

## Chapter 2

# Financial Statement Analysis: What's Right, What's Wrong, and Why?

This is what can be referred to as a bridge chapter in the sense that it provides the setup for what comes from this point forward and builds upon the introduction from the previous chapter. It is sometimes easy to shortchange such topics because they are ancillary to the primary focus of the text. However, although bridges are the means to the destination rather than the destination itself, it is impossible to get there without them. The same is true of this chapter. The materials covered are necessary in laying the groundwork for understanding the purpose of finance in a corporate setting.

We have two topics of concern. First, we will briefly review the primary accounting statements, specifically focusing on how the discipline of finance views and uses the documents. Second, we will dig into methods using accounting statements to make financial decisions. The motivation behind both areas of concern is to provide a clear picture of where efforts need to be focused to improve the financial performance of the firm. It is this motivation that provides the bridge between understanding what we generally want to do in corporate finance (Chap. 1) and the implementation of that understanding (Chap. 3 and beyond).

## 2.1 Finance and Accounting

The disciplines of finance and accounting are often confused for one another and for logical reason. From the financial perspective, accounting is a support discipline. This is not meant to belittle or minimize the contribution in any way; in fact, finance views accounting as a perfect discipline. More specifically, in finance, accounting information is used as though it is always 100 % perfectly calculated and reported. Accountants are always happy to hear such statements, but they are not made flippantly. As will become obvious as we continue our journey through corporate finance, you will see that virtually everything that is done is based upon accounting in some fashion.

That being said, however, it is necessary to detail the differences between the two disciplines. While many details will emerge, virtually all differences are rooted in philosophical and definitional differences. Accounting is, by necessity, primarily a *past-focused* discipline. In other words, they are tasked with evaluating an immense amount of information pertaining to periods which have ended. Personally, you may go to an accountant at the beginning of each year to help you sort through a grocery bag full of tax forms, receipts, and statements from *last* year. What is indecipherable to you is taken and transformed into an easy-to-understand standardized form, known of course as an income tax return. That is the magic done daily by accountants. Now, for a corporation, if the size of the grocery bag is magnified by 100, you get the same thing. There are more numbers, the rules are more complex, and the final report more detailed, but the idea is the same. Accountants do a wonderful job of creating concise reports detailing the financial performance of a past period.

Finance, conversely, is primarily a *forward-focused* discipline. Our job, as previously detailed, is to facilitate firm growth and transform this growth into shareholder wealth. Suppose the firm is trying to appeal to new shareholders. While the shareholders are undoubtedly interested in the financial performance of the firm last year, they are much more interested in the expected financial performance next year. Thus, while it is undoubtedly a fact that accountants sometimes look forward and financiers sometimes look backwards, one of the primary differences between the two is the primary period of focus.

Another way of describing this difference piggybacks upon the first, but from a different perspective. Since accounting is past focused, the values they report are generally *static* in nature, implying of course that they do not change, absent of any adjustments garnered to be necessary. Finance on the other hand is a *dynamic* discipline, by necessity. When attempting to predict the future, the values found are virtually certain to be erroneous to some degree. As such, adjustment is generally necessary as new information becomes available.

So, the ultimate question is how accounting and finance work together and build upon each other. The two disciplines, although certainly different, are interlinked and somewhat inextricably related. Finance generally starts by examining previous accounting statements. Then, financial information is developed based upon conclusions drawn from previous accounting statements before new accounting statements are again used in the financial planning process. Finally, once the financial decisions have been made, accounting tools are used to evaluate the success or failure of those decisions.

## 2.2 Income Statement

The most common and oft-used financial statement is the **income statement**, which is a fairly simple notion on the surface. It begins with revenues, or all raw cash inflows, the firm generated over a period of time. Then, once all costs associated

**Table 2.1** Income statement for Firm ABC

ABC Corp.	
Income statement for the year ending Dec. 31, 2012 (values in 000s)	
Sales	\$89,000
Cost of goods sold	49,000
Depreciation	7,600
<i>EBIT</i>	32,400
Interest	2,500
Taxable income	29,900
Taxes (35 %)	10,465
Net income	19,435
Dividends	14,550
Addition to retained earnings	4,885

with those sales are removed, the so-called bottom line is obtained. This latter figure is most often labeled **net income**. Therefore, the income statement attempts to obtain a reasonable estimate of how much of the company's revenues were retained as income throughout the accounting period.

Consider Table 2.1 to illustrate a model of the basic income statement. While there are many forms it can take (and many are more complicated), we can accomplish our goals with this simplified version. **Sales** is a slightly more specific title for revenues and is the sum of all cash inflows as a result of selling the firm's goods or services. **Cost of goods sold (COGS)** is a catchall to represent all direct costs that come about in the producing and selling of the firm's product(s). **Depreciation** will be considered in more depth later in this chapter, but for now the simple definition will suffice. Depreciation is the systematic retirement of the value of firm assets over time according to a predetermined schedule. As such, the company can "write-off" the depreciated value of assets each year and in doing so can reduce tax consequences. Once *COGS* and depreciation are removed, the first subtotal of real importance, **earnings before interest and taxes (EBIT)**, is obtained. Since the goal is to get only "earnings," the next step is to eliminate the interest and taxes portions.

**Interest** represents the amount of money the company has to pay in exchange for the right to maintain ownership of funds loaned to them. This will make considerably more sense as we move throughout the text, but it is likely that each of you already has a personal understanding of what it means to pay interest on a loan. Once this interest is excluded, we then have **taxable income**, which is a relatively important value since it determines the company's tax liability. The final step requires removing taxes to arrive at the **net income**. Notice the tax rate utilized in Table 2.1 is 35 %. We will discuss the reasoning behind this number in the next section.

Finally, notice that net income has been divided between two options: dividends and addition to retained earnings. The basic idea is that once a company makes money, they must then do something with it. This decision is actually more important than the amount of income itself. In our simplified textbook world,

**Table 2.2** Corporate tax rates

Taxable income	Tax rate
\$0–\$50,000	15 %
50,001–75,000	25
75,001–100,000	34
100,001–335,000	39
335,001–10,000,000	34
10,000,001–15,000,000	35
15,000,001–18,333,333	38
> 18,333,333	35

there are only two options. One, they can give it to shareholders via **dividends**, which are simply monetary “gifts” awarded in exchange for investment in the company. The other option is to keep the money. If they do this, the money changes names, from net income to **retained earnings**. If you’ve been paying attention, your first thought may be to pay the entire amount (or at least the majority) to shareholders since our goal is to maximize their wealth and there seems no better way to do so than to write them a check. However, remember that to accomplish the goal of maximizing wealth, we must ensure long-term company success. In order to do this, the company must grow. In order to grow, the company needs money, and...well, you can see where that leads. As with most things, there has to be a balance between the two options.

### 2.2.1 Taxes

Before we move away from the income statement, two components need a closer examination. While taxes and depreciation are important for completely different reasons, understanding where the values of both come from is essential in making accurate capital budgeting decisions. Taxes are important because they represent a direct cash outflow from the firm. Current corporate tax rates are shown in Table 2.2. Notice the rates are not strictly increasing as the corporation makes more money. While this may seem odd from an individual’s perspective, it does little good to wonder about where they came from. Rather, we just need to learn to use them. The bottom line is that a company has to pay whatever the rules dictate.

**LOOK IT UP:** Despite the above statement, the curious among you may want to know a bit more about where these rates come from and how they are calculated. You should be able to find this information in the Tax Reform Act of 1986 and the 1993 Omnibus Budget Reconciliation Act.

Unfortunately, calculating the tax liability is a bit more difficult than you may think. The best way to illustrate is with an example. Consider a firm with taxable income of \$175,000. You may be inclined to just find the range in which \$175,000 falls and multiply by the rate (39 %) to get a tax bill of \$68,250. Unfortunately, that is incorrect. The tax bill is actually calculated as follows:

$$\begin{array}{rcl}
 .15 (50,000) & = & \$7,500 \\
 +.25 (75,000 - 50,000) & = & 6,250 \\
 +.34 (100,000 - 75,000) & = & 8,500 \\
 +.39 (175,000 - 100,000) & = & \underline{29,250} \\
 & & \$51,500
 \end{array}$$

As you can see, the tax bill has to be calculated in chunks. Therefore, it is a bit different than individual tax rates, which are specific to the tax bracket you fall into. Perhaps the most important thing to be concerned about is the difference between the average and the marginal tax rates. The **average tax rate** is the average tax payment made per dollar of taxable income. In other words, it spreads the tax paid evenly over each dollar of income over the period. On the other hand, the **marginal tax rate** is the rate you would have to pay on the *next* dollar of taxable income. It is an incremental tax rate and gives a much better idea of what future tax liabilities may be. To illustrate with our example, the average tax rate would be

$$\begin{aligned}
 \text{Average tax rate} &= \frac{51,500}{175,000} \\
 &= 29.43\%
 \end{aligned}$$

This means each \$1 of the \$175,000 is taxed, on average, 29.43 cents. The marginal tax rate is easier to find. We need to do what we couldn't do when calculating the tax bill; locate the range in which the additional \$1 of taxable income would fall and identify the corresponding tax rate. Therefore, in this case, the marginal tax rate is 39 %. Obviously the two rates are numerically different, so we need to take a close look at which one most matters.

In finance, probably the most important reason for examining corporate tax rates is the impact taxes have on capital budgeting decisions. The average tax rate is informative in that it tells us, on average, how much we *have* paid. However, it does little in terms of telling us what we *will* pay when we add additional taxable income. When we consider taking on new projects, it is likely that taxable income will increase. Thus, it is crucial we use the rate which will tell us the direct tax consequence of the additional income. This leads to the conclusion that we are most concerned with the marginal tax rate, which tells us how taxes will affect our future cash flows and, subsequently, the decision to accept or reject a project.

Luckily, there is one significant shortcut. Corporate tax rates are calculated based on a modified flat tax rate. This modified flat tax becomes a pure flat rate

**Table 2.3** MACRS depreciation

Year	Property class		
	3-year	5-year	7-year
1	33.33	20.00	14.29
2	44.44	32.00	24.49
3	14.82	19.20	17.49
4	7.41	11.52	12.49
5		11.52	8.93
6		5.76	8.93
7			8.93
8			4.45

for the highest incomes. What all this means is that if a company has taxable income in excess of \$18.33 million dollars, each dollar of that \$18.33 million is taxed at a flat rate of 35 %. This is a function of the design of the corporate tax structure. For most examples we use in this text, we assume firms are already very large and therefore can apply the 35 % flat tax rate to future projects.

### 2.2.2 Depreciation

The last piece of the income statement that needs a bit more examination is depreciation. Much like taxes, the amount of depreciation is determined by a standardized schedule. Also much like taxes, there are a few shortcuts we need to be aware of. We will start by defining the **Modified Accelerated Cost Recovery System (MACRS)**. The Tax Reform Act of 1986 defined the specifics of MACRS, building upon the original accelerated cost recovery system instituted in 1981.

There are essentially two steps in the MACRS. The first is grouping assets into classes, effectively determining the expected life of the asset. Once that is done, each asset is depreciated by a certain percentage each year according to the MACRS schedule. At the end of the depreciation period, the assets are, on the books, worthless. There are several typical property classes for non-real estate properties, ranging from 3 years to 20 years. Table 2.3 shows the associated percentages of the first three classes of property.

**LOOK IT UP:** These figures are curious looking, aren't they? Wonder where they come from? Most people do. You can look it up and fill us all in. Try looking at the IRS website ([www.irs.gov](http://www.irs.gov)) and go from there. Or you could just check out the MACRS Wikipedia page. While you're at it, see if you can find out why a 5-year property is depreciated for 6 years.

Let's again illustrate with an example. Suppose your firm buys a computer that costs \$15,000. Let's assume it will be classified as a 5-year property. Therefore, in the first year, the computer will be depreciated by 20 % of the initial asset value, or

\$3,000. At the end of the first year, the computer will then have a book value of \$12,000. We then repeat for the remaining 5 years. This results in a depreciation schedule of:

Year	Depreciation percentage	Depreciation amount	Ending book value
1	20.00 %	\$3,000	\$12,000
2	32.00	4,800	7,200
3	19.20	2,880	4,320
4	11.52	1,728	2,592
5	11.52	1,728	864
6	5.76	864	0

As you can see, the design of MACRS is such that at the end of the asset's life (as determined by its property class), it is fully depreciated. This means that some practical concerns, such as the true economic life (how long the asset can be used) and salvage value (how much it may be worth at the end of the depreciable life), are not considered.

The most important consideration for us in relation to depreciation is how it affects the tax bill. In order to see what is meant by this, we need to examine the differences between book and market asset values. The **book value** of any asset is the value recorded on period-ending accounting statements. This is a product of two things: historical cost and accumulated depreciation. The difference between the two can be crudely described as the net book value. The market value of that same asset is simpler in description, but more complicated in discovery. The **market value** is the true economic value of the asset and can be defined as the amount of money the asset could be sold for under current market conditions. An interesting note is that market values do not have to necessarily make sense to everyone. Just watch any episode of *Antique Roadshow* for evidence of this.

In finance, we are naturally concerned more about the market value of an asset than the book value. The book value is necessary for accounting purposes since, by design, accounting statements must be created under a disciplined structure, something not available with market values. On the other hand, market values are constantly changing and, more importantly, unknown in advance of the actual sale.

As mentioned, depreciation affects the tax bill. To see why, let's take it from the beginning. A very important result of depreciating an asset is getting a tax write-off. From the government's perspective, depreciation makes the assets at your disposal worth less, which is seen as an economic disadvantage. Therefore, the "reward" for this is a tax deduction. Sometimes, however, it is possible to over-depreciate the asset. How can you know that you've done this? If the asset can be sold on the market for more than the current book value, the asset has been over-depreciated. This doesn't mean anything has been done incorrectly since there is no way to know the market value until a buyer is actually found. However, there are ramifications if this should happen.

Revisiting the example from a few paragraphs ago, let's say, for the sake of argument, you sell the computer at the end of the third year for \$5,000. The book

value is only \$4,320; therefore, it is being sold for more than it's worth on the books. The difference between the two is \$680, which is the over-depreciated amount. The company has to pay taxes on that amount to make up for this "error." If the tax rate is 35 %, so the tax bill is \$238.

Should the example have worked out differently, it is possible to have a tax savings. To prove this to yourself, make sure to get a tax savings of \$92.40 if you sell the computer at the end of the fifth year for \$600. Just keep the following in mind when doing problems related to depreciation: a market value greater than the book value results in a tax bill, but the opposite results in a tax savings.

The topic of depreciation is much more involved than can be covered in this text. There are many rules related to different types of assets. For example, nonresidential real property, such as an office building, is depreciated straight-line over 39 years. This is often important when considering projects, which is a major focus of this text. Residential property, such as condominiums, is depreciated over 27.5 years. Also, it may shock you to learn that land cannot be depreciated.

**LOOK IT UP:** Why can't land be depreciated? There must be some logical reason. Do you know why? Maybe you can get some extra credit!

## 2.3 The Balance Sheet

Anyone who has seen a **balance sheet** can quickly understand the meaning of the name. There are two sides and, well, they must balance. Each side must sum to an equal value. The variables on the left-hand side take many forms but are all some type of **asset**. An asset is anything the firm owns, likely in hopes of using it to generate revenue. It can be something tangible, such as a building or machine, or it can be intangible, such as a copyright or patent. Very generally speaking, assets are grouped into two categories based on asset life. While this is not set in stone, a good rule of thumb is that assets with a life of less than 1 year (current assets) are segmented from those with lives of more than 1 year (fixed assets). If these things don't sound familiar, review a basic accounting text before moving on.

There are two components on the other side (the right-hand side) of the balance sheet. The first is **liabilities**. A liability is essentially another name for debt obligations. It represents a contractual obligation to the firm's future cash flows. Like an asset, a liability can be short term (current liabilities) or long term (long-term debt), again usually loosely defined as less than or greater than 1 year. A short-term liability is one that has to be paid back by the firm in less than 1 year, while long-term debt represents a longer obligation.

The other category is common (or shareholder or owner's) **equity** and is perhaps most important due to its direct relationship to the goal of the firm. Equity represents the value of ownership, which again can come in several forms. For our simplistic example, we will also separate equity into two categories; however, these categories



are not short versus long. Rather, it helps to understand the capital budgeting process by looking at equity as either internally generated or externally generated. The first of these two categories is generally referred to as retained earnings. Retained earnings represent the amount of firm money that was internally generated and kept. In other words, it represents the money the firm currently has that did not directly come from some outside source. Externally generated equity can take multiple forms, but most notably **common stock**. Common stock is a publicly available security that represents ownership in the firm. Preferred stock is also a source of externally generated equity but is a topic that will be discussed at length in a later chapter. Thus, for now, we will assume Firm ABC has no preferred equity.

The term additional paid in surplus is also sometimes found in this section of the balance sheet and refers to any additional amount paid in by investors in excess of the par value of the shares. The notion of a par value for common stock is largely antiquated but refers to the minimum amount the firms will accept for new issues of common stock. For example, if a firm agrees with its underwriter that shares will not be sold for less than \$10 and they end up selling for \$12, the \$2 is additional surplus. As discussed in Chap. 1, most issues of common stock are completed with firm commitment underwritings, which makes the par value a mute issue. Therefore, we will assume that any additional surplus is also included under the umbrella of externally generated equity without need for distinction.

In short, the balance sheet of a firm can be summed up by the following statement: *a balance sheet is a snapshot of what the firm owns, owes, and the difference between the two*. To illustrate, consider the example in Table 2.4. Notice there are a few thus far unmentioned variables. Don't let that distract you from the basic form, which leads us to the balance sheet identity and can be succinctly described as follows:

$$\text{Assets} = \text{Liabilities} + \text{Equity}$$

There is a direct link between the balance sheet and the income statement that derives from the addition to retained earnings recording during the period in question. We see from Table 2.1 that the addition to retained earnings for 2012 was \$4,885. From Table 2.4, we find the firm had retained earnings of \$4,500 at the end of 2011. Therefore, the new retained earnings figure, assuming that none was removed, is \$9,385. The remaining amount of equity needed to balance the sheet comes from the other equity category: externally generated.

## 2.4 Using Accounting Statements in Finance

This being a finance text, the focus must now turn to how accounting information can be used in finance. Accounting statements are extremely useful in identifying areas where financial planning will be most beneficial. The purpose of financial planning is to improve the firm in ways that are most advantageous to the

**Table 2.4** Balance sheet for Firm ABC

ABC Corp.					
Balance sheet as of December 31, 2011 and 2012 (values in 000s)					
Assets			Liabilities		
	2011	2012		2011	2012
Current assets			Current liabilities		
Cash	9,300	7,800	A/P	6,500	9,000
A/R	2,600	3,500	N/P	8,200	4,500
Inventory	5,000	3,000	Total current	14,700	13,500
Total current	16,900	14,300	Long-term debt	7,800	14,000
Fixed assets	31,600	34,000	Total debt	22,500	27,500
Total assets	48,500	48,300			
			Equity		
				2011	2012
			Common stock	21,500	11,415
			Retained earnings	4,500	9,385
			Total equity	26,000	20,800
			Total debt and equity	48,500	48,300

shareholders. In many cases, this involves focusing on firm strengths and building upon them. In other cases, it involves identifying areas of weakness to focus on improvement. In each case, the paramount issue is the ability to identify the strength or weakness.

Think about yourself for a moment. We all have personal strengths and weaknesses and some of yours probably spring to mind at this moment. The question is how we define these things as strengths or weaknesses? For most people, the answer is that you do so *relatively*. For example, if you feel you have a strength in math, you probably believe so because you are better at math than most others. If you believe you have a weakness in public speaking, it is likely because most others seem to do it better than you.

The same is true of a firm. To identify what the firm excels at, as well as its shortcomings, we typically do so by comparison. Doing so requires transforming accounting statements into comparable forms. We need to be able to compare our firm to something else in order to see if we are better or worse in various aspects. This “something else” can take numerous forms, but three options come to mind. First, we would like to compare our current situation to our previous situation. It is generally a good thing to be better now than we were last year. Second, we can compare our firm to our competitors with whom we are directly competing for market share. Third, we can compare ourselves on a grander scale to our industry or sector. If our performance is trending in a positive direction and we compare favorably to our peers, we can confidently say things are moving in the right direction.

**LOOK IT UP:** How do you define an industry or sector? What makes a firm your competitor? Look up SIC and NAICS codes. What do these mean and how do they differ? As an exercise, what is Lowe’s SIC and NAICS code? Who are their direct competitors?

However, there is a complication to this process. We use accounting statements to evaluate relative performance. However, accounting statements are largely firm and time specific and as such cannot be readily compared. Could you definitively conclude that you were better at math than your peers if you were taking a different test? Of course not. Likewise, if you have a net income of \$25,000 and your competitor, who is a much bigger company, has net income of \$300,000, what statements can you make regarding relative performance? We need to identify ways of creating an equal playing field, a standardized test if you will, only for firms instead of individuals.

2.5 Standardized Statements

When presented with accounting statements from both your firm and some comparison entity, one quick way of leveling the playing field is to standardize the statements. One way of doing this is to create a **common-size statement**. A common-size statement uses a base figure on each accounting statement to generate comparable values for both statements. The primary figure on an income statement is the sales figure, while total assets is typically used for balance sheets. To illustrate the process, consider Table 2.5, which again shows Firm ABC’s income statement but this time in comparison to its competitor, Firm XYZ.

If we evaluate the raw values presented in the income statements, it could easily be concluded that Firm XYZ outperformed Firm ABC, and in some ways perhaps

**Table 2.5** Standardized income statements for Firms ABC and XYZ

	Income statements		Common-size income statements	
	ABC	XYZ	ABC	XYZ
Sales	\$89,000	\$110,000	100.00 %	100.00 %
Cost of goods sold	49,000	67,000	55.06 %	60.91 %
Depreciation	7,600	6,700	8.54 %	6.09 %
EBIT	32,400	36,300	36.40 %	33.00 %
Interest	2,500	3,400	2.81 %	3.09 %
Taxable income	29,900	32,900	33.60 %	29.91 %
Taxes (35 %)	10,465	11,515	11.76 %	10.47 %
Net income	<b>19,435</b>	<b>21,385</b>	<b>21.84 %</b>	<b>19.44 %</b>
Dividends	14,550	15,400	16.35 %	14.00 %
Addition to retained earnings	4,885	5,985	5.49 %	5.44 %

they did. A larger sales figure is a desirable thing, all else equal. However, the goal is not to have the largest sales figure, but to maximize shareholder wealth. Making an additional dollar is useless if it costs too much to make. Firm XYZ does have larger *EBIT* and net income, both of which would indicate superiority. Also, from the shareholder's perspective, Firm XYZ pays out more in dividends than Firm ABC. However, the question remains whether the larger numbers are a result of larger sales figures or a more efficient operation in retaining the funds from sales. These questions cannot be answered from the raw figures.

The last two columns of Table 2.5 display the standardized figures, which are calculated by dividing each value by the sales amount. This allows us to accurately depict what happened to each average penny the firm made. For each dollar that Firm ABC brought in as sales, 55 % was used in the process of creating that sale. This, when compared to the 61 % for Firm XYZ, is a superior value. On average, ABC generated sales with less expense than XYZ. Further, for every dollar of sales, Firm ABC has a profit (net income) of nearly 22 cents, compared to less than 19.5 for Firm XYZ, which again suggests that Firm ABC was more efficient in retaining the money that came into the firm. In short, when put on a comparable level, Firm ABC outperformed Firm XYZ. An important note is that this does not suggest to ignore the differing levels of sales. A larger amount of sales and by extension a larger level of net income is desirable. But, it is even more desirable to efficiently retain sales as income.

## 2.6 Ratio Analysis

An alternative to standardized statements is a more involved process known as ratio analysis. One of the more extensively studied areas in both finance and accounting, ratio analysis is a massive topic that easily fills entire texts alone. Thus, our focus will not be a comprehensive, detailed analysis, but rather to obtain an overall understanding of why such an analysis is useful. **Ratio analysis** is a way of combining and comparing multiple pieces of financial information. The reason we would do so is to again create a comparable analysis between two entities, the subject group and the comparable group.

There are five categories of ratios, with numerous examples within each that we will discuss in time. However, the much more important issue is to consider why we want to complete ratio analysis. The five categories are as follows: (1) short-term solvency (liquidity) ratios, (2) long-term solvency (leverage) ratios, (3) asset utilization (turnover) ratios, (4) profitability ratios, and (5) market ratios. The ordering is not by coincidence. They are listed in this specific order so as to be consistent with the goal of the firm. Taken collectively, the first two categories can be referred to as *sustaining* categories. Remember that our job in finance is to plan for future growth, constantly attempting to make the firm better and more valuable. However, we cannot do that if we are not a firm that can sustain our current condition.

**Short-term solvency** simply refers to the firm's ability to pay their short-term bills without undue distress. Topics that fall into this category can be as simple as the ability to pay the power bill or to keep current on our short-term tab with suppliers. This is the first category of concern because if we find a problem in this area, there is little need to further proceed. It is relatively simple to draw analogies to your personal life. If you are having trouble paying the rent each month, you probably should not consider investing in a house that would cost more. The same is true of a firm. If a firm is struggling to meet its short-term obligations, then considering a large project for the future is likely a fruitless prospect.

Short-term solvency is sometimes referred to as **liquidity**, although they are not exactly the same thing. The easiest way to see the difference is to examine the counterarguments to each. If a firm is insolvent, they cannot currently pay their bills and have no avenue through which they can obtain cash to pay. If a firm is illiquid, they cannot pay their bills with the cash they currently have in a timely manner. It may be possible, however, for the firm to convert other assets to cash and then pay their bills. The term liquidity refers to the speed and ease with which an asset can be converted to cash, at a fair value. This seemingly simple notion is actually one of the more discussed topics in a firm.

Liquidity has both positive and negative connotations. On the positive side, the more liquid a firm is, the less likely they will have trouble paying their short-term bills. Therefore, *liquidity is valuable*. However, when searching for liquidity, one will most often find themselves in the category of current assets, most of which are relatively liquid. As an example, consider cash, which is the most liquid of all assets. Unfortunately, if you take a pile of cash and store it in a safe, moist-free environment for a large amount of time, it STILL is just the same amount of cash. In other words, cash, unless used, is unprofitable. And, when cash becomes used, it usually moves away from current assets and into fixed assets (via whatever the cash is spent on). Thus, we are stuck with a decision. We can stockpile current assets, such as cash, to fight against potential future financial distress, but we do so at the expense of profitability. Alternatively, we can use as much of our assets as possible in the effort to generate firm value, but do so at the risk of increasing the potential for financial distress. This balancing act is one of continuous concern for a firm. Opinions on holding cash differ drastically among firms. Some hold a great deal, while some hold almost none.

**LOOK IT UP:** The discussion of how much cash a firm should hold is an ongoing, highly debated issue. As an illustration, take some time to dig into the amount of cash that Apple has held over the last several years. (Hint: It's a lot.) As you read and research this, think about what a shareholder would like for a firm to do with the cash they hold. Would you like them to hold more of it or less of it? Getting back to Apple, something very important happened concerning shareholders and cash holdings on July 24, 2012. What was it?

Hopefully, the firm successfully dances this tightrope and will be able to essentially get a “pass” on the short-term solvency category, indicating short-term distress is not problematic. If so, we can move to the second category, **long-term solvency**, which simply measures the firm's ability to pay their long-term debt obligations. The term leverage is used as an alternative here, since the use of debt in a financial structure is often referred to as “leveraging” your money. An analogy here would be if you cannot make your current payment on your small house, you probably shouldn't buy a larger, more expensive house. Or, if the firm is struggling to meet its current debt obligations, considering funding a new project is perhaps a questionable proposition. Again, the hope is that the firm can again check this issue off the list of concern.

The reason the first two categories can be referred to as *sustaining* categories is that they measure the firm's performance in areas of the firm that are essential to current operations. The firm needs to reach certain levels within each category to sustain current levels of production, just as you need a certain level of income to maintain your current lifestyle. If you are successful in that pursuit, then you can proceed to try to improve your lifestyle, much as we can then proceed to improve the firm. Thus, we can then address the last three categories, which collectively present a path to follow in measuring the firm's ability to generate shareholder wealth. As such, we will refer to them as *progressing* categories.

The first of those three, the **asset utilization ratios**, are also known as turnover ratios since they measure the firm's ability to generate sales with their asset base. In short, they measure the firm's ability to get money in the door. The notion, naturally, is to get as much revenue into the firm as possible. However, while an excellent first step, the appropriate goal of the firm is not to maximize sales. In fact, as illustrated earlier with the common-size statements, obtaining sales is certainly not the same thing as obtaining profits and can often be misleading in measuring performance. Thus, the fourth category of ratios takes the next step in the process.

**Profitability ratios** measure the firm's ability to generate profits from sales. This takes into account the expenses used in the accumulation of sales, taxes, and interest expenses, as well as noncash issues such as depreciation. Ask yourself a question. Which do firms and shareholders care more about, sales or profits? Well, which do you care more about, your gross pay or your net pay? Naturally, the amount we get to keep or “bring home” is more important. It is impossible to spend money that you once had.

But wait! Shareholders do not truly care about profits either, because their wealth is not measured by firm profits. Profits are accounting values, or book values, which have only an indirect relationship with market values. What shareholders truly care about is the degree to which the firm's profits get transformed into market value, which leads to the final category of ratios, **market ratios**. The unique thing about this category is that they include values typically not found on accounting statements. These values are, unsurprisingly, market values such as shares outstanding and stock prices. Market ratios measure the firm's ability to generate market value with profits and, as such, present the most important conclusions pertaining to the goal of the firm. To review, Table 2.6 summarizes the ratio categories.

**Table 2.6** Ratio categories

	Category	Purpose
Sustaining categories	Short-term solvency (liquidity) ratios	Measure the firm's short-run ability to pay their bills
	Long-term solvency (leverage) ratios	Measure the firms' long-run ability to pay their bills
Progressing categories	Asset utilization (turnover) ratios	Measure the firm's ability to generate sales with assets
	Profitability ratios	Measure the firm's ability to generate profits from sales
	Market ratios	Measure the firm's ability to generate market value from profits

### 2.6.1 Short-Term Solvency Ratios

Since this category of ratios measures the firm's ability to meet their short-term debt obligations, it makes sense that we would use short-term variables in calculation. Perhaps the most popular short-term solvency, or liquidity ratio, is the **current ratio**, which is calculated as

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

Since short-term liabilities generally represents a short-run contractual obligation of future cash flows, an overly small current ratio can create problems, since doing so would indicate a short-run deficiency in our ability to pay our short-term bills. In fact, a current ratio of less than one would indicate that debt outweighs assets in the short-run. Such a scenario is typically not ideal. The larger question would be *what value is a good value?* Unfortunately, that is a difficult question to answer. If we recall Firm ABC from earlier in the chapter, we can calculate their 2012 current ratio from Table 2.4:

$$\begin{aligned}\text{Current ratio} &= \frac{14,300}{13,500} \\ &= 1.06 \text{ times}\end{aligned}$$

The firm has \$1.06 in current assets for every \$1 in current liabilities, or, put differently, the firm can pay its short-term bills 1.06 times with short-term assets. In order to make any definitive statement on whether the firm should be pleased or disappointed with that number, comparisons to peer groups or past values would be necessary.

Another short-term solvency ratio that is often of importance is the **quick ratio**. The name is due to the fact that it relates short-term debt to short-term assets *that*

*can be quickly converted to cash.* The ratio is designed to measure the relationship between short-term debt and *liquid* short-term assets. The current ratio assumes that all short-term assets are liquid, and most generally are. However, often there is a category of short-term assets that are relatively illiquid. For example, **inventory** may sometimes be liquid, but oftentimes is not, depending on the nature of the assets held in inventory. With this understanding, the quick ratio removes inventory from the total of current assets.

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

Since inventory for a traditional firm is rarely negative, the quick ratio is generally lower than the current ratio, and depending on the amount of inventory held, it could be considerably less. The intention of the quick ratio is to give a more accurate depiction of the firm's ability to pay their bills quickly without undue distress. The fact stands that often inventory cannot be converted to cash quickly and effectively, so converting it to cash and paying bills is an unlikely possibility. For Firm ABC, this works out to be

$$\begin{aligned}\text{Current ratio} &= \frac{14,300 - 3,000}{13,500} \\ &= .84 \text{ times}\end{aligned}$$

An additional, or sometimes alternative, measure of the quick ratio could be computed by subtracting part of the firm's **accounts receivables (A/R)**. This value is included in current assets because it represents sales that were done on "credit" and should be repaid in relatively short order. However, in many cases, this repayment does not happen in short order, and it would be appropriate to omit the cash flows expected from repayment in liquidity analysis. The firm may choose to eliminate past-due A/R amounts from their liquidity ratios. An example would be

$$\frac{\text{Current assets} - \text{Accounts receivables over 90 days old}}{\text{Current liabilities}}$$

And, of course, sometimes it is appropriate for a firm to remove both past-due A/R and inventory from current assets. We can take this process one step further by examining the **cash ratio**. As the name implies, this ratio is concerned with only the amount of cash the firm has, again in relation to the firm's short-term debt obligations:

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

Firm ABC has a cash ratio of .58 times, indicating they can fund a bit more than half of their short-term debt with the cash they currently have available. The cash



ratio is very restrictive in that it assumes only the most liquid of all assets are available for repayment of short-term debt. Naturally, if the firm's philosophy is to hold very little or no cash, the cash ratio is of little use to that firm. So, the idea is this. If the firm believes that all their current assets are liquid, then the appropriate measure of liquidity is the current ratio. If they feel that all assets are liquid except the inventory, the quick ratio is the appropriate measure. And, finally, if they feel that only the cash they hold should be used to finance short-term debt, the cash ratio is of most use.

### 2.6.2 Long-Term Solvency Ratios

We now turn our attention to long-term solvency. While the ability to repay short-term debt obligations is certainly important, from a financial standpoint, the ability to pay long-term debt obligation is perhaps even more important. And, naturally, the ability to repay both is the ultimate concern. In order to advance the firm, it is critical that we maintain the ability to obtain new financing, which would not happen if we fail to maintain our current financing. Would a bank give you a loan if you just defaulted on another one? Most likely not, and if so, it would be at a considerable cost. So, measuring the relationship between the firm's debt and asset levels is of considerable importance. The first three ratios in the long-term solvency category address this issue.

First, the **total debt ratio** is computed as follows:

$$\text{Total debt ratio} = \frac{\text{Total debt}}{\text{Total assets}}$$

and reports the relationship between total debt (short and long term) and total assets. For Firm ABC in 2012, this can be computed to be

$$\begin{aligned} \text{Total debt ratio} &= \frac{27,500}{48,300} \\ &= .57 \text{ times} \end{aligned}$$

This implies the firm has \$.57 in debt for every \$1 in assets. However, it also means much more. From our understanding of the balance sheet identity, we know that if the firm has 57 % in debt, they must have 43 % in equity. This 57/43 split is the firm's current capital structure or the specific mixture of debt and equity the firm currently utilizes. Much later in the text, we will examine this notion, paying particular attention to whether this mixture is the best for the firm and whether any new financing should come from the same allocation of sources.

An alternative way of viewing this is to calculate the **debt-to-equity ratio**, which is fairly self-explanatory:

$$\text{Debt-to-equity ratio} = \frac{\text{Total debt}}{\text{Total equity}}$$

Firm ABC has 2012 total equity of \$20,800, so their debt-to-equity ratio is 1.32 times. With a little mathematical finagling, we can again arrive at the capital structure of 57 % debt and 43 % equity.

The debt-to-equity ratio is of importance, particularly to shareholders, as it highlights the tradeoff the firm faces in asset allocation. The firm has a contractual obligation to the debtholders and an implied obligation to the equity holders. Thus, the relationship between the levels of these two is of paramount importance. If the debt-to equity ratio is greater than one, the firm has an allocation of debt in their capital structure in excess of 50 %. A ratio of less than one indicates the firm is weighted more towards equity.

A third measure of the relationship between debt, assets, and equity is the **equity multiplier**, calculated as

$$\text{Equity multiplier} = \frac{\text{Total assets}}{\text{Total equity}}$$

Before we calculate this ratio for Firm ABC, let's examine the relationship between the equity multiplier and the debt-to-equity ratio. Since assets must equal the summation of debt and equity, then

$$\begin{aligned} \text{Equity multiplier} &= \frac{\text{Total debt} + \text{total equity}}{\text{Total equity}} \\ &= \frac{\text{Total debt}}{\text{Total equity}} + \frac{\text{Total equity}}{\text{Total equity}} \end{aligned}$$

So,

$$\text{Equity multiplier} = \text{Debt-to-equity ratio} + 1$$

Thus, we know that the equity multiplier for Firm ABC must be 2.32 times, but that can easily be confirmed with a quick calculation. Also, we can again find the capital structure from this answer. In fact, it simply works out that if you divide 1 by the equity multiplier, the resulting answer is the weight of equity in the capital structure.

Since a primary concern of the firm is to measure the firm's ability to stay current on debt obligations, the **times interest earned ratio** is of particular importance. The period-by-period cost of debt is the interest expense of that debt, which is paid out of earnings before interest and taxes (*EBIT*). With this understanding, the ratio is calculated as follows:

$$\text{Times interest earned} = \frac{\text{EBIT}}{\text{Interest}}$$

Firm ABC has a times interest earned ratio of 12.96 for 2012, indicating they can pay their interest nearly 13 times with their earnings for the year. Whether this is a “good” number depends on comparison to past, competitors, and industry, but it at least appears the firm has an ability to maintain their current debt obligations, which is critical in moving forward with financial planning. An additional measure, of the same nature, includes acknowledging noncash expenses. Depreciation, although critical for the purpose of reconciling book and market values, does not require an actual cash payment or receipt, thus removing it from the amount available for interest payments may be misleading. Therefore, the **cash coverage ratio** is calculated as follows:

$$\text{Cash coverage ratio} = \frac{\text{EBIT} + \text{Depreciation}}{\text{Interest}}$$

Firm ABC has a cash coverage ratio of 16 times for 2012. The cash coverage ratio will always exceed the times interest earned ratio, provided the firm has some amount of depreciation.

### 2.6.3 Asset Utilization Ratios

We now arrive at the first of the *progressing* categories of ratios. The ability to pay debts both in the short and long run is a critical necessity for firm survival and sets the stage for progression. However, what we truly need is to effectively use our business plan to generate revenue that will turn into profit, which will in turn create shareholder wealth. We shall begin with the first step: the ability to get money into the firm from our business operations. Our operations are a product of our asset base. The aptly named asset utilization ratios are often called turnover ratios because they measure the ability of the firm to “turn over” their assets into revenue over and over again.

**Total asset turnover** is perhaps the most direct measure of this notion:

$$\text{Total asset turnover} = \frac{\text{Sales}}{\text{Assets}}$$

This ratio reports the amount of sales the firm receives per dollar of assets. A larger number is naturally desired. For Firm ABC, this is

$$\begin{aligned} \text{Total asset turnover} &= \frac{89,000}{48,300} \\ &= 1.84 \text{ times} \end{aligned}$$

Firm ABC generates \$1.85 in sales for every \$1 in assets. If this value compares favorably to those of Firm ABC’s competitors or the industry at large, then it would

suggest that ABC is doing an effective job of generating sales. If not, it provides an area where the firm should search for improvement.

**Inventory turnover** measures the number of times per period that the firm replaces their inventory. Since inventory is a large component of the expenses of creating sales, it typically falls into the cost of goods sold category. Thus, the more inventory used, the higher the cost of goods sold, but the sales level should also increase. It is helpful to imagine a firm that has a relatively set amount of inventory at any given time. In the simplest scenario, imagine a two-room business. In the front room, business takes place and customers buy the products. In the back room, inventory is stored, and anytime a piece of inventory is sold in the front room, it is replaced on the shelf in the back room. Inventory turnover is calculated as

$$\text{Inventory turnover} = \frac{\text{Cost of goods sold}}{\text{Inventory}}$$

In our example of Firm ABC, we can calculate the 2012 turnover to be

$$\begin{aligned}\text{Inventory turnover} &= \frac{49,000}{3,000} \\ &= 16.33 \text{ times}\end{aligned}$$

So, on average, each \$1 worth of inventory gets replaced 16 times per year. Naturally, some pieces get replaced much more often and some may not be replaced at all during the period. A careful analysis would perhaps suggest certain items be replaced with those that have a shorter shelf life. Items that remain in inventory for an extended period represents money tied up in a profitless situation, which is naturally inconsistent with the goal of the firm.

A companion ratio is **days sales in inventory** and is designed to convert the inventory turnover ratio to a more readily understood interpretation:

$$\text{Days sales in inventory} = \frac{365}{\text{Inventory turnover}}$$

For any non-leap year, 365 is the number of days in the year, thus the resulting answer can be interpreted as the number of days an average \$1 of inventory sits before being sold. For Firm ABC, this works out to be a little more than 22 days.

A very similar notion can be applied to receivables. Whereas the inventory turnover measure creates an analysis of the speed at which we are using a specific type of short-term asset to generate sales, the **receivables turnover** measures the speed at which we are recovering our short-term credit sales, which are typically classified as accounts receivable. For many firms this represents a large piece of their overall sales figures, and since sales are generally recognized at the point of sale, the amount of time between the sale and the receipt of the money is of high importance. The goal is to minimize this lag time, since the quicker the money is

received, the quicker it can be used. Of course, interest charged to customers on past-due accounts negates some of this concern.

Receivables turnover and its companion ratio, **days sales in receivables**, are calculated as follows:

$$\begin{aligned} \text{Receivables turnover} &= \frac{\text{Sales}}{\text{Accounts receivables}} \\ \text{Days sales in receivables} &= \frac{365}{\text{Receivables turnover}} \end{aligned}$$

For Firm ABC, these values are 25.43 times and 14.35 days, respectively. While the definition for the receivables turnover is less intuitive, the days sales in receivables simply implies that it takes, on average, 14.35 days to recover each \$1 of credit sales.

## 2.6.4 Profitability Ratios

Getting money into the firm is a great first step, but not the ultimate goal. In fact, obtaining revenues is a useless endeavor if they do not result in profits. If, for example, it costs \$2 to produce \$1 of sales, then the firm would be better off without that sale in the first place. Thus, we now turn our attention to ratios that focus on profits. The first is a widely used measure in many facets of finance. The **profit margin**, generally, can be calculated as

$$\text{Profit margin} = \frac{\text{Net income}}{\text{Sales}}$$

As such, we measure profit in relation to the sales from which profit is generated. This is often referred to as the net profit margin, since net income is net of all expenses that were incurred throughout the period. An alternative is measuring the *gross profit margin*, where *net income* is replaced with *sales – cost of goods sold*. Such a measure eliminates the expenses for depreciation, taxes, and interest, which may differ drastically among firms and, in a way, provides a cleaner comparison of profit performance. Also, a ratio known as *operating profit margin* is calculated by replacing *net income* with *EBIT*, which excludes taxes and interest.

For Firm ABC, the 2012 profit margin is 21.84 %, while the gross and operating profit margins are 44.94 % and 36.40 %, respectively. Firm ABC generated 21.84 cents in profit for every \$1 in sales, while the numbers are naturally elevated when select expenses are removed. Notice that these ratios are measured in percentages, since they are generally thought of as *returns* on sales. While this is the standard convention, a note of caution regarding interpretation is important. These ratios are still accounting ratios measured using accounting data and, as such, cannot, and

should not, be compared to market returns. For example, if you ever hear someone say, “this firm had a profit margin of 14 % and the market only made 10 % last year, so this firm did better,” you may feel free to correct them post-haste.

**Return on assets** and **return on equity** are two other widely used profitability ratios. They are calculated in a similar and straightforward manner:

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

For Firm ABC, these are calculated as follows:

$$\begin{aligned}\text{Return on assets} &= \frac{19,435}{48,300} \\ &= 40.24\% \\ \text{Return on equity} &= \frac{19,435}{20,800} \\ &= 93.44\%\end{aligned}$$

Firm ABC generates 40 cents in profit for every dollar in assets and 93 cents for every dollar in equity. Since the return on equity removes the debt obligation of the firm, it will always be higher than return on assets, provided the firm has a positive amount of debt. Note that for each of these, the alternatives in calculating profit (gross profit or operating profit) mentioned earlier in the section can also be used as the numerator value.

### 2.6.5 Market Ratios

Generating revenues is a great thing and generating profits is even better. However, as a shareholder in a publicly traded company, the major concern is neither, because quite simply, neither have any direct impact on the shareholders' bank accounts. A shareholder's wealth is determined not by revenues or profits, but by stock prices. So, the primary concern is in measuring how the firm's performance is reflected in the firm's stock price. We can measure this in a variety of ways, but most notably with the **price-to-earnings (P/E)** ratio:

$$\text{Price-to-earnings ratio} = \frac{\text{Price per share}}{\text{Earnings per share}}$$

Notice that this ratio, for the first time in our discussion, includes a value that cannot be found on either the income statement or the balance sheet. The price per

share is market value and, as such, changes whenever the market dictates that it should. As discussed at the opening of the chapter, accounting statements cannot be based upon fluctuating values. The **earnings per share (EPS)** is an accounting ratio, calculated as *net income/number of shares outstanding*. The EPS is a very important number in the world of investments, as it is typically referred to when *earnings estimates* or *earnings statements* are released or when firms are said to *beat* or *fail to beat earnings estimates*. The number of shares outstanding can fluctuate for a firm as they can issue more or buy some back. However, the numbers will change much less frequently than the price and can often go long periods of time without changing at all.

For the sake of completion, let's assume that Firm ABC has 3,000 shares outstanding and each share is currently selling for \$35. If so, then Firm ABC has an EPS of \$6.48, which results in a P/E ratio of 5.40. An interpretation of this value would be that Firm ABC converts each dollar of earnings into \$5.40 of market value. If, as with Firm ABC, the denominator is calculated using the past 12 months of earnings, then P/E ratio is referred to as a *trailing P/E*. If, instead, the calculation uses estimates of earnings over the next 12 months, it is referred to as a *forward P/E*. In the latter case, the earnings are typically obtained from an average of analysts' estimates of the firm's future earnings.

**LOOK IT UP:** These analysts' estimates are an indispensable source of information for investors. Analysts are paid professionals whose job is to evaluate a firm and report estimates of important financial numbers, such as stock prices or earnings. Such estimates can be widely obtained. As a relevant exercise, find at least three websites that report earnings estimates for Facebook next year. What value would you use as the denominator in calculating Facebook's forward P/E?

The P/E ratio has become such a fixture in investment strategy that it is often used to classify assets. For example, you have likely heard of a "growth" or "value" stock. The P/E ratio is one way of making such statements regarding an asset. An asset with a high P/E ratio has a high price in relation to earnings, suggesting the asset base has room to *grow* to catch up to the price. Alternatively, of course, the price could be inflated and the stock relatively overvalued. A stock with a low P/E has a low price in relation to earnings, which suggests purchase of such an asset is a good deal, or a good *value*.

The P/E ratio is just one of a larger group of ratios that are collectively known as **price ratios** and are widely used in investment analysis to theoretically valuating a firm's stock. Other commonly used examples include the *price-to-sales ratio* and the *price-to-cash flow ratio*. The price-to-sales ratio is calculated in the expected manner, as is the price-to cash flow ratio, although a thorough discussion of cash flow has not yet occurred in this text.

A second market ratio that serves largely the same purpose is the **market-to-book ratio**. As the name implies, the ratio examines the relationship between the firm's market value and the firm's book value on a per share basis:

$$\text{Market-to-book ratio} = \frac{\text{Price per share}}{\text{Book value per share}}$$

Recall the market value of an asset is simply the amount that someone is willing to pay; thus, for a publicly traded security, the market value is the same as the price. The book value per share is computed by dividing total equity by the number of shares outstanding. Firm ABC has a 2012 market-to-book ratio of

$$\begin{aligned} \text{Market-to-book ratio} &= \frac{35.00}{20,800/3,000} \\ &= 5.05 \text{ times} \end{aligned}$$

For every \$1 in book value, Firm ABC generates \$5.05 in market value. As with everything else, conversion to a higher market value is always preferred.

### 2.6.6 Dividend Ratios

A final group of ratios deals with the choice of profit dispersion. From earlier in this chapter, you may recall that net income can only go to one of two places. The firm may choose to keep it and invest back into firm operations. Or, alternatively, they may choose to pay it out to shareholders. In most cases, the final choice is a mixture of both, and for that reason, examining ratios that measure the firm's chosen profit allocation is an appropriate extension to the five primary categories.

The **dividend payout ratio** is calculated as

$$\text{Dividend payout ratio} = \frac{\text{Dividend per share}}{\text{Earnings per share}}$$

Another way of examining this would be done on an aggregate basis, by simply dividing the total amount of dividends paid by the net income. Either way, the resulting answer for Firm ABC is 75 %, indicating the firm paid out three-quarters of their profits in dividends. Naturally, this indicates they *retained* the other 25 %, a finding which can be formalized with the **retention ratio**:

$$\text{Retention ratio} = \frac{\text{Addition to retained earnings}}{\text{Net income}}$$



Another often used dividend ratio is referred to as the **dividend yield**. Unlike the payout ratio, the yield examines the relationship between the dividend paid and the market price:

$$\text{Dividend yield} = \frac{\text{Dividend per share}}{\text{Price per share}}$$

Shareholders care a great deal about this value because it represents a portion of their return on investment. The denominator is the current cost of securing position in the firm, while the numerator is the current dividend “reward” for owning the securities. For example, should someone examine Firm ABC’s current positions, they would note that an investment of \$35 would generate an annual return of \$4.85 from dividends. Of course, what really matters is not the dividend paid last year, but rather the one that will be paid next year.

### 2.6.7 DuPont Identity

In finance, we are constantly trying to identify solutions to issues that are holding the firm back. Ratio analysis helps do *half* of this, by aiding in the identification of potential problem areas. Unfortunately, finding problems is less of a concern than finding solutions to those problems. For example, the return on equity (*ROE*) is an important ratio since it most directly relates firm performance to shareholder interest. Suppose at the end of a given year, you are reviewing the ratio analysis just computed and notice the *ROE* is lower than in previous years and also lags behind your competitors and the industry. The conclusion drawn is that something is wrong. From the base *ROE* equation, all that can be concluded is either that net income is too low or that equity is too high. The first is the most likely scenario, although it is certainly possible that your capital structure needs to be realigned in some way.

So, what do you do? Do you call a meeting and tell your superiors that the problem is your profits were too low last year? Of course not, because you would immediately get the follow-up question of *why* this happened. Back in the 1920s, the DuPont Corporation found a solution to this scenario by introducing **ratio decomposition**. The process begins with the *ROE* formula:

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

The first step is to simply multiply by *assets/assets*, which of course changes nothing quantitatively:

Table 2.7 Summary of financial ratio equations

Ratio	Equation	Ratio	Equation
	Short-term solvency ratios		Asset utilization ratios
Current ratio	$\frac{\text{Current assets}}{\text{Current liabilities}}$	Total asset turnover	$\frac{\text{Sales}}{\text{Assets}}$
Quick ratio	$\frac{\text{Current assets} - \text{inventory}}{\text{Current liabilities}}$	Inventory turnover	$\frac{\text{Cost of goods sold}}{\text{Inventory}}$
Cash ratio	$\frac{\text{Cash}}{\text{Current liabilities}}$	Days sales in inventory	$\frac{365}{\text{Inventory turnover}}$
	Long-term solvency ratios	Receivables turnover	$\frac{\text{Accounts receivables}}{\text{Sales}}$
Total debt ratio	$\frac{\text{Total debt}}{\text{Total assets}}$	Days sales in receivables	$\frac{365}{\text{Receivables turnover}}$
Debt-to-equity ratio	$\frac{\text{Total debt}}{\text{Total equity}}$		Profitability ratios
Equity multiplier	$\frac{\text{Total assets}}{\text{Total equity}}$	Profit margin	$\frac{\text{Net income}}{\text{Sales}}$
Times interest earned	$\frac{\text{EBIT}}{\text{Interest}}$	Return on assets	$\frac{\text{Net income}}{\text{Assets}}$
Cash coverage ratio	$\frac{\text{EBIT} + \text{depreciation}}{\text{Interest}}$	Return on equity	$\frac{\text{Net income}}{\text{Equity}}$
	Market ratios		Dividend ratios
Price-to-earnings ratio	$\frac{\text{Price per share}}{\text{Earnings per share}}$	Dividend payout ratio	$\frac{\text{Dividend per share}}{\text{Earnings per share}}$
Market-to-book ratio	$\frac{\text{Price per share}}{\text{Book value per share}}$	Retention ratio	$\frac{\text{Addition to ret. earnings}}{\text{Net income}}$
		Dividend yield	$\frac{\text{Dividend per share}}{\text{Price per share}}$

$$\text{Return on equity} = \frac{\text{Net income}}{\text{Equity}} * \frac{\text{Assets}}{\text{Assets}}$$

Then, simply cross multiply to obtain

$$\text{Return on Equity} = \frac{\text{Net Income}}{\text{Assets}} * \frac{\text{Assets}}{\text{Equity}}$$

$\nearrow$   
ROA
 $\nwarrow$   
EM

Notice this simple process has decomposed the subject ratio into two other ratios, the return on assets (ROA) and the equity multiplier (EM). If the ROE is too low, it must be because either the ROA is too low or the capital structure needs to be adjusted. However, we can still go further in this analysis by again multiplying by one, which this time takes the form of *sales/sales*:

$$\text{Return on equity} = \frac{\text{Sales}}{\text{Sales}} * \frac{\text{Net income}}{\text{Assets}} * \frac{\text{Assets}}{\text{Equity}}$$

Again, cross multiplying results in

$$\text{Return on Equity} = \frac{\text{Sales}}{\text{Assets}} * \frac{\text{Net Income}}{\text{Sales}} * \frac{\text{Assets}}{\text{Equity}}$$

$\nearrow$   
TATO
 $\nearrow$   
PM
 $\nwarrow$   
EM

So, the ROE depends upon three things: (1) the total asset turnover (TATO), (2) the profit margin (PM), and (3) the equity multiplier (EM). If it is deemed to be too low, then the reason must lie somewhere in those three categories. More to the point, recall that TATO is that a measure of asset use efficiency. If this is deemed to be the culprit, the conclusion is the firm simply isn't getting enough revenues into the company. Potential solutions could include price discounts, better advertising and promotion, or perhaps putting more desirable products on the shelves.

The profit margin is a measure of profitability. If it is deemed to be the culprit, the problem isn't necessarily in getting the money into the firm, but rather the rate in which it is retained. Potential solutions could perhaps lie in changes in the purchasing process, better training for employees, or identifying lower cost suppliers. Finally, if both of these values seem to be relatively on par with competitors and/or the industry, the issue must lie with the firm's chosen capital structure. The equity multiplier is a measure of the relationship between a firm's assets, equity, and, as an extension, debt.

### 2.6.8 Growth Rates

There is one final issue that warrants address before we move beyond financial statement analysis. Since the primary motivation of the firm is shareholder wealth maximization and this generally requires an attitude that facilitates firm growth,

the expected growth rate is of obvious importance. While there are many ways of estimating a firm's growth rate, there are two that can be addressed readily alongside the materials in this chapter. The first, known as the **internal growth rate**, provides an estimate of how fast the firm can expect to grow when provided no external financing. Put differently, it is the rate the firm can expect to maintain if they only use the benefits from their business activities as a source of capital. With such an estimate, the possibility of external debt or equity financing is not considered, and the increase in assets is exactly offset by the increase in retained earnings:

$$\text{Internal growth rate} = \frac{ROA * b}{1 - (ROA * b)}$$

In the above equation,  $b$  refers to the retention ratio. If you think of it for a moment, the formula makes sense.  $ROA$  is the return on current assets, as calculated from the most recent financial statements. Thus, it is what the firm has shown to return from activities using the current asset base. The retention ratio, on other hand, represents *new money* that will be added, in some way, to the asset base of the firm. Thus, when you multiply the rate earned on existing assets with the ratio of new assets, the result is a growth rate that can be obtained including those new assets. The denominator of the ratio is a result of the assumption that we are using *period-ending* asset levels to calculate  $ROA$ . If, instead, you are using beginning of period levels, the dominator is removed from the equation.

The internal growth rate is a very restrictive measure of growth, since it allows the firm to have no outside “help” in financing projects. The second rate, the **sustainable growth rate**, is slightly less restrictive and is defined by a set of two characteristics:

1. The firm does not wish to issue new equity.
2. The firm wishes to maintain a constant debt-to-equity ratio.

The first characteristic is self-explanatory and has a strong basis. There are many reasons the firm would not wish to issue new equity, not the least of which is the large cost associated with doing so. The second characteristic is not the same as the internal growth rate because it doesn't require the firm to take *no* new debt or equity issuances. Rather, it says that as the firm increases their equity through retained earnings, they are willing to also add debt as long as the ratio between the two is maintained. Another way to put it is that the sustainable growth rate is the maximum rate at which the firm is expected to grow without an increase in financial leverage. They are, however, willing to take on debt in proportion to their increase in equity. Doing so allows the asset base to grow at a faster rate, which should also allow the firm to grow at a faster rate.

The formula for the sustainable growth rate is

$$\text{Sustainable growth rate} = \frac{ROE * b}{1 - (ROE * b)}$$

You can quickly see the only difference in the formulas is the inclusion of the return on equity instead of the return on assets. Since the *ROE* will always be greater than the *ROA* for any positive debt-level firm, the notion that the sustainable growth rate will be larger than the internal growth rate is confirmed. Again, the inclusion of the denominator is only appropriate when using ending of period accounting values, but that will be the customary assumption throughout the text. For Firm ABC, the growth rates can be calculated as follows:

$$\begin{aligned} \text{Internal growth rate} &= \frac{.4024 * .2514}{1 - (.4024 * .2514)} \\ &= 11.25\% \\ \text{Sustainable growth rate} &= \frac{.9344 * .2514}{1 - (.9344 * .2514)} \\ &= 30.70\% \end{aligned}$$

### IN THE REAL WORLD

*Dubarb Freeman always sat at his desk to have lunch. March 8, 2011, was no exception. While he could certainly afford to dine out and even had developed a certain level of fondness for the younger members of his team, he still felt most comfortable amid his stacks of papers. Tyler and Lilly had repeatedly attempted to lure him into one of the more spacious offices in the executive suite, but Freeman had steadfastly refused, choosing to remain lost in the back corridor of the junior employees' office space. That way he could be within easy shouting distance of all four of his team.*

*The team was less than thrilled by his loyalty.*

*Lunch for today was a fried egg and tomato sandwich with a side of potato salad, both lovingly prepared by Freeman's long-suffering wife. He was just finishing up when there was solid knock on his door.*

*"Come on in," Freeman mumbled as he gulped the last bit of his sandwich, leaving a small stream of tomato juice running down his chin. He quickly wiped it with the nearest thing to his left hand, which happened to be a neatly printed copy of last quarter's income statement.*

*"Uhm, hello, sorry to interrupt," came a cavernously deep voice that accompanied a mountain of a man into the tiny office space. Coleman Turner would have made an excellent exhibit for preschool teachers on square day. He carried broad shoulders as wide as the doorway with a block of cement perched squarely on top. He even wore square-rimmed glasses to further the look. It appeared as though he had traded his neck in for biceps. In short, Coleman did not look the part of a typecast accountant, but in reality, he was a top-notch numbers man.*

*Upon not receiving a response from Freeman, he ventured a half step further into the den of reckless organization. Each precipitously placed stack of papers*

*was exactly where it was supposed to be, since it was being used to hold up the neighboring stack. The Dubarb Freeman filing system. To Coleman, it was borderline unbearable. He defined his life by organization, which made him a perfect fit for his job.*

*"I'm a little early for the, uh, the meeting," he said and pointed at the tomato-stained paper in Freeman's hand. "We're supposed to go over the statements."*

*Freeman looked down and realized his dubious choice of napkin. He quickly placed the stained sheet on the nearest stack.*

*"Yes, yes, of course," he said. "I'll be right with you."*

*Like everything else, Freeman's actions undersold his attention to detail. He had studied the financial statements at length and was very much prepared for the meeting.*

*"I found a couple of things I thought would be good to talk about," Coleman said. His voice rumbled out of his throat like thunder, even though he had learned long ago to muffle it as much as possible.*

*"Yeah, yeah, absolutely," Freeman said, knowing he likely had many of the same thoughts. He craned his neck to direct his yell over Coleman's massive left shoulder.*

*"My office, please!" he bellowed. Moments later, Jane stuck her head in the door and inadvertently flinched when noticing Coleman. Marilyn arrived next and wedged herself in next to the big man. Stewart's head popped up over her shoulder. Brandon took the longest, taking a full ten seconds to arrive at the door. He was draining the last of his to-go cup of coffee.*

*"What's going on?" he said, speaking for the group.*

*"Coleman is here to go over those financials," Freeman said, "What say we take it to the conference room?"*

*Everyone breathed a sigh of relief. No one wanted to be the one that knocked over the first domino in Freeman's complex matrix of chaos.*

*Over the next 30 min, the small group discussed the previous quarter's statements, going into detail of the areas in which they had found improvement. Naturally, they also discussed areas where the firm was most struggling. Then, discussion turned to a longer time frame.*

*"Tyler and Lilly have been talking about making a large-scale financial commitment to improving the firm," Freeman announced, rather suddenly. This certainly caused his team to take notice. The young owners had taken a conservative approach to investment throughout the young public life of the firm. Even Coleman seemed excited. His left tricep twitched.*

*"Over the three-plus years since we've gone public, we have been working hard on getting the company in order, and we have, if I may say so myself, done a pretty good job. In fact, we've done about all we can with the infrastructure the firm currently has in place. Tyler and Lilly understand this and feel it is time to make an aggressive financial commitment to increasing firm value. And it is our job to figure out where that financial commitment would be best served. To that end, I propose we pull the annual statements for 2009 and 2010 and do some analysis."*

*“If I may,” Coleman interjected, “I actually already have those numbers available. Marilyn and I were talking about this the other day and thought they may come in handy.”*

*Jane, Stewart, and Brandon looked questioningly at Marilyn, who suddenly found a spot on the conference table fascinating. Coleman appeared oblivious to the extra attention as he held up a flash drive.*

*“They’re right here,” he announced.*

*Moments later, the overhead screen was filled with simplified versions of Hack Back’s 2009 and 2010 income statements and balance sheets.*

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**Hack Back, Inc.**

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**Income statement for years ending December 31, 2009 and 2010**

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	2009	2010
Sales	\$327,890,500	\$402,456,525
Cost of goods sold	244,606,313	327,599,611
Depreciation	37,435,864	41,385,900
EBIT	45,848,323	33,471,014
Interest	1,743,800	2,015,435
Taxable income	44,104,523	31,455,579
Taxes (35%)	15,436,583	11,009,453
Net income	28,667,940	20,446,126
Dividends	2,400,000	5,040,000
Addition to retained earnings	26,267,940	15,406,126

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**Hack Back, Inc.**

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**Balance sheet as of December 31, 2009 and 2010**

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Assets			Liabilities		
	2009	2010		2009	2010
Current assets			Current liabilities	\$20,435,135	\$27,349,500
Cash	\$37,970,869	\$51,581,987	Long-term debt	28,197,000	30,125,346
A/R	17,976,050	19,341,907	Total debt	48,632,135	57,474,846
Inventory	102,987,500	140,891,891			
Total	158,934,419	211,815,785	Equity		
				2009	2010
Fixed assets	147,505,203	118,872,674	Common stock	223,200,000	223,200,000
Total assets	\$306,439,622	\$330,688,459	Retained earnings	34,607,487	50,013,613
			Total equity	257,807,487	273,213,613
			Total debt	\$306,439,622	\$330,688,459
			and equity		

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*“So, then we ran the standard ratio panel on it,” Coleman said, as Marilyn nodded in agreement. “And here are the results of that.”*

*A few moments later a new set of numbers flashed on the screen, divided into categories. Marilyn had recovered sufficiently to discuss the data being shown.*

*“You’ll notice that we ran both years, along with peer analysis. We identified our closest competitors as Bubba’s Golf Equipment, Inc., and PLC Golf, Inc.*

*Bubba's is a bigger company than ours in terms of market cap, while PLC is a bit smaller. We also included values for each ratio calculated from an industry composite index. This should give us a great idea of where we stand."*

	<i>HBCK2009</i>	<i>HBCK2010</i>	<i>Bubba's</i>	<i>PLC Golf</i>	<i>Industry</i>
<i>Liquidity ratios</i>					
<i>Current ratio</i>	<i>7.7775</i>	<i>7.7448</i>	<i>6.4903</i>	<i>8.7606</i>	<i>6.5939</i>
<i>Quick ratio</i>	<i>2.7378</i>	<i>2.5932</i>	<i>3.9926</i>	<i>5.9055</i>	<i>4.3331</i>
<i>Cash ratio</i>	<i>1.8581</i>	<i>1.8860</i>	<i>2.6144</i>	<i>2.3602</i>	<i>2.7562</i>
<i>Leverage ratios</i>					
<i>Total debt ratio</i>	<i>0.1587</i>	<i>0.1738</i>	<i>0.2781</i>	<i>0.1647</i>	<i>0.2355</i>
<i>Debt-to-equity ratio</i>	<i>0.1886</i>	<i>0.2104</i>	<i>0.3852</i>	<i>0.1971</i>	<i>0.3081</i>
<i>Equity multiplier</i>	<i>1.1886</i>	<i>1.2104</i>	<i>1.3852</i>	<i>1.1971</i>	<i>1.3081</i>
<i>Times interest earned</i>	<i>26.2922</i>	<i>16.6073</i>	<i>8.4221</i>	<i>7.7680</i>	<i>6.7602</i>
<i>Cash coverage ratio</i>	<i>47.7602</i>	<i>37.1418</i>	<i>14.7962</i>	<i>10.3281</i>	<i>10.7135</i>
<i>Turnover ratios</i>					
<i>Total asset turnover</i>	<i>1.0700</i>	<i>1.2170</i>	<i>0.8670</i>	<i>0.9506</i>	<i>0.6935</i>
<i>Inventory turnover</i>	<i>2.3751</i>	<i>2.3252</i>	<i>3.4154</i>	<i>2.7560</i>	<i>3.1175</i>
<i>Days sales in inventory</i>	<i>153.6773</i>	<i>156.9768</i>	<i>106.8674</i>	<i>132.4365</i>	<i>117.0826</i>
<i>Receivables turnover</i>	<i>18.2404</i>	<i>20.8075</i>	<i>9.6945</i>	<i>4.0449</i>	<i>7.3414</i>
<i>Days sales in rec</i>	<i>20.0105</i>	<i>17.5418</i>	<i>37.6502</i>	<i>90.2374</i>	<i>49.7180</i>
<i>Profitability ratios</i>					
<i>Profit margin</i>	<i>0.0874</i>	<i>0.0508</i>	<i>0.1179</i>	<i>0.1922</i>	<i>0.1367</i>
<i>Gross profit margin</i>	<i>0.2540</i>	<i>0.1860</i>	<i>0.3615</i>	<i>0.4513</i>	<i>0.3912</i>
<i>Operating profit margin</i>	<i>0.1398</i>	<i>0.0832</i>	<i>0.2058</i>	<i>0.3394</i>	<i>0.2468</i>
<i>Return on assets</i>	<i>0.0936</i>	<i>0.0618</i>	<i>0.1022</i>	<i>0.1827</i>	<i>0.0948</i>
<i>Return on equity</i>	<i>0.1112</i>	<i>0.0748</i>	<i>0.1416</i>	<i>0.2188</i>	<i>0.1240</i>
<i>Market ratios</i>					
<i>Earnings per share</i>	<i>4.7780</i>	<i>3.4077</i>	<i>7.7002</i>	<i>6.0780</i>	<i>5.5826</i>
<i>Price-to-earnings</i>	<i>9.9875</i>	<i>19.0510</i>	<i>11.4283</i>	<i>8.3909</i>	<i>14.6884</i>
<i>Market-to-book</i>	<i>1.1106</i>	<i>1.4257</i>	<i>1.6177</i>	<i>1.8356</i>	<i>1.8218</i>
<i>Dividend ratios</i>					
<i>Payout ratio</i>	<i>0.0837</i>	<i>0.2465</i>	<i>0.2279</i>	<i>0.5820</i>	<i>0.2962</i>
<i>Retention ratio</i>	<i>0.9163</i>	<i>0.7535</i>	<i>0.7721</i>	<i>0.4180</i>	<i>0.7038</i>
<i>Dividend yield</i>	<i>0.0084</i>	<i>0.0129</i>	<i>0.0199</i>	<i>0.0694</i>	<i>0.0202</i>

*After allowing a few moments to absorb the information, Freeman cleared his throat and offered a suggestion.*

*"What say we take them one category at a time," he said, settling deeper into his chair, "starting with the liquidity ratios."*

*It had become sort of an informal understanding that Brandon would begin discussions of this type, since he had no issue with leaping blindly. It was a task he knew he was suited for, so he didn't mind being the designated guinea pig. The others subconsciously angled towards him.*

*"I see nothing wrong with our ability to meet our short-term debt obligations," he said. "If you notice, our current ratio is on par with our competitors and the industry."*



*“Yes,” Jane said, pointing at the screen, “but let’s be careful. Look at the quick ratio. We trail the pack considerably there.”*

*“And what is the difference between the two?” Freeman prompted.*

*“Inventory,” Coleman boomed, the single word rattling around the walls.*

*“That’s right,” Freeman said, “and that is a number on our books that has been bothering me for a while. If you notice, we carry a lot of inventory.”*

*“Do we know why?” Brandon asked.*

*Freeman knew the answer all too well, but was going to make them work for it.*

*“We have to in order to keep our business,” he said cryptically. The others sat with furrowed brows thinking about the statement, until Coleman cleared his throat.*

*“If I may,” he said in his softest loud voice. “I think I know what you mean, Mr. Freeman. I do all the billing for our distance deliveries, which we have been doing a lot lately. Our product isn’t the easiest to ship so it takes time and money to get it to their destination. We keep a large reserve of inventory so that we can meet demand on all these distance orders.”*

*“He’s right,” Freeman said, stabbing a finger in his direction. “And what is more, I personally know that we missed some earlier orders due to insufficient inventory. It takes too long to make the merchandise we sell, so we have to keep it in stock so as to get the deliveries to their destination in time.”*

*“So, we can’t make it when the orders come,” Stewart said with a nod of understanding.*

*“Not given our current infrastructure,” Freeman agreed with a shake of his rumpled head, “and along with the fact that a large portion of our demand is spread across the USA.”*

*“You know,” Jane said thoughtfully, “that also makes sense with something else I notice in these numbers. On average it takes us more than a month longer to move a piece of inventory than our benchmarks.” She glanced at Freeman. “I get what you are saying about it being necessary, but that is a lot of money tied up in inventory for a long time.”*

*“Which also drains our cash resources,” Stewart added, “and makes us riskier and more susceptible to financial distress.”*

*“This all suggests to me,” Marilyn spoke up, “that we need to think about a way of more efficiently producing our merchandise and then more efficiently getting it to the customer.” The sentiment was unmistakably Marilyn. It was her typical inclination to search for a broad fix as soon as possible. She was a more of a “bigger picture” thinker than the others.*

*“Well, let’s get back to the point at hand for a moment before we go there,” Freeman gently urged. “Although we clearly see the issue with excess inventory, can we now look at the long-term solvency?”*

*Around the room, five heads nodded. Only one spoke.*

*“I don’t see a problem in that area,” Coleman said, beginning to feel more a part of the group. “But that is a primarily a product of our low debt levels. Our ability to pay our interest is really not in doubt at the current time.”*

*"Agreed. So we can move on," Freeman said. "You all know that the turnover measures are indicators of the demand for our products. Tell me your thoughts in that area."*

*"Aside from the inventory issue we have already discussed, they also look pretty good," Stewart said. "Our total asset turnover is higher than our competitors and the industry. Our receivables seem to be turning over very well also."*

*"It seems to me the problem is not in getting money, but rather in keeping it once we get it," Brandon said. "Our sales figure is up by more than 20 % over 2009, which is amazing. But, our net income is lower. That is an odd, and bad, scenario."*

*Stewart was nodding. "Look at our profitability ratios," he said. "Our profit margin is currently less than half that of the industry. We only keep a nickel on the dollar."*

*"And what's more," Marilyn said, "is that the problem seems to be largely the expenses of those sales. The operating profit margin is abysmal as well."*

*"Even worse," Jane added, "is our return on equity. It also considerably lags our benchmark measures."*

*"You are all making excellent, and worrisome, points," Freeman said encouragingly, which was hard for him to pull off. "And we can drive them home by also adding that not only are these numbers unflattering, but they seem to be getting worse. If you compare 2010 to 2009, we see a discouraging trend."*

*He paused and held up an open palm to emphasize the next point.*

*"But," he said emphatically, "you are all well aware that this discouraging news has, for some reason, not resulted in a negative market reaction. In fact, we had a wonderful year during 2010, with our stock price going from less than fifty dollars to nearly sixty-five."*

*Freeman again paused to let the group mull over the details.*

*"So," Brandon said slowly rolling his thoughts out of his mouth as they formed, "we had a great market year, despite the negative numbers in relation to peers and a troublesome trend within our own ratios. . . . What does that tell us?"*

*Jane answered first.*

*"I think it means that the market is viewing our stock as a profitable future investment, but that we are going to very soon have to earn that trust."*

*"Very good," Freeman encouraged, "carry on."*

*"Well, the reason I say that is because of the market ratios, particularly the P/E ratio. In 2009, it was well below industry average, but last year it shot up by more than 100 %, mostly as a product of the increase in stock price. Now we are above our competitors and the industry. This creates a scenario where we are viewed as a riskier security, since our price is high in relation to our earnings. Risk encourages investment but of course also encourages fickle investors. If we fail to continue to deliver both internally and externally, we will lose shareholders. And when we lose shareholders, we will lose value, which goes against everything we want to do. It's a vicious cycle."*

*"I agree with her," Marilyn added. "And if we continue to follow a pattern of eating our sales with expenses before they become profits, it will happen sooner rather than later."*

*"It seems to me," Stewart spoke up again, "that the way to solve this is to try to fix the issues we have brought up so that future statements can more favorably reflect the financial health of the firm."*

*"Good, good," Dubarb said, slightly impatient to get to the final point. "Who would like to summarize?"*

*"I will," Brandon offered, holding up his hand and ticking off points. "First, we need to work on a way of reducing money held in excess inventory, but we need to do so in a way that doesn't harm sales. This, in part, would require us to find a way to access our out-of-region customer base. Second, we need to work on more efficiently taking advantage of our demand. The turnover figures indicate that we have products that are marketable and in demand. But we have to work on generating profits from that demand."*

*"And third, we need to work on a way of reassuring shareholders that our stock price is not artificially inflated to an unsustainable level."*

*"That's a good assessment," Freeman said approvingly. "Now, let me add a few proprietary details that I am privy to."*

*This got everyone's attention. It was rare that Freeman let go of secrets.*

*"First, I can put numbers to the qualitative statements made regarding our customer base. Three years ago, over 90 % of our sales were within 300 miles of where we sit, with only the occasional large warehouse order from another region. Over the past twelve months, however, nearly 40 % of our sales have come from areas outside of that radius."*

*Everyone's eyebrows seemed to rise in unison.*

*"And, the marketing department is putting the final touches on a national advertising campaign, which will feature our two new spokespersons: Natalie Fulton and Shane Logan."*

*Everyone's mouths made the effort to get as far from their eyebrows as possible. Natalie Fulton and Shane Logan were professional golfers on the LPGA and PGA tours, respectively. Both had won multiple times over the past year and had huge followings. The fact that Hack Back had signed them to endorsement deals was a huge step forward in getting the Hack Back name into mainstream golf.*

*Freeman pretended he didn't notice their reactions and continued.*

*"So, we have no reason to believe the out-of-region demand will slow down in the near future. There is just no way we can continue to efficiently ship the goods to all over creation."*

*"So what's the proposal?" Marilyn asked, unable to hold her tongue any more.*

*"Well," Freeman paused for the dramatic, "with your agreement, I am going to propose to Tyler, Lilly, and the board that we begin analysis on a project that would result in two new production plants being placed at geographically*

*advantageous areas within the country. To do so will be a large undertaking, easily the largest that we have done. But, I personally feel it is time to move, since our market presence is starting to build along with our demand. If we wait too long, it will be too late to capture the market share that is currently there for the taking."*

*His words rang true to those in the small audience and their agreement was implied by eager nods of consent.*

*"So," Freeman continued, "you know your roles. Marilyn and Stewart," he turned in their direction, "you are assigned the arduous task of identifying potential projects and coming up with expected cash flows from those projects. I'm sure Coleman will assist you in the accounting aspect of the job."*

*Coleman eagerly nodded, and Marilyn failed to hide her smile. Freeman then turned to Jane and Brandon.*

*"And you two are assigned the task of identifying the best way to fund the projects that we decide are best."*

*Freeman then turned to address the entire crowd again.*

*"Naturally, we will also continue to work together as well when an issue arises. I want all of us to know what is happening at all times. This is an important time for Hack Back, and I want to make sure we do everything the correct way."*

### ALTERNATE ENDINGS

1. Assume that instead of ratio analysis, Anna and Coleman had completed common-size income statements for Hack Back, Bubba's, PLC, and the industry composite (the statements are presented in an appendix). Pretend you are either Marilyn or Coleman and make a report to Dubarb Freeman solely from the common-size statements. What is your advice? Does it differ?
2. Suppose Coleman and Marilyn had completed the basic DuPont Identity as a way of furthering their arguments. How would that look? Does it support the contention that profitability is the primary issue with Hack Back?
3. Insert the following statement somewhere in the dialogue above:

*"Okay," said Dubarb, "now let's talk about the dividend ratios. What do they add to this discussion? Also, what is your recommendation on the percentages we are paying out? Given our needs, should we increase or decrease the payout ratio?"*

*It is your turn to play author. Insert the dialogue you feel necessary to respond to this, using the characters you wish to respond.*

### Concept Questions

1. **Finance versus accounting** You have a friend that is a rising junior in college and is in the process of making a tough decision. She has narrowed her choice for major to either accounting or finance and knows that, with either one, she wants to work in a large corporation. She comes to you for advice. What are the

differences in the jobs she would be doing? What are the similarities? How should she go about deciding which one she wants?

2. **Income statement** Discuss the form and function of the typical income statement. Why is it important for a firm?
3. **Dividends versus retained earnings** Hank from the board of directors has issued a proposal that the firm start paying 98 % of their profits in dividends. “There’s no better way to keep shareholders happy!” he exclaims. How do you respond?
4. **Corporate taxes** Julie is getting ready to file both her personal and corporate tax returns. She is confused because the tax rates seem to work differently. Explain to Julie what is going on with corporate taxes that differ from individual taxes.
5. **Corporate tax rates** Company XYZ is proposing a new multimillion dollar project that is expected to generate revenues for the next 10 years. They are using the average tax rate from last year in their estimations. What is the potential problem with doing this? What should they use?
6. **Market versus book values** Your company has a large machine that originally cost \$100,000. They just sold it for \$20,000 and actually got a tax reward for doing so. How could they have received a tax benefit from a cash inflow?
7. **Balance sheet** Discuss the form and function of the balance sheet. Why is it important for a firm?
8. **Using accounting statements** Your neighbor across the office just made the statement, “I don’t understand how accounting statements help in finance at all. Accounting tells us what has happened and finance is concerned with what will happen.” What is he missing?
9. **Peer analysis** How do you determine if values on accounting statements are “good” or “bad.” Discuss the difficulties of doing so, along with potential solutions to those difficulties.
10. **Standardized statements** You are trying to explain standardized statements to your friend, who is an avid golfer. He doesn’t understand, so you try it in his language. “Standardizing your statements is like handicaps in golfing. It puts everyone on a level playing field,” you say. He still doesn’t get it. “What do you mean?” he asks. Go ahead; explain the analogy to him.
11. **Ratio analysis** Discuss the five categories of ratio analysis, detailing the role they play in determining the financial well-being of the firm.
12. **DuPont identity** Explain the difference between the DuPont Identity and a standard ratio. What does the DuPont allow that the standard ratio does not?
13. **Growth rates** Internal and sustainable growth rates measure the firm’s expected growth rate, with restrictions. Discuss those restrictions and how you can draw similarities between the way they are calculated and your personal financial decisions.

## Problems

1. **Income statement** Fill in the blanks in the following income statements.

Income statement for the year ending Dec. 31, 2012	
Sales	1,369,534
Cost of goods sold	
Depreciation	146,897
<i>EBIT</i>	
Interest	86,389
Taxable income	
Taxes (35 %)	
Net income	<b>456,897</b>
Dividends	129,485
Addition to retained earnings	

2. **Net income** During 2012, Patrick's Dog Salon, Inc., had total sales of \$430,000 and costs were 59 % of sales. They also had interest expense of \$5,300 and depreciation of \$3,400. What is the firm's net income if their tax rate is 35 %?
3. **Retained earnings** In the preceding problem, if Patrick pays out \$15,000 in dividends, what is the addition to retained earnings?
4. **EPS and DPS** Using the two problems above, suppose Patrick has 34,000 shares outstanding. What is the earnings per share (EPS)? What is the dividend paid per share?
5. **Income statement** Last year, Billy's Boat Barn had net income of \$1,285,000 and paid out dividends of \$482,000. This year, Billy plans to implement a new project that will increase income by 15 %. If he desires to maintain a constant payout policy, how much does Billy expect to add to retained earnings this year?
6. **Taxes** Iam's Security, LLC, generated taxable income of \$483,000 last year. What is her tax bill? What is her average tax rate? What is her marginal tax rate?
7. **Depreciation** Benefield's Matchmaking Company just bought a new computer network designed to match customer compatibilities electronically. The machine cost \$87,000 and is classified as a 5-year property. What is the ending book value in year four?
8. **Market and book values** In the preceding problem, suppose Benefield sold the machine for \$18,000 at the end of the fifth year. What are the tax ramifications? Is it a tax bill or tax savings?
9. **Balance sheet** As of the end of 2012, Summerville Paving, Inc., had current assets of \$86,000, current liabilities of \$45,000, long-term debt of \$340,000, and total shareholder equity of 294,000. What is the amount of fixed assets?
10. **Market and book values** Exactly 3 years ago, you bought a van for your firm at a cost of \$37,000. The van falls within a 5-year property class. Today, a competitor came to you and offered to buy the van. However, if you sold it to her, you would have a tax bill of \$2,665.60. If your tax rate is 35 %, what was the price your competitor offered for the van?

11. **Profitability ratios** Holly's Fish Farm, Inc., has a current ratio of 2.1 times. In addition, she has total assets of \$571,000 and total debt of \$214,000. Holly's *ROE* is 18.7 %. What is her net income?
12. **Profitability ratios** Billy's Sheet Factory had taxable income of \$20 million last year. In addition, they have total assets of \$36 million and a tax rate of 35 %. What is Billy's return on assets?
13. **Long-term solvency ratios** If the firm has an equity multiplier of 1.85 times, what is the firm's existing capital structure?
14. **DuPont identity** Nanny's Doll Emporium has a profit margin of 11 %, total asset turnover of .8 times, and return on equity of 16.3 %. What percentage of the firm's capital structure is debt?
15. **DuPont identity** The firm's net income is \$59,423, total assets is \$458,008, total sales is \$380,083, and debt-to-equity ratio is 2.81 times. What is the firm's *ROE*?
16. **Internal growth rate** Your firm had net income of \$590,000 last year. The firm has debt of \$2.4 million and equity of \$1.8 million. The firm paid a dividend per share of \$.05 for each of their five million shares of stock last year. What is the firm's internal growth rate?
17. **Sustainable growth rate** Mac and Lindsey's Doughnut Shop, Inc., had a taxable income of \$1,152,546 and a tax rate of 35 %. They have 500,000 shares outstanding and have a dividend per share (DPS) of \$.51. They have a *ROE* of 21.74 %. What is the firm's sustainable growth rate?
18. **Standardized statements** Create common-size income statements and balance sheets for Gennifer's Basket Shop, whose 2012 statements are below.

Gennifer's Basket Shop, Inc.	
Income statement for the year ending Dec. 31, 2012	
Sales	85,432
COGS	24,810
Depreciation	1,050
EBIT	59,572
Interest	11,211
Taxable income	48,361
Taxes (35%)	16,926
Net income	31,435
Dividends	21,976
Add to retained earnings	9,459

## Gennifer's Basket Shop, Inc.

Balance sheet as of December 31, 2012

<b>Assets</b>		<b>Liabilities</b>	
Current assets		Current liabilities	
Cash	28,517	A/P	18,371
A/R	11,500	N/P	18,800
Inventory	5,320	Total current	37,171
Total current	45,337		
		Long-term debt	24,111
Fixed assets	50,333	Total debt	61,282
Total assets	95,670		
		<b>Equity</b>	
		Common stock	22,604
		Retained earnings	11,784
		Total equity	34,388
		Total liabilities and owners equity	95,670

19. **Ratio analysis** Complete a ratio panel on Gennifer's Basket Shop, Inc., using all ratios included in Table 2.7. Gennifer has 5,000 shares outstanding, each selling at \$24 per share.
20. **Ratio analysis** Gennifer's Basket Shop has two primary competitors, Bob's Weave Shop and Harriet's Container Station. The ratios for each of those firms are presented below. Based upon your work in the preceding question, provide Gennifer with some guidance regarding areas of strengths and weaknesses.

	Bob's Weave Shop	Harriet's Container Station
Liquidity ratios		
Current ratio	2.9631	2.9450
Quick ratio	2.6736	2.2764
Cash ratio	2.0476	0.3668
Leverage ratios		
Total debt ratio	0.2853	0.2912
Debt-to-equity ratio	0.3992	0.4109
Equity multiplier	1.3992	1.4109
Times interest earned	6.1581	13.9828
Cash coverage ratio	7.1440	22.5984
Turnover ratios		
Total asset turnover	0.9280	0.6336
Inventory turnover	13.7858	2.3274
Days sales in inventory	26.4765	156.8298
Receivables turnover	13.3419	1.6906
Days sales in rec.	27.3574	215.9039
Profitability ratios		
Profit margin	0.2049	0.1934
Gross profit margin	0.5220	0.5180
Operating profit margin	0.4500	0.3205
Return on assets	0.1901	0.1226
Return on equity	0.2660	0.1729

(continued)



	Bob's Weave Shop	Harriet's Container Station
	Market ratios	
Earnings per share	5.1100	6.0700
Price-to-earnings	7.0360	6.8500
Market-to-book	6.3500	5.3400
	Dividend ratios	
Payout ratio	0.6991	0.7699
Retention ratio	0.3009	0.2301

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