

CHAPTER 3

FINANCIAL STATEMENT ANALYSIS

LEARNING OBJECTIVES

After studying this chapter, you should understand:

- LO1** The three main financial statements that are produced by corporations: the statement of financial position, the income statement, and the statement of cash flows.
- LO2** How to compute and, more importantly, interpret some common ratios.

KEY NOTATIONS

<i>b</i>	Retention ratio
NWC	Net working capital
P/E ratio	Price–earnings ratio
PPE	Property, plant and equipment
ROA	Return on assets
ROE	Return on equity

A WRITE-OFF BY A COMPANY frequently means that the value of the company's assets has declined. Although this term has seen front-page treatment with respect to the Eurozone sovereign debt crisis in Greece, Spain and Ireland, it has also been a regular occurrence with corporations as well. For example, the online and print directories firm, Yell Group, had to warn investors in 2012 that it may not be able to pay back its debt, which was due in 2014. As a result, it was looking to write off 50 per cent of its outstanding debt.

Given that Yell Group had a debt burden of £2.2 billion (compared to its market value of £48 million), did this mean that the company's investors would lose £1.1 billion? The answer is no. Understanding why ultimately leads us to the main subject of this chapter: that all-important substance known as *cash flow*.

page 40

In this chapter we examine financial statements, taxes and cash flow. Our emphasis is not on preparing financial statements. Instead, we recognize that financial statements are frequently a key source of information for financial decisions, so our goal is to briefly examine such statements and point out some of their more relevant features. We also pay special attention to some of the practical details of cash flow.

As you read, pay particular attention to two important differences: (1) the difference between accounting value and market value; and (2) the difference between accounting income and cash flow. These distinctions will be important throughout the book.

3.1 THE ANNUAL REPORT

Every year, a company will release its annual report. In addition to information relating to the performance and activities of the firm over the previous year, the annual report presents three financial statements:

1. The statement of financial position, or balance sheet
2. The income statement
3. The statement of cash flows

We shall now discuss each statement in turn.

THE STATEMENT OF FINANCIAL POSITION

The **statement of financial position** or **balance sheet** is a snapshot of the firm. It is a convenient means of organizing and summarizing what a firm owns (its assets), what the firm owes (its liabilities), and the difference between the two (the firm's equity) at a given point in time. Figure 3.1 illustrates how the statement of financial position is constructed. As shown, the left side lists the assets of the firm, and the right side lists the liabilities and equity.

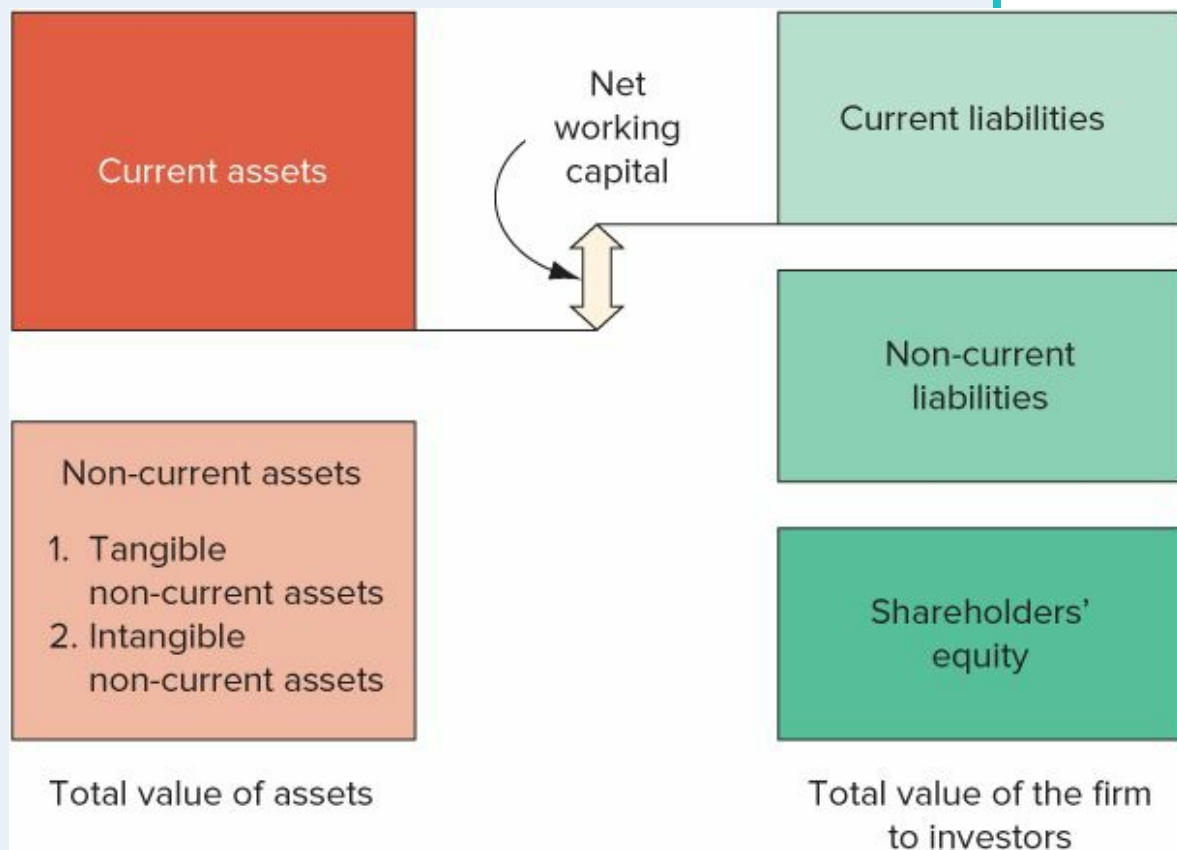
statement of financial position (balance sheet) Financial statement showing a firm's accounting value on a particular date.

Assets: The Left Side Assets are classified as either *current* or *non-current*. A non-current asset is one that has a relatively long life (greater than 12 months). Non-current assets can be either *tangible*, such as a truck or a computer, or *intangible*, such as a trademark or patent. A current asset has a life of less than 1 year. This means that the asset will convert to cash within 12 months. For example, inventory would normally be purchased and sold within a year, and is thus classified as a current asset. Obviously, cash itself is a current asset. Trade receivables (money owed to the firm by its customers) are also current assets.

FIGURE 3.1

The statement of financial position.

Left side: total value of assets. Right side: total value of liabilities and shareholders' equity.



Liabilities and Owners' Equity: The Right Side The firm's liabilities are the first thing listed on the right side of the statement of financial position. These are classified as either *current* or *non-current*. Current liabilities, like current assets, have a life of less than one year (meaning they must be paid within the year), and are usually listed before non-current liabilities. Trade payables (money the firm owes to its suppliers) are one example of a current liability.

A debt that is not due in the coming year is classified as a non-current liability. A loan that the firm will pay off in 5 years is one such non-current liability. Firms borrow in the long term from a variety of sources. We shall tend to use the terms *bond* and *bondholders* generically to refer to long-term debt and long-term creditors, respectively.

Finally, by definition, the difference between the total value of the

assets (current and non-current) and the total value of the liabilities (current and non-current) is the *shareholders' equity*, also called *ordinary equity* or *owners' equity*. This feature of the statement of financial position is intended to reflect the fact that, if the firm were to sell all its assets and use the money to pay off its debts, then whatever residual value remained would belong to the shareholders. So the statement of financial position or balance sheet 'balances' because the value of the left side always equals the value of the right side. That is, the value of the firm's assets is equal to the sum of its liabilities and shareholders' equity:

$$\text{Assets} = \text{Liabilities} + \text{Shareholder's equity} \quad (3.1)$$

This is the *balance sheet identity*, or equation, and it always holds, because shareholders' equity is defined as the difference between assets and liabilities.

Net Working Capital As shown in Figure 3.1, the difference between a firm's current assets and its current liabilities is called **net working capital**. Net working capital is positive when current assets exceed current liabilities. Based on the definitions of current assets and current liabilities, this means the cash that will become available over the next 12 months exceeds the cash that must be paid over the same period. For this reason, net working capital is usually positive in a healthy firm.

net working capital Current assets less current liabilities.

EXAMPLE 3.1

BUILDING THE STATEMENT OF FINANCIAL POSITION

From the 2015 annual report of Danish pharmaceutical firm Novo Nordisk A/S, the firm had current assets of DKK55.140 billion, non-current assets of DKK36.659 billion, current liabilities of DKK40.873 billion, and non-current liabilities of DKK3.957 billion. What does Novo Nordisk's statement of financial position or balance sheet look like? What is shareholders' equity? What is net working capital?

In this case, total assets are $\text{DKK}55.140 + \text{DKK}36.659 = \text{DKK}91.799$ billion and total liabilities are $\text{DKK}40.873 + \text{DKK}3.957 = \text{DKK}44.830$ billion, so shareholders' equity is the difference: $\text{DKK}91.799 - \text{DKK}44.830 = \text{DKK}46.969$

billion. The statement of financial position for Novo Nordisk would look like this:

Assets (DKK billions)		Liabilities and shareholders' equity (DKK billions)	
Current assets	55.140	Current liabilities	40.873
Non-current assets	<u>36.659</u>	Non-current liabilities	3.957
		Shareholders' equity	<u>46.969</u>
Total assets	<u>91.799</u>	Total liabilities and shareholders' equity	<u>91.799</u>

Net working capital is the difference between current assets and current liabilities, or DKK55.140 - DKK40.873 = DKK14.267 billion.

page 42

Table 3.1 shows a real-life statement of financial position for the Italian high-tech firm, Leonardo Finmeccanica SpA at 31 December 2015. The assets on the statement of financial position can be listed in order of the length of time it takes for them to convert to cash in the normal course of business. Similarly, the liabilities are listed in the order in which they would normally be paid. There are other ways in which the statements can be presented. For example, in the UK, non-current assets are sometimes called *fixed assets*, non-current liabilities are known as *long-term debt*, and the statement of financial position is presented as fixed assets + current assets - current liabilities = long-term debt + shareholders' equity.

TABLE 3.1

Leonardo Finmeccanica statement of financial Position

Balance Sheet (in millions euros)	
Period Ending	31 Dec 2015
Assets	
Current Assets	1.771

Cash and Cash Equivalents	
Other Net Receivables	7.358
Inventory	4.337
Other Current Assets	0.662
Total Current Assets	13.466
Property Plant and Equipment	2.630
Intangible Assets	7.010
Other Non-Current Assets	3.049
Deferred Long Term Asset Charges	1.159
Total Non-Current Assets	12.770
Total Assets	26.236
Liabilities	
Current Liabilities	
Trade Payables	3.336
Progress Payments/Advances from Customers	6.626
Other Current Liabilities	3.689
Total Current Liabilities	13.651
Long Term Debt	4.607
Provisions for Risks and Charges	1.463
Other Non-Current Liabilities	2.213
Total Non-Current Liabilities	8.283
Total Liabilities	21.934
Stockholder' s Equity	
Share Capital	2.544
Other Reserves	1.758
Total Stockholder Equity	4.302
Net Tangible Assets	26.236

Source: Yahoo! Finance

Market Value versus Book Value The values shown in the statement of financial position for the firm's assets are *book values*, and generally are not normally what the assets are actually worth. Under **International Accounting Standards (IAS)** financial statements in Europe and many other countries can show assets in two ways. The most common presentation uses the *historical cost model*, in which assets are valued at what the firm paid for them, no matter how long ago they were purchased or how much they are worth today. Another approach page 43 uses the *revaluation model*, which presents an asset's value as

what it is worth in the market today. This is known as the *fair value amount*.

International Accounting Standards (IAS) The common set of standards and procedures by which audited financial statements are prepared in Europe and many other countries.

For current assets market value and book value might be somewhat similar, because current assets are bought and converted into cash over a relatively short span of time. In other circumstances the two values might differ quite a bit. Moreover, for non-current assets under the cost model it would be purely a coincidence if the actual market value of an asset (what the asset could be sold for) were equal to its book value. For example, a railroad might own enormous tracts of land purchased a century or more ago. What the railroad paid for that land could be hundreds or thousands of times less than what the land is worth today. The statement of financial position would nonetheless show the historical cost if the cost model were used.

The statement of financial position is potentially useful to many different parties. A supplier might look at the size of trade payables to see how promptly the firm pays its bills. A potential creditor would examine the liquidity and degree of financial leverage. Managers within the firm can track things such as the amount of cash and the amount of inventory the firm keeps on hand. Uses such as these are discussed in more detail later in the chapter.

Managers and investors will frequently be interested in knowing the value of the firm. This information is not in the statement of financial position. The fact that assets may be listed at cost means that there is no necessary connection between the total assets shown and the value of the firm. Indeed, many of the most valuable assets a firm might have – good management, a good reputation, talented employees – don't appear in the statement of financial position at all.

Similarly, the shareholders' equity figure in the statement of financial position and the true value of the equity need not be related. For example, in 2016 the equity book value of the British insurer, Admiral Group was just over £600 million, whereas the market value was £5.20 billion. Similarly, Leonardo Finmeccanica's book value of equity was

approximately €4.30 billion, and its market value was €4.98 billion.

For financial managers, then, the accounting value of the equity is not an especially important concern; it is the market value that matters. Henceforth, whenever we speak of the value of an asset or the value of the firm, we shall normally mean its *market value*. So, for example, when we say the goal of the financial manager is to increase the value of the equity, we mean the market value of the equity.

EXAMPLE 3.2

MARKET VALUE VERSUS BOOK VALUE

Siouxsie plc has non-current assets with a book value of £700 and an appraised market value of about £1,000. Net working capital is £400 on the books, but approximately £600 would be realized if all the current accounts were liquidated. Siouxsie has £500 in long-term debt, both book value and market value. What is the book value of the equity? What is the market value?

We can construct two simplified statements of financial position, one in accounting (book value) terms and one in economic (market value) terms:

SIOUXSIE PLC				
Statements of financial position				
Market value versus book value				
Assets			Liabilities and shareholders' equity	
	Book £	Market £		Book £
Net working capital	400	600	Non-current liabilities	500
Non-current assets	<u>700</u>	<u>1,000</u>	Shareholders' equity	<u>600</u>
	<u>1,100</u>	<u>1,600</u>		<u>1,100</u>

In this example shareholders' equity is actually worth almost twice as much as what is shown on the books. The distinction between book and market values is important precisely because book values can be so different from true economic value.

THE INCOME STATEMENT

The **income statement** measures performance over some period of time, usually a quarter, 6 months or a year. The income statement equation is

income statement Financial statement summarizing a firm's performance over a period of time.

$$\text{Revenues} - \text{Expenses} = \text{Income} \quad (3.2)$$

If you think of the statement of financial position as a snapshot, then you can think of the income statement as a video recording covering the period between before and after pictures. Table 3.2 shows a real-life income statement for Leonardo Finmeccanica SpA.

TABLE 3.2

Leonardo Finmeccanica income statement

Income statement (in millions euros)	
Period Ending	31 Dec 2015
Total Revenue	12,995
Total Operating Expenses	(12,372)
Earnings Before Interest and Taxes	623
Net Interest Expense	(161)
Income Tax Expense	(193)
Discontinued Operations	258
Net Income	527

Source: Yahoo! Finance

The first thing reported in an income statement would usually be revenue and expenses from the firm's principal operations. Subsequent parts include, among other things, financing expenses such as interest paid. Taxes paid are reported separately. The last item is *net income* (the so-called bottom line). Net income is often expressed on a per-share basis and called *earnings per share (EPS)*.

EXAMPLE 3.3

CALCULATING EARNINGS PER SHARE

Leonardo Finmeccanica had 568.83 million shares outstanding. Based on the income statement in Table 3.2, what was EPS? What were dividends per share?

From the income statement we see that Finmeccanica had a net income of €527 million for 2015. We can calculate earnings per share, or EPS, as follows:

$$\begin{aligned}\text{Earnings per share} &= \text{Net Income} / \text{Total shares outstanding} \\ &= €527.00 / 568.83 = €0.926 \text{ per share}\end{aligned}$$

When looking at an income statement, the financial manager needs to keep two main things in mind: International Accounting Standards (IAS) and cash versus non-cash items.

IAS and the Income Statement An income statement prepared using International Accounting Standards will show revenue when it accrues. This is not necessarily when the cash comes in. The general rule (the *recognition* or *realization principle*) is to recognize revenue when the earnings process is virtually complete, and the value of an exchange of goods or services is known or can be reliably determined. In practice this principle usually means that revenue is recognized at the time of sale, which need not be the same as the time of collection.

page 45

Expenses shown on the income statement are based on the *matching principle*. The basic idea here is to first determine revenues as described previously and then match those revenues with the costs associated with producing them. So, if we manufacture a product and then sell it on credit, the revenue is realized at the time of sale. The production and other costs associated with the sale of that product will likewise be recognized at that time. Once again, the actual cash outflows may have occurred at some different time.

As a result of the way revenues and expenses are realized, the figures shown on the income statement may not be at all representative of the actual cash inflows and outflows that occurred during a particular period.

Non-Cash Items A primary reason why accounting income differs from cash flow is that an income statement contains **non-cash items**. The most important of these is *depreciation*. Suppose a firm purchases an asset for €5,000 and pays in cash. Obviously, the firm has a €5,000 cash outflow at the time of purchase. However, instead of deducting the €5,000 as an expense, an accountant might depreciate the asset over its lifetime.

non-cash items Expenses charged against revenues that do not directly affect cash flow, such as depreciation.

If the depreciation is straight-line and the asset is written down to zero over that period, then $€5,000/5 = €1,000$ will be deducted each year as an expense. The important thing to recognize is that this €1,000 deduction isn't cash – it's an accounting number. The actual cash outflow occurred when the asset was purchased.

The depreciation deduction is simply another application of the matching principle in accounting. The revenues associated with an asset would generally occur over some length of time. So the accountant seeks to match the expense of purchasing the asset with the benefits produced from owning it.

As we shall see, for the financial manager the actual timing of cash inflows and outflows is critical in coming up with a reasonable estimate of market value, so we need to learn how to separate the cash flows from the non-cash accounting entries. In reality, the difference between cash flow and accounting income can be quite high. For example, consider again Leonardo Finmeccanica SpA. For its 2015 fiscal year, the company reported a net income of €527 million and a positive cash flow of €548 million, a difference of about €21 million (see Tables 3.2 and 3.3).

TABLE 3.3

Leonardo Finmeccanica cash flow

Cash Flow (in millions euros)		
Period Ending	31 Dec 2015	31 Dec 2014
Operating Activities, Cash Flows Provided By or Used In		

Gross Cash Flows From Operating Activities	1, 680	1, 556
Changes In Accounts Receivables	(637)	(605)
Changes In Liabilities	5	(171)
Interest Paid	(264)	(258)
Income Taxes Paid	(158)	(155)
Total Cash Flow From Operating Activities	626	367
Investing Activities, Cash Flows Provided By or Used In		
Sales of Business Units	790	239
Capital Expenditures	(597)	(613)
Other Cash Flows From Investing Activities	264	265
Total Cash Flows From Investing Activities	457	(109)
Financing Activities, Cash Flows Provided By or Used In		
Bond Issue	—	250
Bond Redemption	(515)	—
Net Borrowings	(20)	(599)
Total Cash Flows From Financing Activities	(535)	(349)
Change In Cash and Cash Equivalents	548	- 91

Source: Yahoo! Finance

A DIGRESSION: TAXES

Taxes can be one of the largest cash outflows a firm will experience. For example, for the fiscal year 2015 the earnings before tax of multinational bank, HSBC Holdings plc were about £17.187 billion. Its tax bill, including all taxes paid worldwide, was approximately £3.771 billion which suggests an average tax rate of 21.9 per cent.

The size of a company's tax bill is determined by the tax code in each country that it operates, and these are regularly changed by individual governments. In this section we examine corporate tax rates and how taxes are calculated. If the various rules of taxation seem a little bizarre or convoluted to you, keep in mind that the tax code is the result of political, not economic, forces. As a result, there is no reason why it has to make

economic sense.

Corporate Tax Rates An overview of corporate tax rates for a sample of countries that were in effect for 2016 is shown in Table 3.4. Corporate taxes are not normally a simple arithmetic deduction from profit before taxes. Almost all countries in the world allow firms to carry forward losses they've made in previous years to offset their tax bill in the future. In addition, there are a number of adjustments and modifications to the tax figure that affect what is actually paid.

TABLE 3.4

Corporate tax rates for large firms around the world

Country	Corporation tax (%)	Country	Corporation tax (%)
Australia	30	New Zealand	28
Austria	25	Norway	28
Bahrain	0	Oman	12
Belgium	33.99	Pakistan	35
Brazil	25	Poland	19
Canada	34	Portugal	23
China	25	Russia	20
Denmark	24.5	Singapore	17
Finland	20	South Africa	28
France	33.33	Spain	30
Germany	29.58	Sweden	22
Greece	26	Switzerland	11.48 – 24.43
Hong Kong	16.5	Tanzania	30
India	33.99	Thailand	20
Ireland	12.5	Turkey	20
Italy	31.4	United Arab Emirates	0
Japan	35.64	United Kingdom	20
Malaysia	25	United States	40
Netherlands	20/25		

The tax rates presented in Table 3.4 are average tax rates for the largest companies. Many countries apply differential taxation, depending on how much a company earns in any given year.

Average versus Marginal Tax Rates In making financial decisions, it is frequently important to distinguish between average and marginal tax rates. Your average tax rate is your tax bill divided by your taxable income – in other words, the percentage of your income that goes to pay taxes. Your marginal tax rate is the tax you would pay (in per cent) if you earned one more unit of currency. The percentage tax rates page 47 shown in Table 3.4 for the Netherlands are marginal rates. On the first €200,000 of earnings, Dutch firms must pay 20 per cent tax. Any extra earnings are charged 25 per cent tax. Put another way, marginal tax rates apply to the part of income in the indicated range only, not all income.

The difference between average and marginal tax rates can best be illustrated with a simple example. Suppose our Dutch corporation has a taxable income of €400,000. What is the tax bill? Using Table 3.4, we can figure our tax bill like this:

$$\begin{aligned} 0.20 \times \text{€ } 200,000 &= \text{€ } 40,000 \\ 0.25 \times (\text{€ } 400,000 - 200,000) &= \text{€ } 50,000 \\ &= \underline{\text{€ } 90,000} \end{aligned}$$

Our total tax is thus €90,000.

In our example, what is the average tax rate? We had a taxable income of €400,000 and a tax bill of €90,000, so the average tax rate is $\text{€}90,000 / 400,000 = 22.5\%$. What is the marginal tax rate? If we made one more euro, the tax on that euro would be 25 cents, so our marginal rate is 25 per cent.

With a flat-rate tax there is only one tax rate, so the rate is the same for all income levels. With such a tax the marginal tax rate is always the same as the average tax rate. As it stands now, corporate taxation in the United Kingdom is based on a modified flat-rate tax, which becomes a true flat rate for the highest incomes.

Normally, the marginal tax rate will be relevant for financial decision-making. The reason is that any new cash flows will be taxed at that marginal rate. Because financial decisions usually involve new cash flows

or changes in existing ones, this rate will tell us the marginal effect of a decision on our tax bill.

STATEMENT OF CASH FLOWS

At this point we are ready to discuss perhaps one of the most important pieces of financial information that can be gleaned from financial statements: cash flow. By *cash flow* we simply mean the difference between the cash that came in and the cash that went out. For example, if you were the owner of a business, you might be very interested in how much cash you actually took out of your business in a given year. How to determine this amount is one of the things we discuss next.

No standard financial statement always presents this information in the way that we wish. We shall therefore discuss how to calculate cash flow for Leonardo Finmeccanica SpA (Table 3.3), and point out how the result may differ from that of standard financial statement calculations. It is also important to note that the accounting standards used in Europe are different from those in the US, and this leads to differences in the way the cash flow statement is presented. Our focus is on International Accounting Standards, because these are followed by large European firms.

From the balance sheet identity, we know that the value of a firm's assets is equal to the value of its liabilities plus the value of its equity. Similarly, the cash flow from the firm's assets must equal the sum of the cash flow to creditors and the cash flow to shareholders (or owners):

$$\text{Cash flow from assets} = \text{Cash flow to creditors} + \text{Cash flow to shareholders} \quad (3.3)$$

This is the *cash flow identity*. It says that the cash flow from the firm's assets is equal to the cash flow paid to suppliers of capital to the firm. What it reflects is the fact that a firm generates cash through its various activities, and that cash is either used to pay creditors or paid out to the owners of the firm.

Another way of presenting cash flow is to separate it according to the corporate activity to which it relates. Cash flows that arise because of the firm's core operations are known as **operating cash flow**. When a company buys or sells a warehouse, this is a long-term investment that will span many years, and a cash flow of this type relates to the firm's long-term investing activities. Finally, if a firm raises cash in the form of equity or debt, the cash flow would be part of its financing activities. Any cash flow that occurs can be identified as one of these three components:

operating cash flow Cash generated from a firm's normal business activities.

$$\text{Total cash flow} = \text{Cash flow from operating activities} + \text{Cash flow from investing activities} + \text{Cash flow from financing activities} \quad (3.4)$$

We discuss the various components that make up these cash flows next.

page 48

Cash Flow from Operating Activities Operating cash flow refers to the cash flow that results from the firm's day-to-day activities of producing and selling. Expenses associated with the firm's financing of its assets or the purchase of buildings are not included, because they are not operating expenses.

To calculate operating cash flow (OCF), we want to calculate revenues minus costs plus changes in non-cash net working capital. We don't want to include depreciation, because it's not a cash outflow. We also don't want to include interest, because it's a financing expense. The only exception is when we are considering the accounts of a financial institution, such as a bank, where interest payments and receipts relate directly to operating income. Finally, we do want to include taxes, because they are (unfortunately) paid in cash.

International Accounting Standards require companies to present operating cash flows in one of two ways: the direct method, where actual cash outflows and inflows are presented; or the indirect method, which starts off with the company's profit or loss for the year and then extracts any non-cash items incurred (e.g. depreciation), cash flows arising from financing activities, and cash flows from investing activities. Both approaches will arrive at the same operating cash flow.

If we look at Leonardo Finmeccanica SpA's statement of cash generated from core operations (Table 3.3), we see that Finmeccanica had a 2015 net cash flow of €336 million generated from its core operations. Operating cash flow is an important number because it tells us, on a very basic level, whether a firm's cash inflows from its business operations are sufficient to cover its everyday cash outflows. For this reason, a negative operating cash flow is often a sign of trouble.

To complete our calculation of cash flow for Leonardo Finmeccanica SpA, we need to consider how much was reinvested in the firm and how

much was raised from outside financing. We consider spending on non-current assets first.

Cash Flow from Investing Activities **Cash flow from investing activities** (net capital spending) is just money spent on non-current assets less money received from the sale of non-current assets. In Table 3.3 you can also see Leonardo Finmeccanica SpA's net capital spending for financial year 2015.

cash flow from investing activities Cash generated or expended from a firm's long-term investments.

During the year, Leonardo Finmeccanica paid €597 million in buying other non-current assets such as property, plant and equipment. However, through a major restructuring of operations, the firm disposed of significant assets resulting in a net cash *inflow* of €457 million.

Cash Flow from Financing Activities The last major component of a firm's cash flow comes from any actions it has taken during the year to raise cash from investors. The company may also have paid back outstanding borrowings, or repurchased its own shares. **Cash flow from financing activities** can be substantial, and they constitute the third part of the cash flow statement.

cash flow from financing activities Cash generated or expended as a result of its debt and equity choices.

During 2015, Leonardo Finmeccanica SpA had a net *outflow* of €535 million from financing activities. Firms will have a positive cash flow if they raise capital via borrowing or issuing equity. Negative financing cash flow arises when a firm pays off its debt or buys back its equity. In Leonardo Finmeccanica's case, the major restructuring also resulting in a change in the financing mix (Table 3.3).

Net Cash Flow Given the figures we've come up with, we're ready to calculate cash flow for the firm. The total cash flow is found by adding the cash flow from operating activities to the cash flows from investing

and financing activities. Finmeccanica had a net cash inflow of €276 million, once the effect of converting some foreign cash flows into euros had been factored into the analysis.

CONCEPT QUESTIONS

- 3.1a What is the balance sheet identity?
- 3.1b Explain the difference between accounting value and market value. Which is more important to the financial manager? Why?
- 3.1c What is the income statement equation?
- 3.1d Why is accounting income not the same as cash flow? Give two reasons.
- 3.1e What is the difference between a marginal and an average tax rate?
- 3.1f What is the cash flow identity? Explain what it says.
- 3.1g What are the components of operating cash flow?

3.2 RATIO ANALYSIS

One of the main ways to understand how healthy a company is and how well it has performed is to carry out a ratio analysis and compare the **financial ratios** of the firm with those of its competitors. Such ratios are ways of comparing and investigating the relationships between different pieces of financial information.

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

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

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

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

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

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

misleading?

5. How could this measure be improved?

Financial ratios are traditionally grouped into the following categories:

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

We shall consider each of these in turn.

SHORT-TERM SOLVENCY, OR LIQUIDITY, MEASURES

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

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

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

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

$$\text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}} \quad (3.5)$$

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

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

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

$$\text{Quick ratio} = \frac{\text{Current assets} - \text{Inventory}}{\text{Current liabilities}} \quad (3.6)$$

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

LONG-TERM SOLVENCY MEASURES

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

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

$$\text{Total debt ratio} = \frac{\text{Total assets} - \text{Total equity}}{\text{Total assets}} \quad (3.7)$$

We can define two useful variations on the total debt ratio – the *debt–equity ratio* and the *equity multiplier*:

$$\text{Debt} - \text{equity ratio} = \frac{\text{Total debt}}{\text{Total equity}} \quad (3.8)$$

$$\text{Equity multiplier} = \frac{\text{Total assets}}{\text{Total equity}} \quad (3.9)$$

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

$$\begin{aligned}
 \text{Equity multiplier} &= \frac{\text{Total assets}}{\text{Total equity}} \\
 &= \frac{\text{Total equity} + \text{Total debt}}{\text{Total equity ratio}} \\
 &= 1 + \text{Debt} - \text{equity ratio}
 \end{aligned}$$

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

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

$$\text{Times interest earned ratio} = \frac{\text{Operating profit}}{\text{Interest}} \quad (3.10)$$

Operating profit is also known as *earnings before interest and taxes (EBIT)*, and you will see this term used in many books. As the name *times interest earned ratio* suggests, this ratio measures how well a company has its interest obligations covered, and it is often called the *interest coverage ratio*.

Cash Coverage A problem with the TIE ratio is that it is based on operating profit, which is not really a measure of cash available to pay interest. The reason is that depreciation and other non-cash expenses have been deducted out. Because interest is definitely a cash outflow page 51 (to creditors), one way to define the *cash coverage ratio* is this:

$$\text{Cash coverage ratio} = \frac{\text{Operating profit} + \text{Non-cash deductions}}{\text{Interest}} \quad (3.11)$$

The numerator here, operating profit plus non-cash deductions, is often abbreviated to EBITDA (earnings before interest, taxes, depreciation and amortization – say ‘ebbit-dah’). It is a basic measure of the firm’s ability to generate cash from operations, and it is frequently used as a measure of cash flow available to meet financial obligations.

A common variation on EBITDA is earnings before interest, taxes and depreciation (EBITD – say ‘ebbit-dee’). In this variation, only depreciation is considered.

ASSET MANAGEMENT, OR TURNOVER MEASURES

We next turn our attention to the efficiency with which a company uses its

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

Inventory Turnover and Days' Sales in Inventory

Inventory turnover can be calculated as follows:

$$\text{Inventory turnover} = \frac{\text{Cost of goods sold}}{\text{Inventory}} \quad (3.12)$$

As long as we are not running out of stock and thereby forgoing sales, the higher this ratio is, the more efficiently we are managing inventory.

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

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

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

Receivables Turnover and Days' Sales in Receivables

Our inventory measures give some indication of how fast we can sell our product. We now look at how fast we collect on those sales. The *receivables turnover* is defined much like inventory turnover:

$$\text{Receivables turnover} = \frac{\text{Sales}}{\text{Trade receivables}} \quad (3.14)$$

page 52

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

$$\text{Days' sales in receivables} = \frac{365 \text{ days}}{\text{Receivables turnover}} \quad (3.15)$$

For obvious reasons, this ratio is frequently called the *average collection period (ACP)*.

Payables Turnover and Days' Payables in Receivables A similar measure to Receivables Turnover is Payables Turnover. This gives an estimate of how long it takes to pay our supplier purchases.

$$\text{Payables turnover} = \frac{\text{Credit purchases}}{\text{Trade payables}} \quad (3.16)$$

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

$$\text{Days' purchases in payables} = \frac{365 \text{ days}}{\text{Payables turnover}} \quad (3.17)$$

For obvious reasons, this ratio is frequently called the *average payment period (APP)*.

Asset Turnover Ratios Moving away from specific accounts such as inventory or receivables, we can consider several 'big picture' ratios. For example, *net working capital (NWC) turnover* is

$$\text{NWC turnover} = \frac{\text{Sales}}{\text{NWC}} \quad (3.18)$$

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

Similarly, *PPE turnover* is

$$\text{PPE turnover} = \frac{\text{Sales}}{\text{Property, plant and equipment}} \quad (3.19)$$

REAL WORLD INSIGHTS

Understanding the linkages among financial statements, business forecasts and long-term financial planning can stretch experts, never mind beginners. All companies work with different types of information and it is from these that the business decisions of the firm are made. Financial statements like the income statement and balance sheet use data on past activities. Cash flow

forecasts, on the other hand, use forward-looking predictions and estimates. The key to making correct finance decisions lies in an understanding of how accounting figures and cash flow forecasts are linked. You will also be faced with a number of different financial ratios that can sometimes seem contradictory. Cutting through noise is sometimes very difficult and even experts can get confused.

For example, read the information below and decide whether or not the automobile parts manufacturer, Elringklinger GB, performed well in 2015.

Revenues increased to £20.4 million over the year but operating profit dropped to £1.802 million from £2.117 million. Gross profit rose to £4.6 million from £4.5 million but unfortunately the profit margin percentage dropped to 23 per cent from 30 per cent. The number of employees jumped from 150 to 192, which increased overall salaries to £5.27 million from £4.08 million.

Difficult, isn't it? Clearly more analysis would be required before you could definitively come to a decision on Elringklinger GB's overall performance.

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

$$\text{Total asset turnover} = \frac{\text{Sales}}{\text{Total assets}} \quad (3.20)$$

PROFITABILITY MEASURES

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

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

$$\text{Profit margin} = \frac{\text{Net income}}{\text{Sales}} \quad (3.21)$$

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

For example, lowering our sales price will usually increase unit volume, but will normally cause profit margins to shrink. Total profit (or, more important, operating cash flow) may go up or down; so the fact that margins are smaller isn't necessarily bad.

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

$$\text{Return on assets} = \frac{\text{Net income}}{\text{Total assets}} \quad (3.22)$$

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

$$\text{Return on equity} = \frac{\text{Net income}}{\text{Total equity}} \quad (3.23)$$

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

MARKET VALUE MEASURES

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

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

$$\text{P/E ratio} = \frac{\text{Price per share}}{\text{Earnings per share}} \quad (3.24)$$

Earnings per share is simply net income divided by the number of shares.

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

Sometimes analysts divide P/E ratios by expected future earnings growth rates (after multiplying the growth rate by 100). The result is the PEG ratio. The idea behind the PEG ratio is that whether a P/E ratio is high or low depends on expected future growth. High PEG ratios suggest that the P/E is too high relative to growth, and vice versa.

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

$$\text{Price – sales ratio} = \frac{\text{Price per share}}{\text{Sales per share}} \quad (3.25)$$

As with P/E ratios, whether a particular price–sales ratio is high or low depends on the industry involved.

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

$$\text{Market-to-book ratio} = \frac{\text{Market value per share}}{\text{Book value per share}} \quad (3.26)$$

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

page 54

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

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

replacement cost:

$$\begin{aligned}\text{Tobin's } Q &= \frac{\text{Market value of firm's assets}}{\text{Replacement cost of firm's assets}} \\ &= \frac{\text{Market value of firm's debt and equity}}{\text{Replacement cost of firm's assets}}\end{aligned}\tag{3.27}$$

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

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

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

CONCLUSION

This completes our definitions of some common ratios. We could tell you about more of them, but these are enough for now. We'll go on to discuss some ways of using these ratios instead of just how to calculate them. Table 3.5 summarizes the ratios we've discussed.

TABLE 3.5

Common financial ratios

Short-term solvency or liquidity ratios

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

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

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

$$\begin{aligned} \text{Net working capital to total assets} \\ = \frac{\text{Net working capital}}{\text{Total assets}} \end{aligned}$$

Asset management or turnover ratios

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

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

$$\text{Receivables turnover} = \frac{\text{Sales}}{\text{Accounts receivables}}$$

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

$$\text{Payables turnover} = \frac{\text{Credit purchases}}{\text{Trade payables}}$$

$$\text{Days' sales in receivables} = \frac{365 \text{ days}}{\text{Payables turnover}}$$

$$\text{NWC turnover} = \frac{\text{Sales}}{\text{NWC}}$$

$$\text{PPE turnover} = \frac{\text{Sales}}{\text{Property, plant and equipment}}$$

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

Long-term solvency, or financial leverage ratios

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

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

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

$$\text{Long-term debt ratio} = \frac{\text{Long-term debt}}{\text{Long-term debt} + \text{Total equity}}$$

$$\text{Times interest earned ratio} = \frac{\text{Operating profit}}{\text{Interest}}$$

$$\begin{aligned} \text{Cash coverage ratio} \\ = \frac{\text{Operating profit} + \text{Non-cash deductions}}{\text{Interest}} \end{aligned}$$

Profitability ratios

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

$$\text{Return on assets (ROA)} = \frac{\text{Net income}}{\text{Total assets}}$$

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

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

Market value ratios

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

$$\text{PEG ratio} = \frac{\text{Price} - \text{earnings ratio}}{\text{Earnings growth rate (\%)}}$$

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

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

$$\text{Tobin's Q ratio} = \frac{\text{Market value of firm's assets}}{\text{Replacement cost of firm's assets}}$$

- 3. 2a What are the five groups of ratios? Give two or three examples of each kind.
- 3. 2b Given the total debt ratio, what other two ratios can be computed? Explain how.
- 3. 2c Turnover ratios all have one of two figures as the numerator. What are these two figures? What do these ratios measure? How do you interpret the results?
- 3. 2d Profitability ratios all have the same figure in the numerator. What is it? What do these ratios measure? How do you interpret the results?

3.3 THE DU PONT IDENTITY

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

page 56

A CLOSER LOOK AT ROE

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

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

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

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

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

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

The difference between ROE and ROA can be substantial, particularly for certain businesses that have borrowed a lot of money. We can further decompose ROE by multiplying the top and bottom by total sales:

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

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

$$\begin{aligned}\text{ROE} &= \underbrace{\frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}}}_{\text{Return on assets}} \times \frac{\text{Assets}}{\text{Total Equity}} \\ &= \text{Profit margin} \times \text{Total asset turnover} \times \text{Equity multiplier}\end{aligned}\tag{3.28}$$

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

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

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

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

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

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

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

CONCEPT QUESTIONS

- 3.3a Return on assets, or ROA, can be expressed as the product of two ratios. Which two?
- 3.3b Return on equity, or ROE, can be expressed as the product of three ratios. Which three?

3.4 USING FINANCIAL STATEMENT INFORMATION

We now discuss in more detail some practical aspects of financial statement analysis. In particular, we shall look at reasons for analysing financial statements, how to get benchmark information, and some problems that come up in the process.

WHY EVALUATE FINANCIAL STATEMENTS?

As we have discussed, the primary reason for looking at accounting information is that we don't have, and can't reasonably expect to get, market value information. We stress that whenever we have market information, we shall use it instead of accounting data. Also, if there is a conflict between accounting and market data, market data should be given precedence.

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

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

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

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

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

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

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

CHOOSING A BENCHMARK

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

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

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

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

Also, we may be more concerned with a group of the top firms in an industry, not with the average firm. Such a group is called an *aspirant group*, because we aspire to be like its members. In this case, a financial statement analysis reveals how far we have to go.

PROBLEMS WITH FINANCIAL STATEMENT ANALYSIS

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

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

More generally, the kind of peer group analysis we have been describing works best when the firms are strictly in the same line of business, the industry is competitive, and there is only one way of operating. Another problem that is becoming increasingly common is that major competitors and natural peer group members in an industry may be scattered around the globe. The automobile industry is an obvious example. The problem here is that financial statements from outside Europe do not necessarily conform at all to International Accounting Standards. The existence of different standards and procedures makes it difficult to compare financial statements across national borders.

Several other general problems frequently crop up. First, different firms use different accounting procedures – for property, plant and equipment, for example. This makes it difficult to compare statements. Second, different firms end their fiscal years at different times. For firms in seasonal businesses (such as Tesco, with a large Christmas season), this can lead to difficulties in comparing statements of financial position, because of fluctuations in accounts during the year. Finally, for any

particular firm, unusual or transient events – such as a one-time profit from an asset sale – may affect financial performance. In comparing firms, such events can give misleading signals.

CONCEPT QUESTIONS

- 3.4a What are some uses for financial statement analysis?
- 3.4b Why do we say that financial statement analysis is management by exception?
- 3.4c What are some problems that can come up with financial statement analysis?

SUMMARY AND CONCLUSIONS

This chapter has introduced some of the basics of financial statements. Financial statements are often the only basis on which to begin a financial analysis, and so it is important to understand them, how they are generated, and the weaknesses in using accounting information as compared with real cash flows.

In this chapter, We explored the following areas:

1. We defined and discussed a number of the most commonly reported and used financial ratios.
2. We categorized financial ratios into five distinct groups:
 - Short-term solvency, or liquidity, ratios
 - Long-term solvency ratios
 - Asset management, or turnover, measures
 - Profitability measures
 - Market value measures.
3. We discussed the famous Du Pont identity as a way of analysing financial performance.
4. Finally, we reviewed the problems that may arise with financial statement analysis.

page 59

One area that is linked and often discussed in the context of financial statement analysis and corporate finance is financial planning. We cover financial planning in some detail and introduce a number of ways in which to estimate the future growth rates of companies in the online appendix to this chapter.

CHAPTER REVIEW AND SELF-TEST PROBLEMS

- 3.1 **Financial Ratios** Consider the statement of financial position for John Stevens Group.

	£m	
Current assets		Current liabilities
Cash	761.3	Accounts payable
Short-term investments	390.8	Accrued expenses
Trade receivables	347.1	Notes payable/short term debt
Notes receivable: short term	19.9	Current port. of LT debt/capital lease
Receivables: other	131.6	Other current liabilities
Total inventory	24.2	Total current liabilities
Other current assets	<u>404.8</u>	
Total current assets	2,079.7	Non-current liabilities
		Long-term debt
Non-current assets		Deferred income tax
Property/plant/equipment	897.6	Minority interest
Intangible assets	3,432.4	Other liabilities, total
Long-term investments	143.4	Total non-current liabilities
Note receivable: long term	126.4	
Other long-term assets	<u>338.9</u>	Total liabilities
Total non-current assets	4,938.7	Ordinary share capital
		Additional paid-in capital
		Retained earnings (accumulated

Total assets

7,018.4

deficit)
Other equity,
total
Total equity
Total
liabilities
and
shareholders
equity

Based on the statement of financial position and income statement, calculate the following ratios:

Current ratio _____

Quick ratio _____

Cash ratio _____

Inventory turnover _____

Receivables
turnover _____

Days' sales in
inventory _____

Days' sales in
receivables _____

page 60

Total debt ratio _____

Long-term debt
ratio _____

Times interest
earned ratio _____

Cash coverage
ratio _____

3.2 ROE and the Du Pont Identity Calculate the ROE for John Stevens Group, and then break down your answer into its component parts using the Du Pont identity.

SOLUTIONS

3.1 We' ve calculated the following ratios based on the ending figures.

Current ratio	£2, 079. 70/£3, 748. 40	= 0. 55 times
Quick ratio	£2, 055. 50/£3, 748. 40	= 0. 55 times
Cash ratio	£761. 30/£3, 748. 40	= 0. 20 times
Inventory turnover	£6, 282. 50/£24. 20	= 259. 61 times
Receivables turnover	£8, 167. 10/£347. 10	= 23. 52 times
Days' sales in inventory	365/259. 61	= 1. 41 days
Days' sales in receivables	365/23. 52	= 15. 52 days
Total debt ratio	£5, 021. 90/£7, 018. 40	= 71. 55%
Long-term debt ratio	£711. 30/£2, 707. 80	= 26. 27%
Times interest earned ratio	£109/£114	= 0. 96 times
Cash coverage ratio	£236. 60/£114	= 2. 08 times

3.2 The return on equity is the ratio of net income to total equity. For John Stevens Group, this is £44. 70/£1, 996. 60 = 2. 2%, which is not outstanding.

Given the Du Pont identity, ROE can be written as follows:

$$\begin{aligned}
 \text{ROE} &= \text{Profit margin} \times \text{Total asset turnover} \times \text{Equity multiplier} \\
 &= £44.70/£8,167.10/£8,167.10/£7,018.40/£1,996.50 \\
 &= 0.55\% \times 1.16 \times 3.52 \\
 &= 2.2\%
 \end{aligned}$$

Notice that return on assets, ROA, is £44. 70/£7, 018. 40 = 0. 64%.

QUESTIONS AND PROBLEMS

- 3.1 Building a Statement of Financial Position** According to AEB Systems plc financial statements as of June 2016, the firm had current assets of £6.642 billion, non-current assets of £16.521 billion, current liabilities of £11.283 billion, and non-current liabilities of £6.589 billion. What is the value of the shareholders' equity for AEB Systems? How much is net working capital?
- 3.2 Building an Income Statement** In 2016, the UK insurance firm, Wheeler & Fox, had revenue of £38,440 million, total expenses of £37,133 million, tax of £487 million and zero depreciation. What is the net income for the firm? Wheeler & Fox paid out £238 million in cash dividends. What is the addition to retained earnings?
- 3.3 Calculating Liquidity Ratios** Guthrie plc has current liabilities of £340,000, a quick ratio of 1.8, inventory turnover of 4.2 and a current ratio of 3.3. What is the cost of goods sold for the company?
- 3.4 Calculating Profitability Ratios** Volkswagen AG had sales of €113,808 million, total assets of €167,919 million, and total debt of €69,380 million. If the profit margin is 4.173 per cent, what was net income? What was ROA? What was ROE?
- 3.5 Calculating Leverage Ratios** GNR plc has a total debt ratio of 0.43. What is its debt–equity ratio? What is its equity multiplier?
- 3.6 Calculating Market Value Ratios** Axel plc had additions to retained earnings for the year just ended of £430,000. The firm paid out £175,000 in cash dividends, and it has

ending total equity of £5.3 million. If the company currently has 210,000 shares of equity outstanding, what are earnings per share? Dividends per share? Book value per share? If the equity currently sells for £63 per share, what is the market-to-book ratio? The price–earnings ratio? If the company had sales of £4.5 million, what is the price–sales ratio?

3.7 Book Values versus Market Values In preparing a balance sheet, why do you think International Accounting Standards allow both historical cost and fair value approaches?

3.8 Residual Claims Moneyback Limited is obligated to pay its creditors £7,300 during the year.

(a) What is the market value of the shareholders' equity if assets have a market value of £8,400?

(b) What if assets equal £6,700?

3.9 Net Income and OCF This year, Southern Coat Company had sales of £730,000. Cost of goods sold, administrative and selling expenses, and depreciation expenses were £580,000, £105,000 and £135,000 respectively. In addition, the company had an interest expense of £75,000 and a tax rate of 28 per cent. (Ignore any tax loss carry-back or carry-forward provisions.)

(a) What is Southern Coat Company's net income?

(b) What is its operating cash flow?

(c) Explain your results in (a) and (b).

3.10 Accounting Values versus Cash Flows In page 62

Problem 3.9, suppose Southern Coat Company paid out £25,000 in cash dividends. Is this possible? If spending on non-current assets and net working capital was zero, and if no new shares were issued during the year, what do you know about the firm's long-term debt?

3.11 Calculating Cash Flows Consider the following

abbreviated financial statements for Parrothead Enterprises:

Parrothead Enterprises Partial balance sheets					
	Assets			Liabilities and owners' equity	
	Year $t-1$ £	Year t £		Year $t-1$ £	Year t £
Current assets	653	707	Current liabilities	261	
Non-current assets	2,691	3,240	Non-current liabilities	1,422	1,422

Parrothead Enterprises Year t Income statement	
	£
Sales	8,280
Costs	3,861
Depreciation	738
Interest paid	211

- (a) What is owners' equity for years $t-1$ and t ?
- (b) What is the change in net working capital for year t ?
- (c) In year t , Parrothead Enterprises had capital expenditure of £1,350. How much in non-current assets did Parrothead Enterprises sell? What is the cash flow from investing activities for the year? (The tax rate is 28 per cent.)
- (d) During year t , Parrothead Enterprises raised £270 in new long-term debt. How much long-term debt must Parrothead Enterprises have paid off during the year? What is the cash flow from financing activities?

3.12 Profit Margin In response to complaints about high prices, a grocery chain runs the following advertising campaign: 'If you pay your child £3 to go and buy £50 worth of groceries, then your child makes twice as much on the trip as we do.' You've collected the following

information from the grocery chain's financial statements:

	£m
Sales	750
Net income	22.5
Total assets	420
Total debt	280

Evaluate the grocery chain's claim. What is the basis for the statement? Is this claim misleading? Why or why not?

Some recent financial statements for the luxury goods page 63 company LVMH Moët Hennessy Louis Vuitton SA follow. Use this information to attempt Problems 3.13–3.16.

Income statements for LVMH Moët Hennessy Louis Vuitton		
	Y/E 2016 (€m)	Y/E 2015 (€m)
Revenue	17,193	16,481
Cost of revenue	<u>6,012</u>	<u>5,786</u>
Gross profit	11,181	10,695
Selling/general/admin. expenses	7,553	7,140
Amortization	0	6
Unusual expense (income)	126	116
Other operating expenses, total	<u>17</u>	<u>4</u>
Operating profit	3,485	3,429
Interest expense	-255	-241
Interest/invest income	15	30
Other, net	<u>-41</u>	<u>-41</u>
Profit before taxes	3,204	3,177
Provision for income taxes	<u>893</u>	<u>853</u>
Profit after taxes	2,311	2,324
Minority interest	-292	-306
Equity in affiliates	<u>7</u>	<u>7</u>

Profit attributable to shareholders	<u>2,026</u>	<u>2,025</u>
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Statements of financial position LVMH Moët Hennessy

	Dec 16 € m	Dec 15 € m	
Current assets			Current liabilities
Cash and short-term investments	1,013	1,559	Trade payables
Trade receivables	1,650	1,595	Accrued expenses
Receivables - other	229	151	Notes payable short-term debt
Current assets			Current liabilities
Total inventory	5,767	4,812	Current portion of LT debt capital lease
Other current assets	<u>1,695</u>	<u>2,001</u>	Other current liabilities
Total current assets	10,354	10,118	Total current liabilities
Non-current assets			Non-current liabilities
Property/plant/equipment	6,081	5,419	Total long-term debt
Goodwill, net	4,423	4,818	Deferred income taxes
Intangibles, net	8,523	7,999	Minority interest
Long-term investments	591	952	Other liabilities
Other long-term assets	<u>1,511</u>	<u>1,078</u>	Total non-current liabilities
Total non-current assets	21,129	20,266	Total liabilities
			Shareholders' equity
			Ordinary shares

				Additional paid-in capital
				Retained earnings (accumulated deficit)
				Treasury - common
				Other equity
				Total equity
Total assets	31,483	30,384		Total liabilities and shareholders' equity

page 64

3.13 Calculating Financial Ratios Find the following financial ratios for LVMH Moët Hennessy Louis Vuitton SA (use year-end figures rather than average values where appropriate):

Short-term solvency ratios:

- (a) Current ratio _____
- (b) Quick ratio _____
- (c) Cash ratio _____

Asset utilization ratios:

- (d) Total asset turnover _____
- (e) Inventory turnover _____
- (f) Receivables turnover _____

Long-term solvency ratios:

- (g) Total debt ratio _____
- (h) Debt-equity ratio _____

- (i) Equity multiplier _____
- (j) Times interest earned ratio _____

Profitability ratios:

- (k) Profit margin _____
- (l) Return on assets _____
- (m) Return on equity _____

3.14 Du Pont Identity Construct the Du Pont identity for LVMH Moet Hennessy Louis Vuitton SA.

3.15 Market Value Ratios LVMH Moet Hennessy Louis Vuitton SA has 473.06 million ordinary shares outstanding, and the market price for a share of equity at the end of 2015 was €46.79. What is the price–earnings ratio? What is the market-to-book ratio at the end of 2015? If the company’s growth rate is 9 per cent, what is the PEG ratio?

3.16 Tobin’s Q What is Tobin’s Q for LVMH Moet Hennessy Louis Vuitton SA? What assumptions are you making about the book value of debt and the market value of debt? What about the book value of assets and the market value of assets? Are these assumptions realistic? Why or why not? Assume that the book value of debt is equal to the market value of debt and the assets can be replaced at the current value on the statement of financial position (balance sheet).

3.17 Earnings Management Companies often try to keep accounting earnings growing at a relatively steady pace, thereby avoiding large swings in earnings from period to period. They also try to meet earnings targets. To do so, they use a variety of tactics. The simplest way is to control the timing of accounting revenues and costs, which all firms can do to at least some extent. For example, if earnings are looking too low this year, then some accounting costs can be deferred until next year. This practice is called earnings management. It is common, and

it raises a lot of questions. Why do firms do it? Why are firms even allowed to do it under International Accounting Standards? Is it ethical? What are the implications for cash flow and shareholder wealth?

3.18 Cash Flow What are some of the actions that a ^{page 65} small company can take if it finds itself in a situation in which growth in sales outstrips production capacity and available financial resources? What other options (besides expansion of capacity) are available to a company when orders exceed capacity?

3.19 Non-Current Assets and Depreciation On the simplified statement of financial position, the non-current assets (NCA) account is equal to the gross property, plant and equipment (PPE) account (which records the acquisition cost of property, plant and equipment) minus the accumulated depreciation (AD) account (which records the total depreciation taken by the firm against its property, plant and equipment). Using the fact that $NCA = PPE - AD$, show that the expression for net capital spending, $NCA_{\text{end}} - NCA_{\text{beg}} + D$ (where D is the depreciation expense during the year), is equivalent to $PPE_{\text{end}} - PPE_{\text{beg}}$.

MINI CASE

RATIOS AND FINANCIAL PLANNING AT WEST COAST YACHTS

Dan Ervin was recently hired by West Coast Yachts Ltd to assist the company with its short-term financial planning, and also to evaluate the company's financial performance. Dan graduated from university 5 years ago with a finance degree, and he has been employed in the treasury department of a FTSE 100 company since then.

West Coast Yachts was founded 10 years ago by Larissa Warren. The company's operations are located in a well-known marina, Inverkip, on the west coast of Scotland. The firm is structured as a

private limited company. The company has manufactured custom, midsize, high-performance yachts for clients over this period, and its products have received high reviews for safety and reliability. The company's yachts have also recently received the highest award for customer satisfaction. The yachts are purchased primarily by wealthy individuals for pleasure use. Occasionally, a yacht is manufactured for purchase by a company for business purposes.

The custom yacht industry is fragmented, with a number of manufacturers. As with any industry, there are market leaders, but the diverse nature of the industry ensures that no manufacturer dominates the market. The competition in the market, as well as the product cost, ensures that attention to detail is a necessity. For instance, West Coast Yachts will spend 80 to 100 hours on hand-buffing the stainless steel stem-iron, which is the metal cap on the yacht's bow that conceivably could collide with a dock or another boat.

To get Dan started with his analyses, Larissa has provided the following financial statements. Larissa has gathered the industry ratios for the yacht manufacturing industry.

West Coast Yachts 2016 Income statement	
	£
Operating revenues	128,700,000
Operating expenses	90,700,000
Operating profit	38,000,000
Depreciation	4,200,000
Other non-operating expenses	<u>15,380,000</u>
Interest	2,315,000
Profit before taxes	16,105,000
Taxes (28%)	<u>4,509,400</u>
Profit for period attributable to equity	<u><u>11,595,600</u></u>

holders

Dividends 6,957,360

Addition to retained
earnings 4,638,240

page 66

West Coast Yachts Statement of financial position as of 31 December 2016			
Assets		Liabilities and equity	
	£		£
Current assets		Current liabilities	
Cash	2,340,000	Trade payables	4,970,000
Trade receivables	4,210,000	Notes payable	10,060,000
Inventory	4,720,000		
Total	11,270,000	Total	15,030,000
Non-current assets		Non-current liabilities	25,950,000
Net plant and equipment	72,280,000	Shareholders' equity	
		Ordinary shares	4,000,000
		Retained earnings	38,570,000
		Total equity	42,570,000
Total assets	<u>83,550,000</u>	Total liabilities and equity	<u>83,550,000</u>

Yacht industry ratios			
	Lower quartile	Median	Upper quartile
Current ratio	0.50	1.43	1.89

Quick ratio	0.21	0.38	0.62
Total asset turnover	0.68	0.85	1.38
Inventory turnover	4.89	6.15	10.89
Receivables turnover	6.27	9.82	14.11
Debt ratio	0.44	0.52	0.61
Debt-equity ratio	0.79	1.08	1.56
Equity multiplier	1.79	2.08	2.56
Interest coverage	5.18	8.06	9.83
Profit margin (%)	4.05	6.98	9.87
Return on assets (%)	6.05	10.53	13.21
Return on equity (%)	9.93	16.54	26.15

QUESTIONS

1. Calculate all the ratios listed in the industry table for West Coast Yachts.
2. Compare the performance of West Coast Yachts with that of the industry as a whole. For each ratio, comment on why it might be viewed as positive or negative relative to the industry. Suppose you create an inventory ratio calculated as inventory divided by current liabilities. How do you interpret this ratio? How does West Coast Yachts compare with the industry average?
3. Calculate the sustainable growth rate of West Coast Yachts. Calculate external funds needed (EFN), and prepare a pro forma income statement and statement of financial position, assuming growth at precisely this rate. Recalculate the ratios in the previous question. What do you observe?
4. As a practical matter, West Coast Yachts is unlikely to be willing to raise external equity capital, in part because the owners don't want to dilute their existing ownership and control positions. However, West Coast Yachts is planning for a growth rate of 20 per cent next

year. What are your conclusions and recommendations about the feasibility of West Coast's expansion plans?

5. Most assets can be increased as a percentage of sales. For instance, cash can be increased by any amount. However, non-current assets often must be increased in specific amounts, because it is impossible, as a practical matter, to buy part of a new plant or machine. In this case a company has a 'staircase' or 'lumpy' fixed cost structure. Assume that West Coast Yachts is currently producing at 100 per cent of capacity. As a result, to expand production, the company must set up an entirely new line at a cost of £25,000,000. Calculate the new EFN with this assumption. What does this imply about capacity utilization for West Coast Yachts next year?

page 67

ADDITIONAL READING

The interested reader can find a whole range of readings to peruse in accounting journals such as *Journal of Accounting Research*, *The Accounting Review*, *Journal of Accounting and Economics*, *Journal of Business Finance and Accounting* and *Accounting and Business Research*. Important recent papers that relate to corporate finance are:

1. Faulkender, M., Flannery, M.J., Hankins, K.W. and Smith, J.M. (2012) 'Cash Flows and Leverage Adjustments', *Journal of Financial Economics*, Vol. 103, No. 3, 632–646.
2. Konchitchki, Y. and Patatoukas, P.N. (2013) 'Taking the Pulse of the Real Economy using Financial Statement Analysis: Implications for Macro Forecasting and Stock Valuation', *The Accounting Review*, Vol. 89, No. 2, 669–694.
3. Lewellen, J. (2004) 'Predicting Returns with Financial Ratios', *Journal of Financial Economics*, Vol. 74, No. 2, 209–235.