, Prufrock sold off or turned over the entire inventory 3.18 times.[4] As long as we are not running out of stock and thereby forgoing sales, the higher this ratio is, the more efficiently we are managing inventory.

If we know we turned our inventory over 3.18 times during the year, we can immediately figure out how long it took us to turn it over on average. The result is the average *days' sales in inventory*:

$$\text{Days' sales in inventory} = \frac{365 \text{ days}}{\text{Inventory turnover}} = \frac{365 \text{ days}}{3.18} = 115 \text{ days} \quad (3.13)$$

This tells us that, roughly speaking, inventory sits 115 days on average before it is sold. Alternatively, assuming we have used the most recent inventory and cost figures, it will take about 115 days to work off our current inventory.

To give an example, in March 2020, with sales dropping due to the COVID-19 pandemic, the U.S. automobile industry as a whole had a 116-day supply of cars, almost twice the 60-day supply considered normal. This figure means that at the then-current rate of sales, it would have taken 116 days to deplete the available supply. Of course, there was significant variation in models. For example, light truck sales exceeded sedan sales for the first time. As a result, there were only 400,000 light trucks in inventory and, when GM wanted to ramp up light truck production, it faced delays due to parts shortages.

To see the ratio of auto inventory to sales, check out **fred.stlouisfed.org/series/AISRSA**.

It might make more sense to use the average inventory in calculating turnover. Inventory turnover would then be \$1,344/[(\$393 + 422)/2] = 3.3 times.[5] It depends on the purpose of the calculation. If we are interested in how long it will take us to sell our current inventory, then using the ending figure (as we did initially) is probably better.

In many of the ratios we discuss in this chapter, average figures could just as well be used. Again, it depends on whether we are worried about the past, in which case averages are appropriate, or the future, in which case ending figures might be better. Also, using ending figures is common in reporting industry averages; so, for comparison purposes, ending figures should be used in such cases. In any event, using ending figures is definitely less work, so we'll continue to use them.

Receivables Turnover and Days' Sales in Receivables Our inventory measures give some indication of how fast we can sell product. We now look at how fast we collect on those sales. The *receivables turnover* is defined much like inventory turnover:

$$\text{Receivables turnover} = \frac{\text{Sales}}{\text{Accounts receivable}} = \frac{\$2{,}311}{\$188} = 12.29 \text{ times} \quad (3.14)$$

Loosely speaking, Prufrock collected its outstanding credit accounts and reloaned the money 12.29 times during the year.[6]

[4]Notice that we used cost of goods sold in the top of this ratio. For some purposes, it might be more useful to use sales instead of costs. For example, if we wanted to know the amount of sales generated per dollar of inventory, we could just replace the cost of goods sold with sales.

[5]Notice that we calculated the average as (Beginning value + Ending value)/2.

[6]Here we have implicitly assumed that all sales are credit sales. If they were not, we would use total credit sales in these calculations, not total sales.

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

$$\text{Days' sales in receivables} = \frac{365 \text{ days}}{\text{Receivables turnover}} \tag{3.15}$$
$$= \frac{365}{12.29} = 30 \text{ days}$$

Therefore, on average, Prufrock collects on its credit sales in 30 days. For obvious reasons, this ratio is frequently called the *average collection period* (ACP).

Note that if we are using the most recent figures, we could also say that we have 30 days' worth of sales currently uncollected. We will learn more about this subject when we study credit policy in a later chapter.

EXAMPLE 3.2 Payables Turnover

Here is a variation on the receivables collection period. How long, on average, does it take for Prufrock Corporation to pay its bills? To answer, we need to calculate the accounts payable turnover rate using cost of goods sold. We will assume that Prufrock purchases everything on credit.

The cost of goods sold is $1,344, and accounts payable are $344. The turnover is therefore $1,344/$344 = 3.91 times. So, payables turned over about every 365/3.91 = 93 days. On average, then, Prufrock takes 93 days to pay. As a potential creditor, we might take note of this fact.

Asset Turnover Ratios Moving away from specific accounts like inventory or receivables, we can consider several "big picture" ratios. For example, *NWC turnover* is:

$$\text{NWC turnover} = \frac{\text{Sales}}{\text{NWC}} \tag{3.16}$$
$$= \frac{\$2,311}{\$756 - 540} = 10.70 \text{ times}$$

This ratio measures how much "work" we get out of our working capital. Once again, assuming we aren't missing out on sales, a high value is preferred. (Why?)

Similarly, *fixed asset turnover* is:

$$\text{Fixed asset turnover} = \frac{\text{Sales}}{\text{Net fixed assets}} \tag{3.17}$$
$$= \frac{\$2,311}{\$2,880} = .80 \text{ times}$$

With this ratio, it probably makes more sense to say that for every dollar in fixed assets, Prufrock generated $.80 in sales.

Our final asset management ratio, *total asset turnover*, comes up quite a bit. We will see it later in this chapter and in the next chapter. As the name suggests, the total asset turnover is:

$$\text{Total asset turnover} = \frac{\text{Sales}}{\text{Total assets}} \tag{3.18}$$
$$= \frac{\$2,311}{\$3,636} = .64 \text{ times}$$

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

To give an example of fixed and total asset turnover, based on recent financial statements, Hilton had a total asset turnover of .66, compared to .63 for IBM. However, the much higher investment in fixed assets in a hotel company is reflected in Hilton's fixed asset turnover of .77, compared to IBM's 1.05.

More Turnover — EXAMPLE 3.3

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

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

PROFITABILITY MEASURES

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

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

$$\text{Profit margin} = \frac{\text{Net income}}{\text{Sales}} = \frac{\$435}{\$2{,}311} = .1880, \text{ or } 18.80\% \quad (3.19)$$

This tells us that Prufrock, in an accounting sense, generates a little less than 19 cents in profit for every dollar in sales.

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

For example, lowering our sales price will usually increase unit volume but will normally cause profit margins to shrink. Total profit (or, more important, operating cash flow) may go up or down; so the fact that margins are smaller isn't necessarily bad. After all, isn't it possible that, as the saying goes, "Our prices are so low that we lose money on everything we sell, but we make it up in volume"?[7]

Because the profit margin measures how well a company makes money, it is a widely followed ratio. However, as with any ratio, there is significant variation between different industries. Table 3.8 shows the profit margins for various industries for a recent quarter. As you can see, the average profit margin for a U.S. manufacturing company was 8.65 percent, but the scientific research industry experienced significant issues, with a negative profit margin. At the other extreme, broadcasting had a profit margin of about 44 percent.

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

$$\text{Return on assets} = \frac{\text{Net income}}{\text{Total assets}} = \frac{\$435}{\$3{,}636} = .1195, \text{ or } 11.95\% \quad (3.20)$$

[7] No, it's not.

TABLE 3.8 Profit Margins for Various Industries

All manufacturing	8.65%
Scientific research and development services	–19.59
Management and technical consulting services	1.24
Motion picture and sound recording industries	3.30
Computer systems design and related services	6.04
Food	6.59
Wood products	7.05
Apparel and leather products	9.28
Chemicals	11.36
Pharmaceuticals and medicines	21.67
Broadcasting, except internet	43.57

SOURCE: U.S. Census Bureau, U.S. Manufacturing, Mining, Wholesale Trade, and Selected Service Industries, Second Quarter 2019.

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

3.21

$$\text{Return on equity} = \frac{\text{Net income}}{\text{Total equity}} = \frac{\$435}{\$2{,}639} = .1646, \text{ or } 16.46\%$$

For every dollar in equity, therefore, Prufrock generated 16.46 cents in profit; but this is correct only in accounting terms.

Because ROA and ROE are such commonly cited numbers, we stress that it is important to remember they are accounting rates of return. For this reason, these measures should properly be called *return on book assets* and *return on book equity*. In fact, ROE is sometimes called *return on net worth*. Whatever it's called, it would be inappropriate to compare the result to, for example, an interest rate observed in the financial markets. We will have more to say about accounting rates of return in later chapters.

The fact that ROE exceeds ROA reflects Prufrock's use of financial leverage. We will examine the relationship between these two measures in more detail shortly.

EXAMPLE 3.4 ROE and ROA

Because ROE and ROA are usually intended to measure performance over a prior period, it makes a certain amount of sense to base them on average equity and average assets, respectively. For Prufrock, how would you calculate these?

We first need to calculate average assets and average equity:

Average assets = ($3,373 + 3,636)/2 = $3,505
Average equity = ($2,299 + 2,639)/2 = $2,469

With these averages, we can recalculate ROA and ROE as follows:

$$\text{ROA} = \frac{\$435}{\$3{,}505} = .1240, \text{ or } 12.40\%$$

$$\text{ROE} = \frac{\$435}{\$2{,}469} = .1760, \text{ or } 17.60\%$$

These are slightly higher than our previous calculations because assets and equity grew during the year, so the average values are below the ending values.

MARKET VALUE MEASURES

Our final group of measures is based, in part, on information not necessarily contained in financial statements—the market price per share of stock. Obviously, these measures can be calculated directly only for publicly traded companies.

We assume that Prufrock has 33 million shares outstanding and the stock sold for $88 per share at the end of the year. If we recall that Prufrock's net income was $435 million, we can calculate its earnings per share:

$$\text{EPS} = \frac{\text{Net income}}{\text{Shares outstanding}} = \frac{\$435}{33} = \$13.17$$

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

$$\text{PE ratio} = \frac{\text{Price per share}}{\text{Earnings per share}} = \frac{\$88}{\$13.17} = 6.68 \text{ times}$$

3.22

In the vernacular, we would say that Prufrock shares sell for almost seven times earnings, or we might say that Prufrock shares have or "carry" a PE multiple of 6.68.

PE ratios vary substantially across companies, but, in 2020, a typical large company in the United States had a PE in the 15–20 range. This is on the high side by historical standards, but not dramatically so. A low point for PEs was about 5 in 1974 and the high was about 70 in 2009. PEs also vary across countries. For example, Japanese PEs have historically been much higher than those of their U.S. counterparts.

Because the PE ratio measures how much investors are willing to pay per dollar of current earnings, higher PEs are often taken to mean the firm has significant prospects for future growth. Of course, if a firm had no or almost no earnings, its PE would probably be quite large; so, as always, care is needed in interpreting this ratio.

Sometimes analysts divide PE ratios by expected future earnings growth rates (after multiplying the growth rate by 100). The result is the PEG ratio. Suppose Prufrock's anticipated growth rate in EPS was 6 percent. Its PEG ratio would then be 6.68/6 = 1.11. The idea behind the PEG ratio is that whether a PE ratio is high or low depends on expected future growth. High PEG ratios suggest that the PE is too high relative to growth, and vice versa.

When calculating the PE ratio, one question that arises is which earnings to use. Often, the most recent ("trailing") four quarters of earnings are selected. Using projected, or "forward," earnings for the upcoming year is also common. Using these different measures can produce very different ratios. Table 3.9 shows the PE ratios based on trailing earnings and forward earnings. As you can see, the homebuilding industry has the lowest PE ratio, while the internet software industry has the highest PE. When growth is accounted for, these two industries have similar PEG ratios.

Price-Sales Ratio In some cases, companies will have negative earnings for extended periods, so their PE ratios are not very meaningful. A good example is a recent start-up. Such companies usually do have some revenues, so analysts will often look at the *price-sales ratio*:

$$\text{Price-sales ratio} = \text{Price per share}/\text{Sales per share}$$

TABLE 3.9 PE and PEG Ratios for Various Industries

	Trailing PE	Forward PE	PEG Ratio
Homebuilding	10.45	8.04	2.41
Auto Parts	18.92	11.88	1.27
Apparel	55.05	14.04	1.72
Computer Services	19.29	15.48	1.40
Retail (General)	18.48	16.25	2.50
Household Products	40.46	17.84	2.57
Retail (Grocery and Food)	12.67	19.04	0.86
Cable TV	10.69	23.55	4.04
Green & Renewable Energy	16.64	28.64	2.36
Software (Internet)	70.27	121.85	2.57

SOURCE: http://people.stern.nyu.edu/adamodar/New_Home_Page/dataarchived.html#variables, September 18, 2019.

In Prufrock's case, sales were $2,311, so here is the price-sales ratio:

Price-sales ratio = $88/($2,311/33) = $88/$70 = 1.26 times

As with PE ratios, whether a particular price-sales ratio is high or low depends on the industry involved.

Market-to-Book Ratio A third commonly quoted market value measure is the *market-to-book ratio*:

3.23

$$\text{Market-to-book ratio} = \frac{\text{Market value per share}}{\text{Book value per share}} = \frac{\$88}{\$2{,}639/33} = \frac{\$88}{\$80.0} = 1.10 \text{ times}$$

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

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

Market-to-book ratios in recent years appear high relative to past values. For example, for the 30 blue-chip companies that make up the widely followed Dow Jones Industrial Average, the historical norm is about 1.7; however, the market-to-book ratio for this group has recently been twice this size.

Another ratio, called *Tobin's Q ratio*, is much like the market-to-book ratio. Tobin's Q is the market value of a firm's assets divided by their replacement cost:

Tobin's Q = Market value of firm's assets/Replacement cost of firm's assets
= Market value of firm's debt and equity/Replacement cost of firm's assets

Notice that we used two equivalent numerators here: the market value of the firm's assets and the market value of its debt and equity.

Conceptually, the Q ratio is superior to the market-to-book ratio because it focuses on what the firm is worth today relative to what it would cost to replace it today. Firms with high Q ratios tend to be those with attractive investment opportunities or significant competitive advantages (or both). In contrast, the market-to-book ratio focuses on historical costs, which are less relevant.

As a practical matter, however, Q ratios are difficult to calculate with accuracy because estimating the replacement cost of a firm's assets is not an easy task. Also, market values for a firm's debt are often unobservable. Book values can be used instead in such cases, but accuracy may suffer.

Enterprise Value-EBITDA Multiple A company's enterprise value is an estimate of the market value of the company's operating assets. By operating assets, we mean all the assets of the firm except cash. Of course, it's not practical to work with the individual assets of a firm because market values would usually not be available. Instead, we can use the right-hand side of the balance sheet and calculate the enterprise value as:

$$\text{Enterprise value} = \text{Total market value of the stock} + \text{Book value of all liabilities} - \text{Cash} \quad (3.24)$$

We use the book value for liabilities because we typically can't get the market values, at least not for all of them. However, book value is usually a reasonable approximation for market value when it comes to liabilities, particularly short-term debts. Notice that the sum of the value of the market values of the stock and all liabilities equals the value of the firm's assets from the balance sheet identity. Once we have this number, we subtract the cash to get the enterprise value.

Enterprise value is frequently used to calculate the EBITDA multiple:

$$\text{EBITDA multiple} = \text{Enterprise value}/\text{EBITDA} \quad (3.25)$$

This multiple is similar in spirit to the PE ratio, but it relates the value of all the operating assets (the enterprise value) to a measure of the operating cash flow generated by those assets (EBITDA).

A Note on Ratio Analysis When looking at a ratio, it's important to know what time period is being covered. There are some common initialisms that help in this regard. For example, *mrq* means the most recent quarter, and *ttm* refers to the previous (i.e., "trailing") 12 months. If you see *yoy* or *y/o/y*, it refers to the change from the previous year ("year-over-year"), *lfy* stands for last fiscal year, and *ntm* means the next 12 months.

CONCLUSION

This completes our definitions of some common ratios. We could tell you about more of them, but these are enough for now. We'll go on to discuss some ways of using these ratios instead of just how to calculate them. Table 3.10 summarizes the ratios we've discussed.

Concept Questions

3.3a What are the five groups of ratios? Give two or three examples of each kind.

3.3b Given the total debt ratio, what other two ratios can be computed? Explain how.

3.3c Turnover ratios all have one of two figures as the numerator. What are these two figures? What do these ratios measure? How do you interpret the results?

3.3d Profitability ratios all have the same figure in the numerator. What is it? What do these ratios measure? How do you interpret the results?

TABLE 3.10 Common Financial Ratios

I. Short-term solvency, or liquidity, ratios	II. Long-term solvency, or financial leverage, ratios
Current ratio = $\frac{\text{Current assets}}{\text{Current liabilities}}$	Total debt ratio = $\frac{\text{Total assets} - \text{Total equity}}{\text{Total assets}}$
Quick ratio = $\frac{\text{Current assets} - \text{Inventory}}{\text{Current liabilities}}$	Debt-equity ratio = Total debt/Total equity
Cash ratio = $\frac{\text{Cash}}{\text{Current liabilities}}$	Equity multiplier = Total assets/Total equity
Net working capital to total assets = $\frac{\text{Net working capital}}{\text{Total assets}}$	Long-term debt ratio = $\frac{\text{Long-term debt}}{\text{Long-term debt} + \text{Total equity}}$
Interval measure = $\frac{\text{Current assets}}{\text{Average daily operating costs}}$	Times interest earned ratio = $\frac{\text{EBIT}}{\text{Interest}}$
	Cash coverage ratio = $\frac{\text{EBIT} + \text{Depreciation}}{\text{Interest}}$
III. Asset management, or turnover, ratios	**IV. Profitability ratios**
Inventory turnover = $\frac{\text{Cost of goods sold}}{\text{Inventory}}$	Profit margin = $\frac{\text{Net income}}{\text{Sales}}$
Days' sales in inventory = $\frac{365 \text{ days}}{\text{Inventory turnover}}$	Return on assets (ROA) = $\frac{\text{Net income}}{\text{Total assets}}$
Receivables turnover = $\frac{\text{Sales}}{\text{Accounts receivable}}$	Return on equity (ROE) = $\frac{\text{Net income}}{\text{Total equity}}$
Days' sales in receivables = $\frac{365 \text{ days}}{\text{Receivables turnover}}$	ROE = $\frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}}$*
NWC turnover = $\frac{\text{Sales}}{\text{NWC}}$	**V. Market value ratios**
Fixed asset turnover = $\frac{\text{Sales}}{\text{Net fixed assets}}$	Price-earnings ratio = $\frac{\text{Price per share}}{\text{Earnings per share}}$
Total asset turnover = $\frac{\text{Sales}}{\text{Total assets}}$	PEG ratio = $\frac{\text{Price-earnings ratio}}{\text{Earnings growth rate (\%)}}$
	Price-sales ratio = $\frac{\text{Price per share}}{\text{Sales per share}}$
	Market-to-book-ratio = $\frac{\text{Market value per share}}{\text{Book value per share}}$
	Tobin's Q ratio = $\frac{\text{Market value of assets}}{\text{Replacement cost of assets}}$
	Enterprise value-EBITDA ratio = $\frac{\text{Enterprise value}}{\text{EBITDA}}$

*This ROE decomposition is covered in Section 3.4.

3.4 The DuPont Identity

Excel Master

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As we mentioned in discussing ROA and ROE, the difference between these two profitability measures is a reflection of the use of debt financing, or financial leverage. We illustrate the relationship between these measures in this section by investigating a famous way of decomposing ROE into its component parts.

A CLOSER LOOK AT ROE

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

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

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

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

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

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

Looking back at Prufrock, for example, we see that the debt-equity ratio was .38 and ROA was 11.95 percent. Our work here implies that Prufrock's ROE, as we previously calculated, is this:

$$\text{ROE} = .1195 \times 1.38 = .1646, \text{ or } 16.46\%$$

The difference between ROE and ROA can be substantial, particularly for certain businesses. For example, in 2019, American Express had an ROA of 2.61 percent, which is fairly typical for financial institutions. However, financial institutions tend to borrow a lot of money and, as a result, have relatively large equity multipliers. For American Express, ROE was about 22 percent, implying an equity multiplier of 8.43 times.

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

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

If we rearrange things a bit, ROE looks like this:

$$\text{ROE} = \underbrace{\frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}}}_{\text{Return on assets}} \times \frac{\text{Assets}}{\text{Total equity}}$$
$$= \textbf{Profit margin} \times \textbf{Total asset turnover} \times \textbf{Equity multiplier}$$

3.26

DuPont identity
Popular expression breaking ROE into three parts: operating efficiency, asset use efficiency, and financial leverage.

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

We can check this relationship for Prufrock by noting that the profit margin was 15.71 percent and the total asset turnover was .64:

$$\text{ROE} = \text{Profit margin} \times \text{Total asset turnover} \times \text{Equity multiplier}$$
$$= .1880 \times .64 \times 1.38$$
$$= .1646, \text{ or } 16.46\%$$

This 16.46 percent ROE is exactly what we had before.

The DuPont identity tells us that ROE is affected by three things:

1. Operating efficiency (as measured by profit margin).
2. Asset use efficiency (as measured by total asset turnover).
3. Financial leverage (as measured by the equity multiplier).

Weakness in either operating or asset use efficiency (or both) will show up in a diminished return on assets, which will translate into a lower ROE.

Considering the DuPont identity, it appears that the ROE could be leveraged up by increasing the amount of debt in the firm. However, notice that increasing debt also increases interest expense, which reduces profit margins, which acts to reduce ROE. So, ROE could go up or down, depending on other variables. More important, the use of debt financing has a number of other effects, and, as we discuss at some length in Part 6, the amount of leverage a firm uses is governed by its capital structure policy.

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

General Motors provides a good example of how DuPont analysis can be very useful and also illustrates why care must be taken in interpreting ROE values. In 1989, GM had an ROE of 12.1 percent. By 1993, its ROE had improved to 44.1 percent, a dramatic improvement. On closer inspection, however, we find that over the same period GM's profit margin had declined from 3.4 to 1.8 percent, and ROA had declined from 2.4 to 1.3 percent. The decline in ROA was moderated only slightly by an increase in total asset turnover from .71 to .73 over the period.

Given this information, how is it possible for GM's ROE to have climbed so sharply? From our understanding of the DuPont identity, it must be the case that GM's equity multiplier increased substantially. In fact, what happened was that GM's book equity value was almost wiped out overnight in 1992 by changes in the accounting treatment of pension liabilities. If a company's equity value declines sharply, its equity multiplier rises. In GM's case, the multiplier went from 4.95 in 1989 to 33.62 in 1993. In sum, the dramatic "improvement" in GM's ROE was almost entirely due to an accounting change that affected the equity multiplier and didn't really represent an improvement in financial performance at all.

DuPont analysis (and ratio analysis in general) can be used to compare two companies as well. Amazon and Alibaba are among the most important internet companies in the world. We will use them to illustrate how DuPont analysis can be useful in helping to ask the right questions about a firm's financial performance. The DuPont breakdowns for Amazon and Alibaba are summarized in Table 3.11.

As shown, in 2019, Amazon had an ROE of 18.7 percent, down over 4 percent from the previous year. In contrast, in 2019, Alibaba had an ROE of 34.9 percent, more than double its ROE in 2018 of 16.6 percent. For two of the three years, Alibaba had a higher ROE than Amazon.

A closer inspection of the DuPont breakdown shows the divergence in how these two companies generate their respective ROE. Alibaba has consistently shown a profit margin above 20 percent, while Amazon's profit margin has been in the low single digits. However, Amazon has a much higher total asset turnover, as a well as an equity multiplier that is twice

TABLE 3.11

	ROE		Profit Margin		Total Asset Turnover		Equity Multiplier
Amazon							
2019	18.7%	=	4.1%	×	1.245	×	3.63
2018	23.1	=	4.3	×	1.432	×	3.73
2017	10.9	=	1.7	×	1.355	×	4.74
Alibaba							
2019	34.9%	=	35.2%	×	.507	×	1.96
2018	16.6	=	21.3	×	.390	×	2.00
2017	16.8	=	24.5	×	.349	×	1.96

as large as Alibaba's. We can say that Alibaba has an advantage in that its operating efficiency is much higher than that of Amazon, but Amazon has an advantage in its asset utilization.

AN EXPANDED DUPONT ANALYSIS

So far, we've seen how the DuPont equation lets us break down ROE into its basic three components: profit margin, total asset turnover, and financial leverage. We now extend this analysis to take a closer look at how key parts of a firm's operations feed into ROE. To get going, we went to finance.yahoo.com and found financial statements for science and technology giant DuPont de Nemours. What we found is summarized in Table 3.12.

Using the information in Table 3.12, Figure 3.1 shows how we can construct an expanded DuPont analysis for DuPont de Nemours and present that analysis in chart form. The advantage of the extended DuPont chart is that it lets us examine several ratios at once, thereby getting a better overall picture of a company's performance and also allowing us to determine possible items to improve.

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

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

TABLE 3.12

FINANCIAL STATEMENTS FOR DUPONT DE NEMOURS
12 months ending December 31, 2019
(in millions)

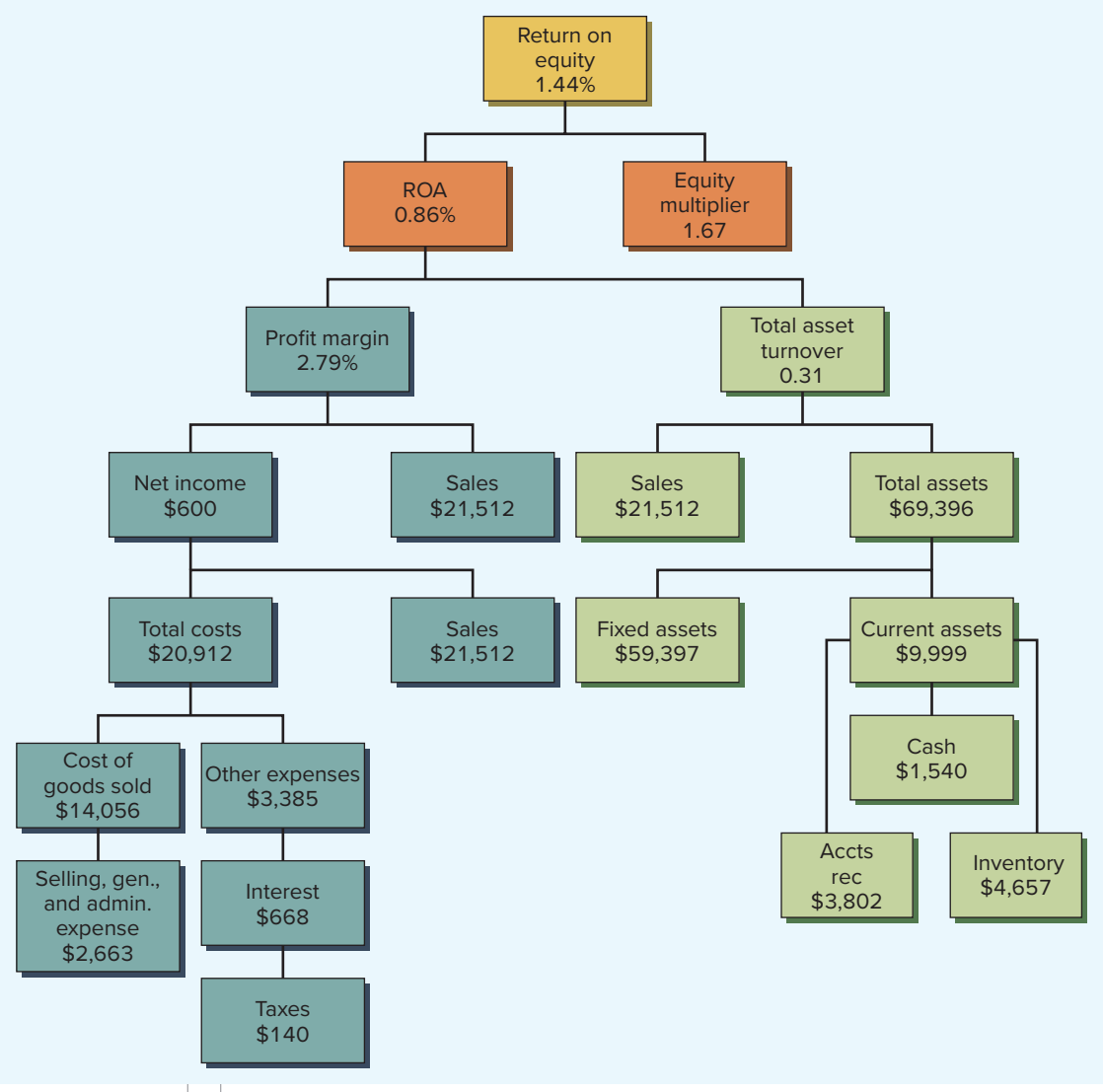
Income Statement		Balance Sheet			
Sales	$21,512	Current assets		Current liabilities	
CoGS	14,056	Cash	$ 1,540	Accounts payable	$ 3,830
Gross profit	$ 7,456	Accounts receivable	3,802	Notes payable	2,934
SG&A expenses	2,663	Inventory	4,657	Other	1,582
Other expenses	3,385	Total	$ 9,999	Total	$ 8,346
EBIT	$ 1,408				
Interest	668	Fixed assets	$ 59,397	Total long-term debt	$19,494
EBT	$ 740				
Taxes	140			Total equity	$41,556
Net income	$ 600	Total assets	$ 69,396	Total liabilities and equity	$69,396

Concept Questions

3.4a Return on assets, or ROA, can be expressed as the product of two ratios. Which two?

3.4b Return on equity, or ROE, can be expressed as the product of three ratios. Which three?

FIGURE 3.1 Extended DuPont Chart for DuPont de Nemours



3.5 Using Financial Statement Information

Excel Master

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

WHY EVALUATE FINANCIAL STATEMENTS?

As we have discussed, the primary reason for looking at accounting information is that we don't have, and can't reasonably expect to get, market value information. We stress that whenever we have market information, we will use it instead of accounting data. Also,

if there is a conflict between accounting and market data, market data should be given precedence.

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

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

Another important internal use we will explore in the next chapter is planning for the future. As we will see, historical financial statement information is useful for generating projections about the future and for checking the realism of assumptions made in those projections.

External Uses Financial statements are useful to parties outside the firm, including short-term and long-term creditors and potential investors. For example, we would find such information quite useful in deciding whether to grant credit to a new customer.

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

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

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

CHOOSING A BENCHMARK

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

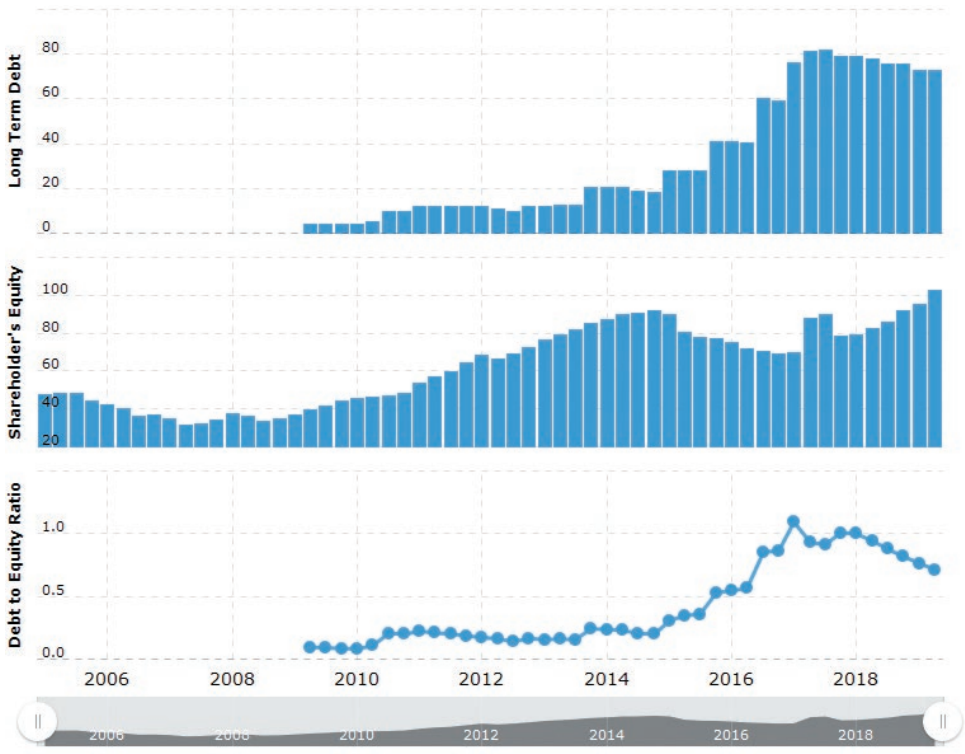
Time Trend Analysis One standard we could use is history. Suppose we found that the current ratio for a particular firm is 2.4 based on the most recent financial statement information. Looking back over the last 10 years, we might find that this ratio had declined fairly steadily over that period.

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

FIGURE 3.2

Microsoft Capital Structure: 2004–2019

SOURCE: www.macrotrends.net/stocks/charts/MSFT/microsoft/debt-equity-ratio, September 25, 2019.



For an example of a time trend analysis, nearby you will find Figure 3.2 showing the debt-equity ratio for Microsoft over the past 15 years. As the figure shows, Microsoft had no long-term debt prior to 2009. At that time, Microsoft began to add long-term debt, with the debt-equity ratio exceeding 1 in 2017. Although Microsoft has become more reliant on debt to finance its operations, this is not necessarily an indication of a problem for Microsoft. Why not?

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

Standard Industrial Classification (SIC) code
A U.S. government code used to classify a firm by its type of business operations.

One common way of identifying potential peers is based on **Standard Industrial Classification (SIC) codes**. These are four-digit codes established by the U.S. government for statistical reporting. Firms with the same SIC code are frequently assumed to be similar.

The first digit in an SIC code establishes the general type of business. For example, firms engaged in finance, insurance, and real estate have SIC codes beginning with 6. Each additional digit narrows down the industry. So, companies with SIC codes beginning with 60 are mostly banks and bank-like businesses; those with codes beginning with 602 are mostly commercial banks; and SIC code 6025 is assigned to national banks that are members of the Federal Reserve system. Table 3.13 lists selected two-digit codes (the first two digits of the four-digit SIC codes) and the industries they represent.

TABLE 3.13
Selected Two-Digit SIC Codes

Agriculture, Forestry, and Fishing	Transportation, Communication, Electric, Gas, and Sanitary Service
01 Agriculture production—crops	40 Railroad transportation
08 Forestry	45 Transportation by air
09 Fishing, hunting, and trapping	49 Electric, gas, and sanitary services
Mining	**Retail Trade**
10 Metal mining	54 Food stores
12 Bituminous coal and lignite mining	55 Automobile dealers and gas stations
13 Oil and gas extraction	58 Eating and drinking places
Construction	**Finance, Insurance, and Real Estate**
15 Building construction	60 Banking
16 Construction other than building	63 Insurance
17 Construction—special trade contractors	65 Real estate
Manufacturing	**Services**
28 Chemicals and allied products	78 Motion pictures
29 Petroleum refining and related industries	80 Health services
37 Transportation equipment	82 Educational services

SIC codes are far from perfect. Suppose you were examining financial statements for Walmart, the largest retailer in the United States. The relevant two-digit SIC code is 53, General Merchandise Stores. In a quick scan of the nearest financial database, you would find about 20 large, publicly owned corporations with a similar SIC code, but you might not be comfortable with some of them. Target would seem to be a reasonable peer, but Neiman Marcus also carries the same industry code. Are Walmart and Neiman Marcus really comparable?

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

Beginning in 1997, a new industry classification system was initiated. Specifically, the North American Industry Classification System (NAICS, pronounced "nakes") is intended to replace the older SIC codes, and it will eventually. Currently, however, SIC codes are still widely used.

With these caveats about industry codes in mind, we can now take a look at a specific industry. Suppose we are in the wine-making business. Table 3.14 contains some condensed common-size financial statements for this industry from the Risk Management Association (RMA, formerly known as Robert Morris Associates), one of many sources of such information. Table 3.15 contains selected ratios from the same source.

There is a large amount of information here, most of which is self-explanatory. On the right in Table 3.14, we have current information reported for different groups based on sales. Within each sales group, common-size information is reported. For example, firms with sales in the $10 million to $25 million range have cash and equivalents equal to 2.0 percent of total assets. There are 48 companies in this group, out of 258 in all.

On the left, we have three years' worth of summary historical information for the entire group. For example, operating profit decreased slightly from 11.7 percent of sales to 11.4 percent over that time.

Learn more about NAICS at **www.naics.com**.

TABLE 3.14 Selected Financial Statement Information

Manufacturing—Wineries (NAICS 312130)									
COMPARATIVE HISTORICAL DATA				CURRENT DATA SORTED BY SALES					
			Type of Statement						
38	33	29	Unqualified	1			2	4	22
40	53	41	Reviewed		2		15	15	9
17	15	12	Compiled	1	2	3	3	2	1
24	25	26	Tax Returns	11	6	4	4	1	
100	150	150	Other	24	35	20	18	26	27
4/1/13–3/31/14 ALL 219	4/1/14–3/31/15 ALL 276	4/1/15–3/31/16 ALL 258	NUMBER OF STATEMENTS	31 (4/1–9/30/15)		227 (10/1/15–3/31/16)			
				0–1MM 37	1–3MM 45	3–5MM 27	5–10MM 42	10–25MM 48	25MM & OVER 59
%	%	%	**Assets**	%	%	%	%	%	%
5.2	5.3	5.0	Cash & Equivalents	6.8	5.0	8.7	5.2	2.0	4.4
8.4	8.1	9.2	Trade Receivables (net)	5.6	7.3	7.5	9.0	11.0	12.3
44.4	47.4	47.3	Inventory	52.0	50.1	49.4	42.6	47.0	44.9
2.4	1.9	1.7	All Other Current	.6	1.6	.7	1.8	1.6	2.8
60.5	62.7	63.1	Total Current	65.0	64.0	66.3	58.6	61.6	64.3
32.0	29.2	29.8	Fixed Assets (net)	28.4	32.6	22.9	36.3	29.4	27.6
3.5	4.0	3.7	Intangibles (net)	4.5	1.5	3.7	3.1	5.0	4.1
4.0	4.1	3.4	All Other Non-current	2.0	2.0	7.1	2.0	3.9	4.0
100.0	100.0	100.0	Total	100.0	100.0	100.0	100.0	100.0	100.0
			Liabilities						
14.1	16.8	15.7	Notes Payable-Short term	17.7	14.3	10.0	12.3	18.8	18.1
2.1	1.8	1.3	Cur. Mat.-L.T.D	.9	1.0	.9	2.0	1.4	1.6
8.8	8.9	8.8	Trade Payables	5.9	9.0	7.2	7.8	12.2	9.3
.2	.2	.2	Income Taxes Payable	.4	.3	.0	.3	.0	.1
6.0	6.0	6.5	All Other Current	7.6	4.8	6.0	4.1	8.7	7.4
31.2	33.8	32.6	Total Current	32.5	29.3	24.1	26.5	41.2	36.5
19.8	17.4	18.5	Long-Term Debt	20.5	17.5	17.8	22.5	17.4	16.6
.4	.3	.4	Deferred Taxes	.0	.0	.2	.7	.7	.4
6.3	6.7	6.6	All Other Non-current	13.5	5.6	7.8	7.5	4.4	3.6
42.2	41.8	41.9	Net Worth	33.5	47.6	50.1	42.8	36.3	42.9
100.0	100.0	100.0	Total Liabilities & Net Worth	100.0	100.0	100.0	100.0	100.0	100.0
			Income Data						
100.0	100.0	100.0	Net Sales	100.0	100.0	100.0	100.0	100.0	100.0
48.9	50.0	49.3	Gross Profit	57.1	54.1	55.8	49.5	45.0	41.0
37.2	37.9	37.9	Operating Expenses	51.4	44.5	39.4	38.2	32.5	27.8
11.7	12.0	11.4	Operating Profit	5.7	9.7	16.4	11.3	12.5	13.3
2.7	2.6	2.6	All Other Expenses (net)	3.4	1.9	1.1	4.3	2.9	2.1
9.0	9.5	8.8	Profit Before Taxes	2.3	7.8	15.3	7.1	9.6	11.2

M = $ thousand; MM = $ million.

Interpretation of Statement Studies Figures: RMA cautions that the studies be regarded only as a general guideline and not as an absolute industry norm. This is due to limited samples within categories, the categorization of companies by their primary Standard Industrial Classification (SIC) number only, and different methods of operations by companies within the same industry. For these reasons, RMA recommends that the figures be used only as general guidelines in addition to other methods of financial analysis.

TABLE 3.15 Selected Ratios

Manufacturing—Wineries (NAICS 312130)									
COMPARATIVE HISTORICAL DATA				CURRENT DATA SORTED BY SALES					
			Type of Statement						
38	33	29	Unqualified	1			2	4	
40	53	41	Reviewed		2		15	15	22
17	15	12	Compiled	1	2	3	3	2	9
24	25	26	Tax Returns	11	6	4	4	1	1
100	150	150	Other	24	35	20	18	26	27
4/1/13–3/31/14 ALL 219	4/1/14–3/31/15 ALL 276	4/1/15–3/31/16 ALL 258	NUMBER OF STATEMENTS	31 (4/1–9/30/15) 0–1MM 37	31 (4/1–9/30/15) 1–3MM 45	227 (10/1/15–3/31/16) 3–5MM 27	227 (10/1/15–3/31/16) 5–10MM 42	227 (10/1/15–3/31/16) 10–25MM 48	227 (10/1/15–3/31/16) 25MM & OVER 59
			Ratios						
4.0	4.5	4.0	Current	4.1	5.8	5.9	3.8	2.4	3.4
2.1	2.0	2.1		2.7	2.3	3.3	2.3	1.5	1.9
1.4	1.4	1.4		1.4	1.5	1.8	1.8	1.2	1.3
.9	.9	.9	Quick	1.2	1.1	1.9	1.2	.6	.7
.3	.3	.3		.3	.3	.5	.4	.3	.4
.2	.2	.2		.1	.2	.2	.2	.1	.2
16 23.0	**15** 24.8	**15** 23.7	Sales/Receivables	**0** UND	**7** 49.3	**11** 32.8	**16** 22.4	**21** 17.2	**28** 13.1
30 12.2	**34** 10.6	**31** 11.8		**10** 35.6	**28** 12.9	**20** 18.3	**29** 12.6	**37** 9.8	**41** 8.9
51 7.1	**52** 7.0	**52** 7.0		**46** 7.9	**50** 7.3	**39** 9.4	**57** 6.4	**56** 6.5	**59** 6.2
261 1.4	**332** 1.1	**304** 1.2	Cost of Sales/Inventory	**192** 1.9	**304** 1.2	**261** 1.4	**304** 1.2	**365** 1.0	**261** 1.4
456 .8	**521** .7	**521** .7		**608** .6	**608** .6	**608** .6	**608** .6	**521** .7	**365** 1.0
730 .5	**912** .4	**730** .5		**912** .4	**912** .4	**730** .5	**730** .5	**730** .5	**608** .6
25 14.4	**26** 14.0	**21** 17.3	Cost of Sales/Payables	**0** UND	**10** 36.2	**21** 17.2	**23** 16.0	**36** 10.1	**23** 16.1
55 6.6	**59** 6.2	**51** 7.2		**48** 7.6	**53** 6.9	**35** 10.3	**47** 7.8	**69** 5.3	**51** 7.2
101 3.6	**122** 3.0	**107** 3.4		**166** 2.2	**146** 2.5	**70** 5.2	**122** 3.0	**122** 3.0	**76** 4.8
1.4	1.3	1.3	Sales/Working Capital	1.2	1.2	1.1	1.3	2.0	1.9
2.7	2.4	2.6		2.0	2.8	2.3	2.1	3.7	2.9
6.6	5.1	5.2		7.8	5.8	4.0	2.8	6.7	6.0
9.7	11.4	14.3	EBIT/Interest	4.5	7.9	31.5	12.3	13.0	19.9
(200) 3.9	(252) 4.7	(235) 3.7		(31) 1.0	(36) 3.6	(25) 9.0	(40) 2.3	(46) 4.1	(57) 5.7
1.4	1.7	1.3		−2.1	1.2	2.1	1.1	1.2	2.8
8.0	9.1	9.5	Net Profit + Depr., Dep,. Amort./Cur. Mat. L/T/D					6.9	17.3
(42) 4.8	(55) 5.0	(45) 5.9						(10) 3.5	(24) 7.7
1.9	2.6	2.6						1.8	4.3
.3	.2	.2	Fixed/Worth	.2	.2	.1	.4	.2	.3
.8	.7	.7		.6	.7	.4	1.0	.8	.8
1.6	1.4	1.5		4.5	1.5	1.1	1.5	1.9	1.3
.6	.6	.6	Debt/Worth	.5	.5	.4	.6	1.2	.8
1.5	1.4	1.4		2.6	1.0	1.2	1.4	2.1	1.1
4.1	3.0	3.9		24.2	2.7	4.3	2.8	4.3	3.2
32.8	33.9	32.7	% Profit Before Taxes/Tangible Net Worth	34.2	25.0	47.0	20.0	42.2	27.9
(194) 14.8	(253) 15.6	(230) 13.6		(29) 5.5	(41) 11.8	(25) 20.5	(38) 7.4	(43) 19.6	(54) 18.3
2.7	3.3	2.7		−8.9	4.6	3.3	.4	3.7	10.2

(continued)

TABLE 3.15 (*continued*)

4/1/13–3/31/14 ALL 219	4/1/14–3/31/15 ALL 276	4/1/15–3/31/16 ALL 258	NUMBER OF STATEMENTS	31 (4/1–9/30/15) 0–1MM 37	31 (4/1–9/30/15) 1–3MM 45	227 (10/1/15–3/31/16) 3–5MM 27	227 (10/1/15–3/31/16) 5–10MM 42	227 (10/1/15–3/31/16) 10–25MM 48	227 (10/1/15–3/31/16) 25MM & OVER 59
12.0	12.8	12.1	% Profit Before Taxes/Total Assets	13.6	9.1	23.9	8.7	13.4	13.1
5.1	5.6	4.8		1.4	5.2	7.2	2.7	4.4	7.0
.7	.9	.6		–5.0	.8	1.5	.2	.8	3.0
7.4	9.5	8.6	Sales/Net Fixed Assets	7.3	6.8	13.9	3.9	33.5	9.0
2.5	3.0	2.9		5.0	2.3	5.1	1.4	2.1	3.3
1.1	1.1	1.2		2.4	1.5	1.7	.9	1.0	1.4
1.1	1.0	1.1	Sales/Total Assets	1.1	1.1	1.2	1.0	1.1	1.1
.7	.7	.7		.7	.7	.8	.6	.7	.7
.5	.5	.5		.5	.5	.5	.4	.4	.5
2.4	2.4	2.1	% Depr., Dep., Amort./Sales	3.4	1.6	1.1	2.7	2.3	1.4
(171) 5.2	(214) 5.1	(199) 5.3		(22) 5.9	(31) 5.8	(18) 3.9	(35) 7.1	(37) 6.1	(56) 4.0
8.3	8.1	8.4		14.3	8.7	9.6	9.1	9.3	7.1
3.1	2.7	2.6	% Officers', Directors', Owners' Comp/Sales						
(27) 4.3	(35) 4.1	(33) 4.1							
7.7	9.5	7.3							
4892971M	**8360552M**	**5519014M**	**Net Sales ($)**	**19825M**	**82307M**	**103312M**	**287163M**	**774866M**	**4251541M**
6963108M	**8811913M**	**8435750M**	**Total Assets ($)**	**49293M**	**161278M**	**147637M**	**602723M**	**1722233M**	**5752586M**

M = $ thousand; MM = $ million.

Table 3.15 contains some selected ratios, again reported by sales groups on the right and time period on the left. To see how we might use this information, suppose our firm has a current ratio of 2. Based on these ratios, is this value unusual?

Looking at the current ratio for the overall group for the most recent year (third column from the left in Table 3.15), we see that three numbers are reported. The one in the middle, 2.1, is the median, meaning that half of the 258 firms had current ratios that were lower and half had higher current ratios. The other two numbers are the upper and lower quartiles. So, 25 percent of the firms had a current ratio larger than 4.0 and 25 percent had a current ratio smaller than 1.4. Our value of 2 falls comfortably within these bounds, so it doesn't appear too unusual. This comparison illustrates how knowledge of the range of ratios is important in addition to knowledge of the average. Notice how stable the current ratio has been for the last three years.

EXAMPLE 3.5 More Ratios

Take a look at the most recent numbers reported for Cost of Sales/Inventory and EBIT/Interest in Table 3.15. What are the overall median values? What are these ratios?

If you look back at our discussion, you will see that these are the inventory turnover and the times interest earned, or TIE, ratios. The median value for inventory turnover for the entire group is .7 times. So, the days' sales in inventory would be 365/.7 = 521 days, which is the boldfaced number reported. While this is long compared to other industries, this doesn't seem like very long for fine wines. The median for the TIE is 3.7 times. The number in parentheses indicates that the calculation is meaningful for, and therefore based on, only 235 of the 258 companies. In this case, the reason is that only 235 companies paid any significant amount of interest.

WORK THE WEB

As we discussed in this chapter, ratios are an important tool for examining a company's performance. Gathering the necessary financial statements to calculate ratios can be tedious and time-consuming. Fortunately, many sites on the web provide this information for free. One of these is www.reuters.com. We went there, entered the ticker symbol "HD" (for Home Depot), and then went to the "Key Metrics" page. Here is an abbreviated look at the results:

	Company	industry	sector
Quick Ratio (MRQ)	0.42	1.03	1.26
Current Ratio (MRQ)	1.34	1.91	1.58
LT Debt to Equity (MRQ)	397.33	84.80	34.40
Total Debt to Equity (MRQ)	406.99	98.04	64.39
Interest Coverage (TTM)	18.56	14.73	3.63

The website reports numerous ratios for each publicly traded company. We encourage you to have a look at your favorite company.

Questions

1. *Go to www.reuters.com and find the major ratio categories listed on this website. How do the categories differ from the categories listed in this textbook?*
2. *Go to www.reuters.com and look at the ratios. You will notice the ratios are reported for annual, quarterly, trailing twelve month, or 5-year numbers. Why might the ratios be calculated using different values?*

There are many sources of ratio information in addition to the one we examine here. Our nearby *Work the Web* box shows how to get this information for just about any company, along with some useful benchmarking information. Be sure to look it over and then benchmark your favorite company.

PROBLEMS WITH FINANCIAL STATEMENT ANALYSIS

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

As we discuss in other chapters, there are many cases in which financial theory and economic logic provide guidance in making judgments about value and risk. Little such help exists with financial statements. This is why we can't say which ratios matter the most and what may be considered a high or low value.

One particularly severe problem is that many firms are conglomerates, owning more or less unrelated lines of business. The consolidated financial statements for such firms don't fit any neat industry category. Well-known companies like General Electric (GE) and 3M fall into this category. More generally, the kind of peer group analysis we have been

Other websites provide different information about a company's ratios. For example, check out **www.marketwatch.com** and **www.morningstar.com**.

describing works best when the firms are strictly in the same line of business, the industry is competitive, and there is only one way of operating.

Another problem that is becoming increasingly common is that major competitors and natural peer group members in an industry may be scattered around the globe. The automobile industry is an obvious example. The problem here is that financial statements from outside the United States do not necessarily conform at all to generally accepted accounting principles (GAAP). The existence of different standards and procedures makes it difficult to compare financial statements across national borders.

Even companies that are clearly in the same line of business may not be comparable. For example, electric utilities engaged primarily in power generation are all classified in the same group (SIC 4911). This group is often thought to be relatively homogeneous. However, most utilities operate as regulated monopolies, so they don't compete much with each other, at least not historically. Many have stockholders, and many are organized as cooperatives with no stockholders. There are several different ways of generating power, ranging from hydroelectric to nuclear, so the operating activities of these utilities can differ quite a bit. Finally, profitability is strongly affected by the regulatory environment, so utilities in different locations can be similar but show different profits.

Several other general problems frequently crop up. First, different firms use different accounting procedures—for inventory, for example. This makes it difficult to compare statements. Second, different firms end their fiscal years at different times. For firms in seasonal businesses (such as a retailer with a large Christmas season), this can lead to difficulties in comparing balance sheets because of fluctuations in accounts during the year. Finally, for any particular firm, unusual or transient events, such as a one-time profit from an asset sale, may affect financial performance. In comparing firms, such events can give misleading signals.

Concept Questions

3.5a What are some uses for financial statement analysis?

3.5b Why do we say that financial statement analysis is management by exception?

3.5c What are SIC codes and how might they be useful?

3.5d What are some problems that can arise with financial statement analysis?

3.6 Summary and Conclusions

This chapter has discussed aspects of financial statement analysis:

1. *Sources and uses of cash:* We discussed how to identify the ways in which businesses obtain and use cash, and we described how to trace the flow of cash through a business over the course of the year. We briefly looked at the statement of cash flows.
2. *Standardized financial statements:* We explained that differences in size make it difficult to compare financial statements, and we discussed how to form common-size and common-base period statements to make comparisons easier.
3. *Ratio analysis:* Evaluating ratios of accounting numbers is another way of comparing financial statement information. We defined and discussed a number of the most

commonly reported and used financial ratios. We also discussed the famous DuPont identity as a way of analyzing financial performance.

4. *Using financial statements:* We described how to establish benchmarks for comparison and discussed some types of information that are available. We then examined potential problems that can arise.

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

CONNECT TO FINANCE

For more practice, you should be in *Connect Finance*. Log on to connect.mheducation.com to get started!

Can you answer the following *Connect* Quiz questions?

Section 3.1 What is an example of a source of cash?

Section 3.2 Pioneer Aviation has total liabilities of $23,800 and total equity of $46,200. Current assets are $8,600. What is the common-size percentage for the current assets?

Section 3.3 What ratio measures the number of days that a firm can operate based on its current assets?

Section 3.4 What is the correct formula for computing the return on equity?

Section 3.5 If you want to identify other firms that have assets and operations that are similar to those of your firm, what should you refer to?

CHAPTER REVIEW AND SELF-TEST PROBLEMS

3.1 Sources and Uses of Cash Consider the following balance sheets for the Philippe Corporation. Calculate the changes in the various accounts and, where applicable, identify the change as a source or use of cash. What were the major sources and uses of cash? Did the company become more or less liquid during the year? What happened to cash during the year?

PHILIPPE CORPORATION
2020 and 2021 Balance Sheets
(in millions)

	2020	2021
Assets		
Current assets	$ 210	$ 215
Cash	355	310
Accounts receivable	507	328
Inventory	$1,072	$ 853
Total		
Fixed assets	$6,085	$6,527
Net plant and equipment	$7,157	$7,380
Total assets		

(continued)