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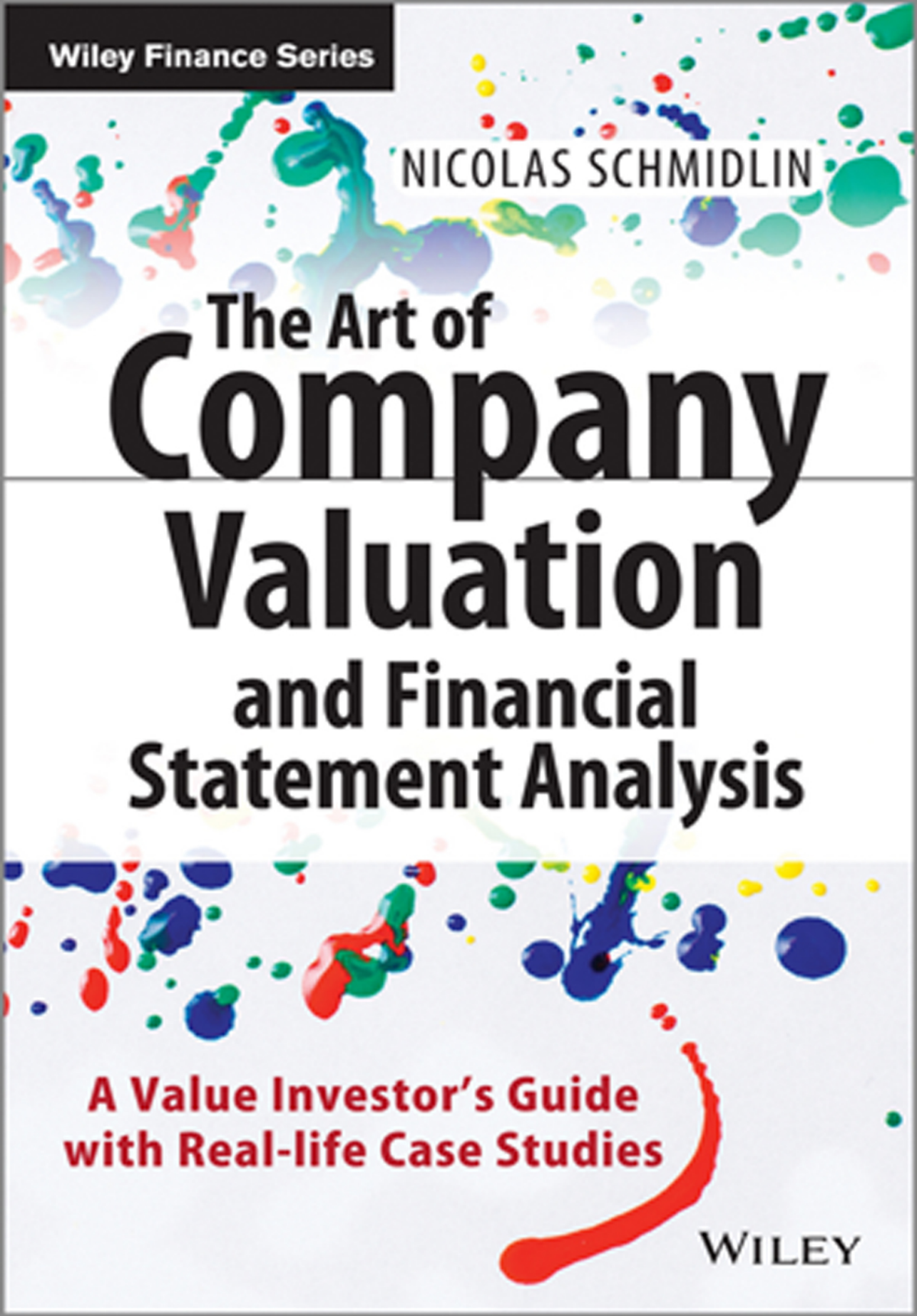
The Art of Company Valuation and Financial Statement Analysis

A Value Investor's Guide with Real-life Case Studies



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Everything should be made as simple as possible, but not simpler.

Albert Einstein

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Preface

> We all know that Art is not truth. Art is a lie that makes us realize the truth, at least the truth that is given to us to understand.
>
> Pablo Picasso

This book looks at the valuation and financial statement analysis of listed companies. Another suitable title could have been 'Not another book on company valuation!' Amazon.com displays more than 5,000 hits for this topic and a further 4,000 hits for financial statement analysis. Why do we need another book on this subject? Maybe you have noticed that the introductory quotation stems not from a famous economist, entrepreneur or investor, but from an artist. Company valuation is more art than science.

The figures and ratios that we obtain from any fundamental analysis do give us an overview, but figures are not everything. If pure calculation and comparison of key figures and ratios were sufficient for identifying undervalued or promising enterprises, this book would be superfluous and a computer could carry out all the necessary work in seconds. This is not the case. The findings that we derive from fundamental analysis only let us draw conclusions about how a company has developed *thus far*. Factors from a variety of areas, especially qualitative ones, will contribute to its future development. Financial market theory struggles with this fact. Most of today's textbooks consist of abstract formulae, are full of Greek letters, and tend to be difficult to understand. This book, however, attempts to convey company valuation and fundamental analysis in a pragmatic, lively and case study-oriented style. It aims to give comprehensive and practical insight into company analysis and valuation in particular by considering alternative approaches in addition to established methods.

The analysis described in this book is carried out with an entrepreneur in mind. It is analysis intended for shareholders who understand that they own shares in a real company, with real employees, real products and (hopefully) real cash flows. The aim of this book is to be a tool that aids the analysis and decision making of such an enterprising investor, rather than a short-term-oriented speculator. Pure figures are one thing, evaluating them reasonably altogether another. Together they form pieces of the puzzle that will reveal a picture of the intrinsic value of a company.

In contrast to other textbooks on company valuation, this book largely dispenses with complicated mathematical formulae and abstract explanations. It aims to be a guide to practical and pragmatic company valuation instead of conveying dry, overly complex and often impractical theory.

Looking at the contents, it is noticeable that only one chapter deals explicitly with company valuation. In fact, each chapter builds upon the previous ones to allow the reader to gain a full picture of the inherent value of a company. Hence the valuation case study described in Chapter 8 builds upon the preceding chapters and can therefore not be understood, or at least correctly applied, without them.

Valuation itself is a technical process; the investor's actual value-adding activity lies within the process of understanding the business and its prospective value drivers.

This book contains over 110 examples interspersed throughout the various chapters. Each example strives to illustrate the practical application of a certain aspect of valuation practice and its link to the topic being covered. Since the majority of investors are still focusing on North American and European equity markets and both regions use comparable accounting systems, this book mainly employs case studies from these markets. There are, however, also examples of companies in emerging markets to take into account this growing market segment. For authenticity and to familiarize the investor with different types of notation, the country-specific use of digits and presentation has been maintained within the cases. The reader can therefore trace the examples directly to the original underlying financial statements should he wish to do so. In the running commentary and formulae the numbers employ the standard English notation in order to ensure that the narrative itself is coherent.

This book focuses on the valuation of listed companies, but it could also be applied to privately-owned companies.

The re-evaluation and revision of one's own valuation is part of daily business for anyone following shares listed on a stock exchange. Major political decisions and other factors that will range from macro-economic developments down to strategic management decisions impact the fair value of a company and make the art of company valuation not only one of the most intellectually challenging but also one of the most exciting activities one can undertake on the financial markets. The following chapters will attempt to convey this dynamic and rewarding side of the subject matter in addition to illustrating the technical aspects of financial statement analysis and company valuation.

The valuation of companies is an art, the inherent value of a company always unknown because constantly in flux, and yet still possible to define. Let us illuminate the darkness.

Nicolas Schmidlin, February 2014
London/Frankfurt

1 Introduction

> By means of this he can at any time survey the general whole, without needing to perplex himself in the details. What advantages does he derive from the system of book-keeping by double entry! It is among the finest inventions of the human mind.
>
> Johann Wolfgang von Goethe

Accounting is the language of businesses. Those who wish to value companies and invest successfully in the long term have to be able to understand and interpret financial statements. The primary purpose of accounting is to quantify operational processes and to present them to stakeholders including shareholders and creditors but also suppliers, employees and the financial community. The financial statement forms a condensed representation of these processes. It delineates the assets and liabilities as well as performance indicators such as turnover, profit and cash flow. Evaluating and interpreting this data against the background of business activity is an important component of the valuation process. Developing an understanding of this 'language of businesses' and, at the same time, including qualitative factors in the analysis provides a solid foundation for anyone interested in valuing enterprises. Accountancy illustrates, in one snapshot, the corporate world in the past and the present. Company valuation joins in at this point and attempts to predict the future development and the risks of an enterprise with the help of data obtained from the financial statement. This chapter addresses the weaknesses and limits of modern accounting. A particular disadvantage of accountancy is that it is by nature a purely quantitative model. A sound financial statement analysis, meanwhile, while being quantitative by design, requires the combination of both quantitative facts and qualitative characteristics in order to be a reliable forecast of the future.

This chapter deals primarily with different types of accounting systems, the components of financial statements and the calculation of a first set of key financial ratios. Chapter 2 lays the foundation for further ratio-based analysis, and also for the following qualitative analyses, which are at least oriented towards the financial statement.

1.1 IMPORTANCE AND DEVELOPMENT OF BUSINESS ACCOUNTANCY

The precursors of today's accounting rules came into being after the stock market crash of 1929, when the American Institute of Accountants' special committee first proposed a list of generally applicable accounting principles. By 1939, the first Committee on Accounting Procedure was created in the US in order to establish a coherent and reliable system of accounting standards. This set of rules was meant to tackle the rather dubious and unreliable accounting procedures and helped to restore the trust in financial statements published by listed companies. Now the Financial Accounting Standards Board (FASB) prescribes the main accounting standards in the United States. This set of rules, the US Generally Accepted

Accounting Principles, or US GAAP for short, governs the accounting principles for all companies subject to Securities and Exchange Commission (SEC) regulation.

On the other side of the Atlantic, beginning in 1973, the European Union began harmonizing the diverse accounting rules of its member countries. This process eventually culminated in the creation of the International Financial Reporting Standards. The IFRS have so far been adopted by more than 100 countries, including all the members of the European Union, Hong Kong, Australia, Russia, Brazil and Canada. Whilst there are several differences between the US GAAP and IFRS, both accounting systems are based on a similar set of principles and are, by and large, comparable. Following the previously mentioned international harmonization of accounting standards around the globe, a key future milestone is the planned full adoption of the International Financial Reporting Standards by the SEC. This adoption, when it occurs, will also require US companies to employ the IFRS, which will effectively unify the accounting standards in most developed countries. This process, which was initially aimed to be completed by 2014 but might require more time, will allow investors to directly compare financial figures and ratios between European and American companies without having to adjust them for diverging accounting treatments.

Given the fact that large-scale regulatory projects such as the US GAAP/IFRS convergence are rarely implemented on schedule, this book covers both accounting standards, presenting case studies of companies using the US GAAP as well as IFRS. The book focuses primarily on US-based and British corporations but also considers emerging market companies. This approach is simply a recognition that the vast majority of investors will have access to equity markets around the world.

Whilst the accounting systems in the US and Europe are by and large comparable, the outward appearance of the annual reports is not. Whereas there are virtually no restrictions as to the presentation and quantity of information contained in European annual reports and financial statements, US companies have to complete a predefined form (commonly called form 10-K) which must be filed with the SEC. The latter leaves little room for supplementary charts and data, which may often provide further information about the market and business model of the company. The standardized presentation and submission requirements can be mainly attributed to the US accounting scandals and frauds in the late 1990s which resulted in the passage of the Sarbanes-Oxley Act. As a result of this legislation, financial statements of listed corporations are more or less standardized, and have to be signed by management and filed with the SEC. From an investor's point of view, this offers both benefits and drawbacks. On the one hand, US-style annual reports (10-K) are well structured and clearly laid out once the reader gets used to the numerous legal phrases peppering the reports. Information about the market or additional industry data, however, is only rarely contained within these reports. In contrast, European annual reports not only supply their recipients with the essential annual accounts, but also include additional data intended to deepen an understanding of the company. It can, however, be argued that forming a true opinion of a company's performance and prospects is more likely in the case of a US-style annual report, as the additional information and graphs that can be included in European-style reports have at least the potential of being suggestive. Given the laxer rules, European annual reports also exhibit a considerably lower degree of comparability than their US counterparts. US annual (10-K) and quarterly reports (10-Q) can also be easily accessed via the SEC web page, whereas the reports of European companies can only be obtained directly from their respective investor relations websites.

Having said this, it must be mentioned that the SEC's EDGAR system to access 10-K and 10-Q filing isn't the most user-friendly. Retrieving company reports may sometimes be faster by simply searching for the term '*company name* + Investor Relations' in a search engine.

Listed companies usually publish interim reports on a quarterly basis as well as a more detailed and extensive annual report at the end of each fiscal year. Smaller companies, whose stock is traded in less regulated markets, often face less rigorous reporting obligations. In this case issuers are commonly able to report less frequently and are able to disclose less information to the general public. Irrespective of the extent of the reporting obligations, these publications are usually released a few months after the end of the quarter or the fiscal year and form the basis of financial statement analysis.

Quoted companies are generally organized as an affiliated group, or, in other words, as a consolidated group of individual companies under the roof of a parent company. Therefore it is the *consolidated* financial statements or group accounts that are usually the starting point in any balance sheet analysis. The distinction between consolidated group accounts and the individual accounts of the parent company is important since the vast majority of European companies publish both accounts in their annual reports. In essence, the consolidated group accounts or financial statements present information about the group as that of a single economic entity. So, although big enterprises consist of numerous subsidiaries worldwide, the consolidated financial statement acts as if there was only one company that encompassed the whole group. In the process of consolidating the accounts of all affiliates and subsidiaries into one group account, all interdependencies between the individual group companies are effectively cancelled out. For example, both a receivable and a liability are being created if one company grants a loan to another group affiliate. On a group level, however, this can be considered a non-event and thus has to be eliminated. Therefore the consolidated group accounts always result in a more accurate representation of the state of the group than an analysis of the individual group member accounts could ever yield.

The following example demonstrates the need for compiling consolidated financial statements and the reason why analysing individual financial statements within a group of companies may lead to incorrect analysis results.

Example 1.1 – Consolidated financial statement: holding structure
Parent Inc. has the individual financial statement below. There are currently no other companies in the group beside Parent Inc. The individual financial statement and the consolidated financial statement are therefore one and the same (Table 1.1).

Table 1.1 Parent Inc.'s consolidated balance sheet

Parent Inc.			
Assets	$		Liabilities
Fixed assets	100	Shareholders' equity	150
Receivables	50	Loans	50
Financial assets	0		
Cash	50		
Balance sheet total	200	Balance sheet total	200

Now Parent Inc. decides to split off its operating division into a separate business unit, which is designated Subsidiary Ltd. Newly founded Subsidiary Ltd. is equipped with fixed assets of $100 and a loan from Parent Inc. of $50. The balance sheets of Parent Inc. and Subsidiary Ltd. now look as shown in Tables 1.2 and 1.3.

Table 1.2 Parent Inc.'s unconsolidated balance sheet

Parent Inc.			
Assets	$	Liabilities	
Fixed assets	0	Shareholders' equity	150
Receivables	100	Loans	50
Financial assets	100		
Cash	0		
Balance sheet total	200	Balance sheet total	200

Table 1.3 Subsidiary Ltd.'s unconsolidated balance sheet

Subsidiary Ltd.			
Assets	$	Liabilities	
Fixed assets	100	Shareholders' equity	100
Receivables	0	Loans	50
Financial assets	0		
Cash	50		
Balance sheet total	150	Balance sheet total	150

After splitting off the operating division, Parent Inc.'s individual financial statement contains a noticeably reduced amount of information. Fixed assets were entirely transferred to Subsidiary Ltd., cash was reduced due to the loan to Subsidiary Ltd. and in return receivables increased by $50. Notice also the item 'financial assets', which includes the share in the newly set-up Subsidiary Ltd. In this case Parent Inc. is the so-called holding company, which only takes on administrative and strategic tasks, while the operating business is carried out by Subsidiary Ltd. The group now has to compile a consolidated financial statement summarizing the various individual financial statements into one document in order to give interested external parties an insight into its assets, liabilities, financial position and profit or loss situation.

To do this, all individual balance sheet items are simply added up, with the internal interrelationships consequently eliminated. The resulting consolidated financial statement will give an adequate insight into the financial conditions of the entire group.

The consolidated financial statements predominantly play an informative role and can be considered the pivotal element in the fundamental analysis of any company. Typically, they consist of the following numerical components (British expressions in parentheses):

- balance sheet (statement of financial position)
- income statement (profit and loss account)

- statement of cash flows (cash flow statement)
- statement of investment and distribution to owners
- notes.

In addition to these, most annual reports include wide-ranging management discussions and an analysis of the past year, a description of the business, risk factors and legal proceedings, as well as an outlook and selected financial data intended to permit a quick overview of the company's past performance.

It is crucial, however, to be aware that any accounting system is always simply a model that *attempts* to capture and represent the business reality and does not always mirror an exact and true picture of the company.

Example 1.2 – Differences in accounting systems
Examine the balance sheet and income statement positions of the two companies given for year-end 2006 shown in Table 1.4.

Table 1.4 Differences in accounting standards

Company 1	€m	Company 2	
Net income	7,021	Net income	6,517
Shareholders' equity	49,650	Shareholders' equity	52,599
Earnings per share	17.09	Earnings per share	15.59

The numbers cited for both companies are of about the same magnitude; however, Company 1 has posted a 7.7% higher net income and consequently higher earnings per share, whereas Company 2's equity base is 5% higher. Despite these differences, both figures were in fact released by the same company – the world's largest insurance company, Allianz SE. These differences arise because of different accounting standards used: while the first figures were reported under the IFRS, the second employed the US GAAP. This comparison is possible because Allianz maintained a double-listing in Frankfurt and New York until 2007, and therefore had to comply with SEC rules as well. This example emphasizes that while accounting figures may give a good general overview of a company's performance and are still the best numerical measure of a company's success, they cannot be mistaken for reality and are always only as good as the accounting framework applied. Whilst IFRS and US GAAP are fairly similar accounting principles, the impact of changes in accounting standards can sometimes be puzzling: when Volkswagen AG switched its reporting from national German GAAP to IFRS in 2000, its shareholders' equity nearly doubled – overnight. As we will see later, other alternative accounting treatments, such as leasing contracts for example, can have a substantial effect on the reliability of the reported figures.

1.1.1 Limited significance of financial statements

Despite numerous rules and regulations issued by the regulatory authorities and governments, criminal activity is ubiquitous in the business world. The most impressive case of accounting fraud, which led to the Sarbanes-Oxley Act in 2002, was committed by former

US energy giant Enron. It would have been difficult to uncover this large-scale fraud by applying traditional balance sheet analysis. Even rating agencies such as Standard & Poor's, which have a deeper insight into a company's books than do investors, gave the company a good credit rating shortly before it was declared insolvent in 2001. In fact, there were clearer signs of trouble in 'soft' factors such as corporate identity and communication suggesting that Enron had something to hide. For instance, in its annual report the company referred to itself as 'The World's Greatest Company'. Critical analysts were insulted during annual press conferences when they dared challenge the reported results.

How did Enron manage to cook its books? Some of the practices were simple. Long-term transactions, for example, were entirely recognized as income at inception instead of allocating profits over the total lifetime of the deal. Another method involved carrying out business with its own offshore enterprises, which had been set up by Enron's management, and reporting such transactions as profit. To compound such practices, Enron failed to declare several billion dollars in liabilities in its books and gave assets inflated values by employing questionable valuation models.

Most instances of balance sheet fraud will use the following methods:

1. off-balance sheet accounting
2. profit management (premature recognition of profits)
3. partiality of auditors
4. capitalization of fictitious assets.

When assets, or more significantly liabilities, are kept off the balance sheet, they ordinarily cannot be detected as part of a standard balance sheet analysis. This, in turn, gives the appearance of increased financial stability, which is employed, for example, to improve creditworthiness.

In other cases of accounting fraud, company management used profit management techniques. Profits were declared before the actual transaction took place, or, as in the case of Enron, long-term contracts were instantly recognized and recorded as profits.

The most important component of balance sheet fraud is the partiality of auditors. It used to be common practice for auditors to also be consultants to the same firm, which would often lead to conflicts of interest. In some cases it was this relationship and the advice of the consultants who were also auditors that led to the above-mentioned methods being used in the first place.

Finally, another method is the capitalization of fictitious assets. This happens when a non-existent asset is created on the balance sheet.

The examples above demonstrate the limitations of accounting practice. They reinforce the assertion that those who wish to successfully analyse and invest in an enterprise need to consider other factors besides balance sheet analysis, such as the business model, the quality of management and current macro-trends, in order to arrive at an accurate valuation of a company. At the same time, a detailed analysis of the financial statements will yield sound and quantifiable insights into a business and will form the foundation of further analysis.

1.1.2 Special features of the financial sector

The analysis of financial statements and company valuation, as elucidated in this book, cannot be applied to insurance companies and banks. The reason for this constraint lies in the fundamentally different capital structure and business model of financial institutions. Given the enormous asset base of most banks – J.P. Morgan posted $2.3 trillion in assets as of the end 2012 for example – an in-depth financial statement analysis is doomed to failure simply as a result of the sheer size of the balance sheet of these institutions. Beside the fundamental differences in size and balance sheet structure, the financial institution business model itself also differs substantially from that of ordinary businesses, which is why the valuation methods developed in the book cannot simply be transposed to financial services companies. To further complicate matters, the banking industry has proven to be volatile over time, which also confounds arriving at accurate long-term valuations. The demise of Northern Rock, Bear Stearns or Lehman Brothers during the financial crisis of 2008–9 makes clear that only a thin line separates record earnings from bankruptcy in this industry. While investment banks such as Salomon Brothers, Drexel Burnham and Nomura dominated Wall Street during the 1980s, most of these institutions have now either disappeared or been taken over by competitors. Given the increasing regulatory pressure around the globe, both the business models and the future prospects of this industry have become even more difficult to forecast.

1.2 COMPOSITION AND STRUCTURE OF FINANCIAL STATEMENTS

The most important part of any annual or interim report is the financial statement, containing the income statement, balance sheet, cash flow statement and notes. Moreover, the management's discussion and analysis give a good overview of the past year and help deepen an understanding of the business. Depending on the size and listing location of the company, the transparency requirements as well as the frequency of reporting will vary. Below is a succinct introduction to the different components of a financial statement as well as to the first financial ratios concerning the cost structure of a business.

1.2.1 Income statement

The income statement or profit and loss account presents the revenues and expenses for a specific accounting period. The balance of these two numbers represents the profit or loss for the period. Table 1.5 shows the typical structure of an income statement.

Table 1.5 Income statement

Revenue
less: Cost of sales
= Gross profit
less: Selling, general and administrative expenses less: Depreciation less: Research and development expenses
= Operating profit/EBIT
less: Interest expenses plus: Interest income
= Profit before taxes
less: Tax expense
= Net profit/Profit for the year

Every income statement begins with the revenues (United Kingdom: turnover) for the period. Suppose you are running a lemonade stand and your first customer buys juice worth $5, paying in cash. One would now book this $5 as revenues – congratulations, you sealed your first deal! But what exactly is your profit? The income statement provides the revenues as well as their *corresponding* expenses. The word *corresponding* is of importance here since the income statement records only those variable expenses associated to the actual sale process. You might have purchased more lemons than needed to serve the first customer, but the cost of these lemons is not recorded immediately since they have not been used and are still part of your assets.

The cost of sales consists of the inventory costs of goods sold. These inventory costs not only include the purchase costs, but also allocated overhead expenses as well as additional material and labour costs in case the goods have been transformed internally. In the case of our lemonade stand, for example, the lemons sold to the first customer have been purchased for $1 and an additional $0.50 was paid for sugar and the labour cost in the squeezing process that turned the raw lemons into juice. So the cost of sales amounts to $1.50, giving a gross profit of $3.50.

Gross profit is equal to the difference between the sales amount and the direct costs associated with producing or purchasing the product sold. The gross profit figure is very important in any financial statement analysis since it gives the amount that is available to pay for any operating expenses.

The next positions which are deductions from gross profit are usually the selling, general and administrative expenses (SG&A), and depreciation as well as research and development (R&D) expenses. SG&A expenses are sometimes split up into the selling and the administrative part, enabling an even closer analysis of the cost structure. In the case of our lemonade stand empire these expenses would include the rent of the space taken up by our stand, the sales clerk's salary as well as our back-office function, which manages the book-keeping. Let's say that we pay another $1 to cover these expenses.

The depreciation expenses reveal the decrease in value of the company's asset base over time. If, for example, a new lemon squeezer has been procured, the initial purchase price is not being charged as an expense since the company has merely changed assets for asset: cash in exchange for a new lemon squeezer. However, as time goes by, the value of the lemon squeezer declines, which is reflected as a depreciation expense in the income statement. Assuming a purchase price of $15 for the machine and an expected lifetime of 10 years would yield a depreciation charge of $1.5 per year.

Subtracting selling, general and administrative expenses, depreciation charges and – for some companies – research and development expenses from the gross profit gives the operating profit, or earnings before interest and taxes, EBIT for short. In the case of our lemon business, this figure is $1.

The operating income effectively presents the profitability of the underlying business without taking into account interest and tax payments. The former are deducted in the next step, the financial result. The financial result is composed of interest expenses and income as well as any profits from associated companies. Let's assume that our lemonade business had to take out a $20 loan at an interest rate of 2% in order to finance operations: this would correspond to an interest expense of $0.40. After having deducted or – in the case of debt-free companies – added interest in the financial result, we obtain the earnings before taxes. It is on this figure that taxes have to be paid. Based on pre-tax earnings of $0.60 and a 35% tax rate for our fictional business, tax expenses of $0.21 follow. We have finally arrived at the net profit for the year of $0.39.

Since no business is exactly identical to another, a close analysis of the income statement is warranted in order to be able to understand the earnings drivers as well as major risk factors inherent to the business model. It is to this end that the first financial ratios are being introduced in the next section.

Financial ratios obtained from the income statement usually express the expense and earning positions in the income statement as a fraction of total sales in order to turn them into comparable figures. Expressing income statement positions as fractions rather than absolute numbers makes it easier to compare them to previous years' figures and allows for the comparison of income statements of competitors, different industries, businesses in different countries and – to a limited extent – even other accounting systems.

Gross profit margin

The gross margin is one of the most prominent financial ratios in nearly every analysis. It expresses the gross profit as a percentage of revenues:

$$\text{Gross profit margin} = \frac{\text{Gross profit}}{\text{Revenues}}$$

The gross profit margin (GP margin) is important for two reasons. First, the cost of sales, which determines the gross profit, is usually the single largest expense position in the income statement. Second, even the most efficiently run company cannot survive without sufficient gross profit to pay for the various fixed costs, interest payments and taxes incurred as a result of running a business.

When compared with other companies, the gross profit margin also indicates the pricing power and input price sensitivity of a company, as can be shown by a simple transformation of this ratio into the related cost of sales margin (CoS ratio):

$$\text{Cost of sales ratio} = \frac{\text{Cost of sales}}{\text{Revenues}}$$

The lower the cost of sales for each unit of revenue, the higher the gross profit margin. In essence it can be said that companies with high gross profit margins are less exposed to input price increases and generally possess a strong basis for negotiation with their customers (higher prices), suppliers (lower wholesale prices) and even their employees (lower salaries).

Whereas the gross profit margin demonstrates how much profit remains after paying for the direct costs of the product, the cost of sales ratio simply demonstrates the costs associated with every transaction. Hence this figure can be viewed as the reciprocal of the average mark-up a company can realize. When Walmart sells apparel for $10 which it purchased for $8 from the manufacturer, its gross profit margin would amount to 20%, its cost of sales ratio to 80% and the mark-up would therefore be 25% (1/0.8 – 1).

In this sense, both ratios are two faces of the same coin, telling the same story but from different perspectives. It is very important to understand which input prices drive the cost of sales for each company. Steel and aluminium producers, for example, are highly dependent on the exploitation and availability of their respective raw materials as well as energy prices. Besides a static analysis of these ratios, it is therefore usually advantageous to compare the development of the gross profit or cost of sales margins and the price trend of the relevant input materials over the past few years.

Table 1.6 demonstrates the calculation of the gross profit and cost of sales margin.

Example 1.3 – Gross profit margin: Alcoa Inc.

Table 1.6 Alcoa Inc.: Shortened income statement

	Alcoa Inc.	
(in US$m)	2012	2011
Sales	23,700	24,951
Cost of goods sold	20,468	20,480

Source: Alcoa 10-K (2012) [US GAAP]

Table 1.6 contains the first two lines of Alcoa's income statement. Alcoa is listed in the Dow Jones Industrial Average and is the world's third largest producer of aluminium. The company does not explicitly state its gross profit. In order to calculate the gross profit margin we therefore first have to subtract the cost of goods sold from the annual sales, yielding a gross profit of $3,232 and $4,471 for 2012 and 2011, respectively.

Based on these figures, the gross profit margin for 2012 is then calculated as follows:

$$\text{Gross profit margin}_{2012} = \frac{\$3{,}232\text{m}}{\$23{,}700\text{m}} = 13.6\%$$

$$\text{Gross profit margin}_{2011} = \frac{\$4{,}471\text{m}}{\$24{,}951\text{m}} = 17.9\%$$

Compared with the prior year, the gross profit margin dropped considerably, by 4.3 percentage points. This worrisome development can also be seen when calculating the cost of sales ratios:

$$\text{Cost of sales ratio}_{2012} = \frac{\$20{,}468\text{m}}{\$23{,}700\text{m}} = 86.4\%$$

$$\text{Cost of sales ratio}_{2011} = \frac{\$20{,}480\text{m}}{\$24{,}951\text{m}} = 82.1\%$$

A decrease in gross profit margins (or, likewise, an increase in the cost of the sales margins) can be attributable to either (i) an increase in input prices, (ii) a decrease in selling prices, or (iii) a combination of both. Without looking deeper into Alcoa's financial statement, it becomes apparent that while the underlying cost of sales remained virtually constant, the sales themselves decreased by more than 5%. Fortunately, Alcoa provides a great deal of additional data as part of its reports in order to help investors better understand the business's development. For example, the shipment of alumina and aluminium products increased by 1.6% to 14,492 kilotonnes (kt), yet sales decreased by 5%. The company appears to have a problem with the selling price, and after delving deeper, it turns out that in fact, the average selling price decreased from $2,636 to $2,327 per kt, a decrease of 11.7%. So, the company sold more products (in terms of kt) in 2012 than in 2011, its cost of sales remained nearly unchanged, but its average selling prices dropped considerably, which was the cause of the sharp drop in its gross margin.

In addition to the comparison with prior years' performance, it is important to know whether a gross margin of 13.6% can be considered good or bad when viewed independently. To this end, let's first take a look at Reckitt Benckiser, a leading producer of health, hygiene and home products, and subsequently at the overall distribution of gross profit margins in the S&P 500.

Example 1.4 – Gross profit margin: Reckitt Benckiser Group plc

Table 1.7 Reckitt Benckiser Group plc: Shortened income statement

	Reckitt Benckiser Group plc	
£m	2012	2011
Net revenue	9,567	9,485
Cost of sales	(4,030)	(4,036)
Gross profit	5,537	5,449

Source: Reckitt Benckiser Group plc (2012) [IFRS]