Master Thesis

The Relevance of Financial Statement Data in the Danish Equity Market: Assessing the Need for Additional Information for Informed Decision-Making

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Abstract

The study of capital markets is a significant area within financial and accounting literature. This research for example investigates the value relevance of accounting figures in explaining market values, and the calculation of a firm's true value through fundamental analysis. This thesis aims to assess the relevance of accounting data in the Danish equity market and explore the significance of supplementary sources of information. This is achieved by conducting a regression analysis of the market value of equity on a variety of accounting figures and performing a fundamental analysis of a representative company from our sample.

To make sure that the regression results are not sensitive to functional form, two different models were applied. The findings show that while one form reveals only earnings as significant, the other form suggests that both earnings and book values are significant. However, the explanatory power of both models is low. Incorporating additional variables into the model, specifically intangible assets and cash flows, does not provide any additional explanatory power. Further robustness tests were also performed which showed that the results were sensitive to input factors. The low explanatory power and non-robust results indicate that financial statement information may not sufficiently reflect the market value of equity. From the fundamental analysis, it is suggested that there are benefits to including additional sources of information when evaluating Danish firms. The analysis provides a true value estimate of Royal Unibrew that seems to align with the trajectory observed in the market.

The results of this thesis implicate that the market value of equity of Danish firms is not sufficiently reflected by financial statement information. The study suggests that fundamental analysis, incorporating additional sources of information in conjunction with financial data, is still a useful tool for investors when evaluating firms.

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1 Introduction

Research on capital markets is a significant area of study in the field of financial and accounting literature. Kothari (2001) lists three main topics within capital market research that is of interest to analyze: market efficiency, fundamental analysis, and value relevance studies. The first topic tests capital market efficiency with respect to accounting information. Fundamental analysis aims to evaluate firms through in-depth analysis of accounting and market data. The last topic is on the value relevance of financial statements and examines the relationship between accounting data and market values. These areas of research are highly intertwined, and all provide important insight into the functioning and efficiency of the capital market.

Studies that aim to explain a firm's value are influenced by the specific factors, variables and models applied. Models which utilize accounting data value a company based on its financial performance. The widely recognized Ohlson (1995) framework is an example of a model that uses accounting information and is often applied in value relevance research. Value relevance regressions study the relationship between accounting figures and market values to find out whether the data enclosed in a firm's financial reports hold any information relevant to explain the market value of equity (Beisland, 2009). Financial statements report accounting values, therefore they offer a clear understanding of a firm's financial position. They are formal records that summarize a company's financial transactions and are commonly composed of four key reports which are the income statement, balance sheet, statement of cash flows, and the statement of changes in owner's equity. The statements aim to provide creditors, investors, regulators and other stakeholders with valuable information about companies, and hence help them make informed decisions (Petersen and Plenborg, 2012).

Other valuation methods, such as fundamental analysis incorporate additional information beyond only accounting data. An example of this is the discounted cash flow model, which is one of the most frequently employed valuation methods by investors (Demirakos, Strong and Walker, 2004). While accounting data is a significant part of the discounted cash flow model it is not the sole type of information utilized. The model integrates a wide range of additional

information, such as investors' beliefs built on micro- and macroeconomic factors, industry and firm potential, and the global economic outlook.

The concept of value relevance of accounting information has been extensively examined since the pivotal works of Beaver (1968) and Ball and Brown (1968). Throughout the years the studies have developed from incorporating only earnings, and then both earnings and book value, to including various additional accounting figures. The additional variables examined are in line with the evolvement of the economy from primarily industrial firms to a "new economy" (Barth et al., 2023). These variables include cash flows and intangible assets, among others. The value relevance of accounting data remains an interesting topic today despite over 5 decades of research (Dunham and Grandstaff, 2022), as researchers have produced contradicting conclusions over the years. Previous research has also focused on the potential benefit of including additional information in conjunction with accounting data. Studies suggest that additional information, such as market data and integrated reports by firms, provides valuable information for investors (Belesis, Sorros and Karagiorgos, 2020; Reitmaier and Schultze, 2017).

1.1 Research Question

Based on the three main capital market research topics stated by Kothari (2001) we found it interesting to study value relevance and fundamental analysis, as they are highly intertwined and related to what information is reflected in market values. From the two areas of research one can get a better understanding of how efficient the market is in portraying the information available. The aim of this thesis is to examine the value relevance of accounting data in the context of the Danish equity market as well as the relevance of additional sources of information, investigated through fundamental analysis. By doing so we can determine the relative importance of financial market information and accounting data in the evaluation of firms. The findings are meaningful to investors and will enable them to prioritize the most significant sources of information and make better-informed decisions. Our research and analysis are motivated by the following research question:

Is accounting data value relevant and does it sufficiently reflect market values in the Danish equity market or are other sources of information valuable for investors to make informed decisions?

1.2 Contribution of the Thesis

The topic of value relevance of financial statement information has been extensively researched in various contexts around the world. However, after looking into the topic, we noticed a gap in the research when it comes to Scandinavian markets. Specifically, we found a limited number of value relevance studies conducted using Danish equity market data. In addition to there being limited previous research on this topic related to the Danish stock market, it was challenging to find papers making a connection between value relevance analysis and valuations through fundamental analysis, specifically the discounted cash flow model. As we have accumulated interest in financial statement analysis and valuation through our time at Copenhagen Business School, we found this to be an interesting approach to the study. Therefore, looking into the information provided by the two analyses and examining the implication of their results was a compelling perspective for further analysis.

Based on our examination of papers from top-rated accounting and financial journals, we noticed that previous studies on this topic were characterized by highly mixed results (e.g., Aboody et al., 2002; Ball and Brown 1968; Barth et al., 2023; Lev and Zarowin, 1999; Srivastava, 2014). For this reason, the topic is still subject to investigation to this date, and researchers have argued for the continued importance of value relevance analysis, even after decades of studies (Dunham and Grandstaff, 2022). Previous research conducted in other markets has yielded conflicting results regarding the degree of value relevance of accounting data, providing no clear indication of the relationship between financial statement information and market values in Denmark. The findings in this thesis do not provide compelling evidence that accounting data alone is a sufficient source of information reflecting the market values of Danish firms. Through a discounted cash flow valuation, we draw the conclusion that there are additional information sources other than accounting data that provide value to investors and incorporating these can result in a more accurate reflection of true market values. These

results underline the continued importance of absolute valuation methods, such as the discounted cash flow model, in the process of investors' decision-making.

1.3 Delimitation

To provide valuable insights within the time frame of the thesis, the analysis has been delimited in several ways. First, the sample consists exclusively of Danish firms listed on the Copenhagen Stock Exchange. This choice was made mainly because of an identified gap in prior literature, but also to provide a clear and relevant context for the thesis. In addition, focusing on a specific market enabled us to reduce potential cross-country variations in accounting regulations. However, it should be noted that the results presented are therefore not generalizable for other countries.

As well as delimiting our focus area, we restricted our analysis to a specific timeframe from 2006 to 2022. Consequently, the results may not extend to other time periods, despite the considerable duration of our chosen interval, as economic conditions, market trends and regulatory frameworks might vary over time. Therefore, to obtain reliable and valid results for other time periods, the analysis would need to be replicated with appropriate data.

In the process of analyzing our research question, we also had to limit the explanatory variables and methods investigated in order to arrive at more precise findings and avoid overcomplicating the model. The explanatory variables applied, as well as the models used to examine the topic of interest, are chosen as they have been extensively utilized in previous studies and are considered the best fit for our analysis.

Lastly, to investigate information beyond accounting data, we performed a fundamental analysis, applying the discounted cash flow model. This analysis is restricted to one representative firm from our sample, as it would be extremely time consuming to perform a discounted cash flow valuation of all the firms. The results, however, might not be fully replicable for all the firms in the sample. To investigate the generalizability of the findings, further research is required to explore potential variations across firms and industries.

1.4 Thesis Outline

The structure of this thesis will be as follows. In Chapter 2, a brief background of the Copenhagen Stock Exchange and regulations will be presented. Chapter 3 is a literature review of previous studies on the topic of capital market research, specifically value relevance and fundamental analysis. The literature review is followed by Chapter 4 where our hypotheses are formulated. Chapter 5 is dedicated to the methodology section. This includes a description of our research approach, sample selection and data collection, a definition of the variables in our model, statistical theory applied and theory on fundamental analysis. Chapter 6 displays and discusses the results of the value relevance analysis. Chapter 7 describes and examines a representative company from our sample, Royal Unibrew A/S, through fundamental analysis. In Chapter 8 we discuss the findings from our two analyses, and what implications they have for investors. After that, the conclusion will be presented in Chapter 9, followed by a breakdown of interesting approaches to further analysis of the topic in Chapter 10.

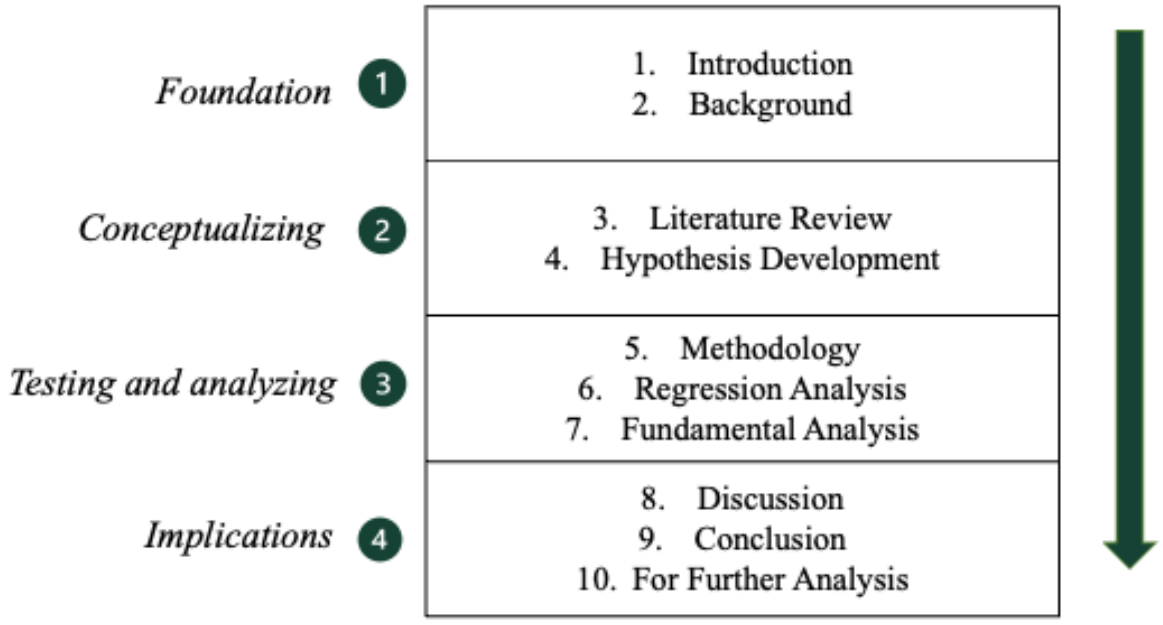

Figure 1: Thesis Outline

2 Background

In this chapter, we provide an overview of the history and development of the Copenhagen Stock Exchange. We will explore how the Copenhagen KAX index has evolved over the time period of interest in this study and introduce the regulatory frameworks that have been put in place to ensure its integrity.

2.1 The Copenhagen Stock Exchange

The Copenhagen Stock Exchange (CSE) is the primary securities market in Denmark. It was founded in 1808 as Denmark's securities exchange. In 1996 the CSE became a limited company and started facilitating the trading of shares, fixed income instruments, and derivatives. In 1998, the CSE became a part of the NOREX Alliance along with the Stockholm stock exchange in Sweden. Over time, NOREX grew to include stock exchanges in Oslo, Iceland, and regional markets, as the goal was to take advantage of broader international investment opportunities using a common trading platform and regulatory framework. The CSE joined the OMX exchange group in 2005 which was then acquired by Nasdaq in 2008 which formed the Nasdaq Nordic division (Nasdaq, n.d.). The Nasdaq Nordic Exchange consists of listed firms from the Copenhagen, Stockholm, Helsinki, Iceland, Tallinn, Riga, and Vilnius stock exchanges. The CSE uses an electronic ordering system to promote efficient order matching and prices are displayed in Denmark's official currency, the Danish Krone.

The Copenhagen KAX Index, which is also known as the KAX Share Index (PI), is comprised of all the shares listed on the Copenhagen Stock Exchange. It was introduced in 2001 and is maintained on a daily basis. The index measures the price return of stocks and yields the performance of stock price movements, excluding adjustments for cash dividend reinvestments. The management of the index is overseen by a committee established by the NOREX Alliance of Stock Exchanges and the index is included in NOREX's All-Share index and the Sector indices family (Capital IQ, n.d.a).

During the time period selected for this analysis the index value has increased substantially. From the beginning of the year 2006 to the end of 2022 the index has increased by roughly 273 percent, which corresponds to a yearly return of approximately 8 percent, assuming annual compounding. Despite these high returns, there have been periods of negative returns. The most obvious periods of large negative returns are from the end of year 2007 until mid 2009, in the build-up and following the great financial recession of 2008, and in early 2020 following the outbreak of Covid-19. In the latter example, markets were however very quick to recover and the big drop in equity values was followed by the largest appreciation of the index in the selected time period. From March 2020 until September 2021, the index had almost doubled in value in just around 18 months. Since September 2021 however, equity prices have decreased and have become increasingly volatile, mostly due to worse economic conditions and lower expectations. With increasing inflation and increasing fear of recession, equity investors might have been faced with negative real returns in the last months or even year.

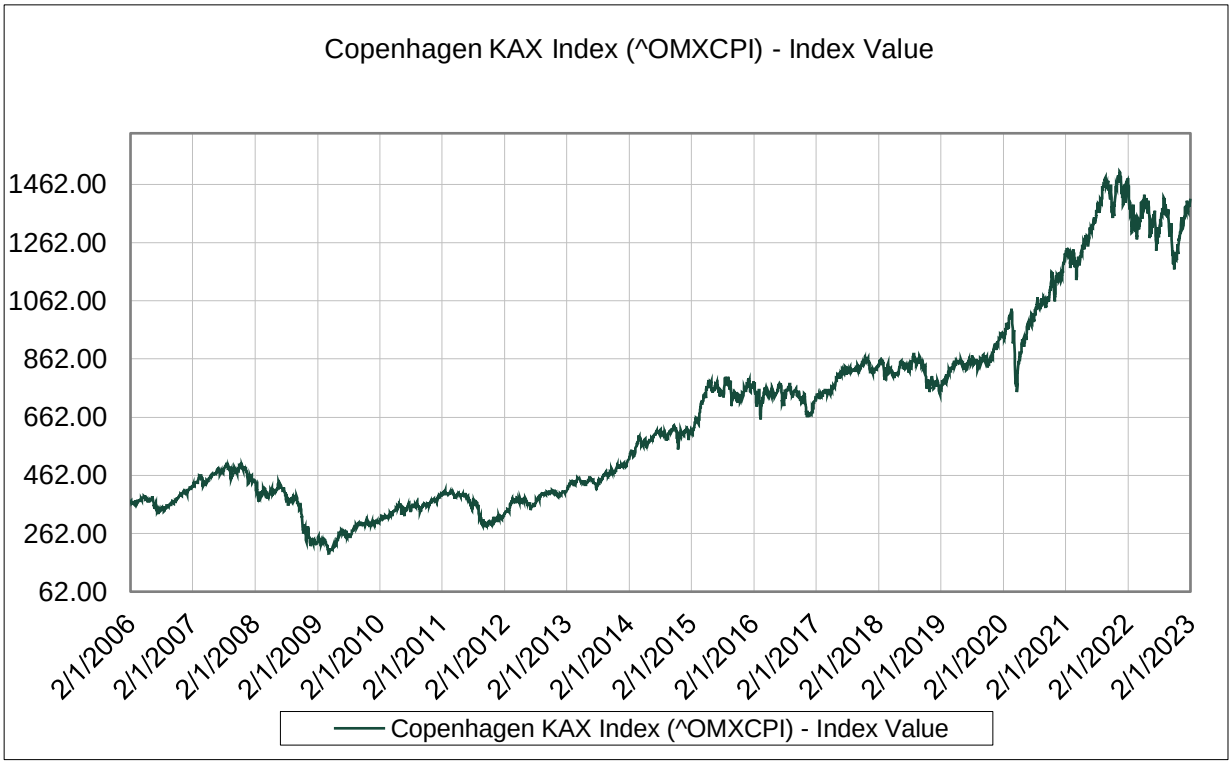

Figure 2: Development of KAX Index (Capital IQ, n.d.a.)

2.2 Regulations

Firms that are listed on a regulated market are obligated to comply with various regulations in addition to the standard provisions for firms, particularly when it comes to the submission of annual reports, recognition, and measurement.

Nasdaq Copenhagen is a regulated market overseen by the Danish Capital Markets Act and is subject to supervision by the Danish Financial Supervisory Authority (Nasdaq Copenhagen, n.d.). The role of the Danish Financial Supervisory Authority is to monitor that publicly listed firms fulfil their obligations to disclose internal knowledge and other relevant information. Additionally, supervision of the stock market area includes overseeing that prospectuses are made available when securities are offered to the public and that they adhere to all legal requirements. Lastly, the Danish Financial Supervisory Authority actively monitors the markets to prevent market abuse, such as insider trading and price manipulation (DFSA, n.d.a).

Consolidated financial statements of all publicly traded firms in Europe must follow International Financial Reporting Standards (IFRS) (Danish Business Authority, n.d.). As Denmark is a member state of the European Union, Denmark is subject to the EU 1606/2002 Regulation regarding the application of international accounting standards (IAS). Therefore, all domestic public companies are required to follow the IFRS Standards (IFRS, n.d.). Furthermore, Danish firms are subject to additional requirements, such as the inclusion of a management report in their annual report, which must be signed and submitted by the Danish Business Authority (Erhvervsstyrelsen, n.d.).

3 Literature Review

As previously mentioned, Kothari (2001) outlines three main subjects within capital market research that are of interest to study: market efficiency, fundamental analysis, and value relevance studies. The aim of fundamental analysis is to evaluate companies through in-depth analysis of accounting and market data. Valuation methodology is widely used by investors and has been subject to continuous improvements over the years, leading to well-established frameworks. The models are utilized to estimate the true value of a firm, giving investors insight into the key factors that drive the company's value and its future prospects. Value relevance literature is an extensive body of literature that seeks to address various aspects of this question. Value relevance regressions study the relationship between accounting information and market values to find out whether the information enclosed in a firm's financial reports holds any information relevant to predicting stock prices or the market value of equity (Beisland, 2009).

3.1 Definition of Value Relevance

According to the International Accounting Standards Board, "relevance" is defined as the primary qualitative characteristic that financial statements must possess to be beneficial in decision-making. Furthermore, accounting information is considered relevant if it impacts users' economic decisions by helping them in assessing past, present, and future events and rectifying previous assessments (IFRS Foundation, 2018). In previous literature, value relevance has been defined in various ways. Barth, Beaver, and Landsman (2001) define value relevance studies as research that "examines the association between accounting amounts and equity market values". Other researchers, including Ohlson (1995), provide similar definitions of value relevance. The essential common feature of the definitions is that accounting information is considered relevant if it is significantly associated with market values.

In 1999, Francis and Schipper divided value relevance into four interpretations. The first view interprets value relevance as the way financial statement information influences stock price changes by capturing the intrinsic value the prices move towards. This approach is related to

the second one which focuses on the variables used in valuation models and how to predict them. According to Francis and Schipper (1999), these two models are flawed in several ways regarding risk and accuracy and would require a number of adjustments in order to provide reliable results. Therefore, the third and fourth interpretations are the most commonly used in conducting value relevance analysis. They interpret value relevance as the statistical association between financial statement data and prices or returns. The third interpretation focuses on whether financial statements change the mix of information in the marketplace and whether new information drives investors' expectations. This relationship is usually studied over a short period of time, often in connection with the release of financial information to the public. However, it is also possible that the association between accounting information and market values or returns over an extended period indicates that the accounting information is linked to data that investors are using. This takes us to the fourth interpretation which states that the value relevance is assessed by how effectively financial statement data collects or summarizes any information that affects stock prices or market values, regardless of its origin. Both interpretations have been the basis of studies on value relevance using a variety of different approaches.

3.2 Early Research

Value relevance literature has been extensively documented since the pivotal works of Beaver (1968) and Ball and Brown (1968) that presented evidence of market reactions following earnings announcements. Beaver (1968) examined how earnings announcements affect stock trading volume while Ball and Brown (1968) studied the market's average response, in terms of returns, to annual earnings announcements. Since the publication of the two aforementioned papers, many researchers have continued and expanded on the research and provided empirical evidence of the relationship between specific accounting figures and market values. In 1999, Brown, Lo and Lys dived further into the returns model by looking into the changes in value relevance over four decades and the validity of the coefficient of determination, R^2, as a value relevance measure.

The earliest research in this field focuses on the relationship between earnings, and its components, and market values. The findings of these studies indicate a decrease in the value relevance of earnings over time (Barth et al., 2023). As Ohlson (1995) recognized in his research, earnings are not the only accounting item that influences market values. Therefore, subsequent studies also included the book value of equity to their valuation model. Collins, Maydew, and Weiss (1997), as well as Francis and Schipper (1999), find that the decline in the value relevance of earnings is offset by the increase in relevance of the book value of equity. Recognizing that accounting information consists of a variety of items, later studies take additional accounting elements into consideration. These studies for example included items related to intangible assets and growth opportunities, such as research and development expenditures and capital expenditures (e.g., Barth et al., 2023; Core et al., 2003; Lev and Gu, 2016). Recent studies have also incorporated cash flow values (e.g., Barth et al., 2023; Mostafa, 2016).

3.3 Studies on Earnings and Book Value

Foster (1977) analyzed how the market responded to quarterly earnings announcements in the United States. In a study of firms in the United Kingdom, Pope and Inyangete (1992) observed a significant increase in the volatility of security returns around the date of firm's annual earnings announcement. Easton and Harris (1991) examined the relationship between earnings and stock returns in the United States stock market and find that earnings can explain a significant amount of stock returns, both at the overall market level and for individual companies. Easton, Harris, and Ohlson (1992) expanded upon the 1991 study by aggregating earnings and returns over a 10-year period. They find that aggregate earnings are highly associated with market returns and can explain a great portion of stock returns. The results also indicate that the relationship between earnings and returns is stronger the longer the time-period of the study. Harris, Lang, and Möller (1994) analyzed the associations between stock returns and accounting earnings of German firms and then compared their results to United States firms. They found that there is a significant relationship between earnings and stock prices for German firms in the time period between 1982 and 1991. Additionally, they found that the explanatory power of earnings of German firms is comparable to United States firms. Numerous other studies have focused on examining the effect of particular accounting items

and various measures of earnings found in financial statements on stock prices and market values of equity. Booth, Kallunki, and Martikainen (1996) for example provide evidence that the net income of Finnish companies could be significantly influenced by top management, therefore they examined the market reaction to various adjusted measures of earnings.

Following Ohlson's (1995) results, that the book value of equity also plays a role in value relevance, Collins et al. (1997) analyze the value relevance of earnings and book value of equity over a 40-year period, from 1953 to 1993, for NYSE, AMEX, and NASDAQ firms. They evaluate the value relevance of book values and earnings by applying an R^2 decomposition technique, which involves regressing market values on both earnings and book values. The study concludes that there is a transition in value relevance from earnings to book values. Francis and Schipper (1999) apply a returns-based method to assess value relevance over a similar time period as Collins et al. (1997), from 1952 to 1994, of exchange-listed and NASDAQ firms. The study reports a decline in the relevance of earnings and an increase in the relevance of book values over time. In their 1999 study, Ely and Waymire examined the value relevance of earnings by looking into the relationship between earnings and market-adjusted returns of 100-stock portfolios from 1927 to 1993. The main finding of this study was that no evidence of improvements in the value relevance of earnings over time was observed. Consistent with the results of Collins et al. (1997) and Francis and Schipper (1999), Ely and Waymire (1999) also report an improvement in the combined relevance of earnings and book values over time. Lev and Zarowin (1999) study the value relevance of earnings and book values, from 1977 to 1996, using regression analysis. Their results are noteworthy as they are in opposition to earlier research (Collins et al., 1997; Ely and Waymire, 1999; Franics and Schipper, 1999). Lev and Zarowin (1999) document a decline in the combined value relevance of earnings and book values.

3.4 The Evolution of Value Relevance Studies

Over the years, the equity valuation landscape has undergone significant changes. Firstly, there has been an increase in valuable information available to investors, particularly in financial statements. Secondly, the economy has shifted towards more knowledge-based

assets and operations, which are challenging to quantify and, therefore, not adequately reflected in financial statements (Barth et al., 2023). Previous research has suggested that the reduction in the value relevance of earnings over time stems from a decrease in earnings quality.

In the 1990s, there was a growing interest in the historical development of value relevance research and cross-country comparison of results. This increase was prompted by the notion that accounting information was becoming less relevant for investors. Prior studies of the applicability of accounting information in equity valuation had questioned the value relevance of financial reporting (e.g., Amir and Lev, 1996; Lev and Zarowin, 1999). According to Lev and Zarowin (1999), there is a less significant association between earnings in firms with more intangible assets. They attribute this result to the timing mismatch of expenses and revenue linked with such assets. In line with the decline in matching, Dichev and Tang (2008) found a reduction in the association between revenue and expenses. They examined United States firm data for a 40-year period, from 1967 to 2003. The authors also found that the decline in matching can be linked to changes in accounting standards. Donelson, Jennings, and McInnis (2011) and Srivastava (2014) suggest that these results can be attributed to changes in the economy, such as the rise in the number of new firms which have business models centered on intangible assets. Another explanation could be the greater presence of loss firms over the years, as Collins, Pincus, and Xie (1999) found that earnings are less relevant for such firms. Lev and Zarowin (1999) claim that changes in the business landscape are crucial factors contributing to the decline in the usefulness of financial information. The primary catalyst for change in developed economies is said to be innovative activities which predominantly take the form of investment in intangible assets, like research and development, information technology, brands, and human resources. They document a positive association between the rate of business change and fluctuations in research and development (R&D) expenditures, as well as a connection between the decline in the usefulness of earnings and changes in R&D spending.

In summary, these studies suggest that the value relevance of earnings and book values has declined over time, potentially due to decreased timeliness of financial statement information, increased reporting of losses and extraordinary items, and an amplified emphasis of

unreported intangible assets due to the growth of high-tech industries. The question of how value relevance of accounting information has changed following the evolvement of the economy from primarily industrial firms to a "new economy" with firms operating in services and information technology where intangible assets have become increasingly important is addressed in recent papers, for example Barth et al. (2023).

3.5 Financial Reporting Standards and Additional Variables

The reason for these inconsistent findings regarding the capability of earnings and the book value of equity to reflect value-relevant information can be attributed to the differences in financial reporting approaches and that accounting measurement practices differ across countries (Oliviera, Rodrigues and Craig, 2010). According to Ball (2006), there is a greater probability that IAS and IFRS will provide better information to investors compared to national standards. A vast amount of research is dedicated to investigating whether the implementation of the European Union Regulation 1606/2002 regarding the mandatory use of IAS/IFRS by companies listed on the European stock exchanges has transformed local accounting systems and improved the value relevance of accounting information (Cordazzo and Rossi, 2020).

Before IFRS was incorporated, studies claimed that investors used R&D expenses as a proxy for anticipated growth in earnings (Chambers et al., 2002; Chan et al., 2001; Demers and Lev, 2001). However, research also suggested a separation between capitalized and expensed R&D investment (Healy, Myers and Howe, 2002; Oswald and Zarowin, 2007). The latest standard on the topic, the IAS 38 was published in 2001 and separates between expensed and capitalized R&D investments (IFRS Foundation, 2001). R&D costs can only be capitalized if the firm is certain that it will create value through future earnings. As various studies suggest that the value relevance of earnings has decreased, researchers propose that including additional accounting figures, such as cash flow and intangible assets, provides incremental value relevance beyond net income. Previous research has looked into capitalized and expensed R&D investments and found implications for value relevance (Aboody and Lev, 1998; Lev and Sougiannis, 1996; Oswald and Zarowin, 2007). Although market values and

R&D expenses are found to be negatively associated, some have found a positive association between market values and capitalized R&D. Aboody and Lev (1998) researched the value relevance of capitalized intangibles and found that they are in fact associated with market variables and future earnings. Other studies such as the one done by Lev and Sougiannis in 1996 resulted in the same conclusion, namely that capitalized R&D investments provide investors with value-relevant information.

In addition to studies on the value relevance of intangible assets, many argue that cash flows contain informative value to investors and that they are associated with the market values. Research done by Sloan (1996) concludes that investors tend to overweight the information contained in accruals and underweight the information contained in cash flows when predicting future earnings, leading to the mispricing of stocks. He emphasizes that investors should pay more attention to cash flows when analyzing a company's financial statements. Barth et al. (1999) also found that cash flows offer significant additional information in explaining market values across all industries. In 2007, Subramanyam and Venkatachalam examined the implications of cash flow information on stock prices and investment decisions and their study had similar conclusions to previous studies, namely that cash flows are better than earnings at predicting future performance and long-term stock price movements. Akbar et al. (2011) studied the value relevance of cash flows in the UK market and similarly found that cash flows possess an additional level of value relevance compared to earnings. They conclude that the information collected from a firm's cash flow statement is useful to investors. More recent research done by Mostafa in 2016 concludes with a contrasting result that indicates no value relevance of cash flow figures. This view is supported by earlier research done by Lev and Zarowin (1999) who also find cash flows to be decreasingly relevant in explaining market values. The definition of the cash flow variable varies within the literature. Many use only operating cash flows (e.g., Amir and Lev, 1996), some define cash flows as operating cash flows net investing cash flows (e.g., Ball and Nikolaev, 2022), while others define the cash flows as the sum of operating cash flows, investing cash flows and financing cash flows (e.g., Dinh Thi and Schultze, 2011).

Barth et al. (2023) analyze the relationship between stock prices and accounting figures between 1962 to 2018 as they want to examine the evolution of value relevance. What is

unique about their study is that they included 16 items derivable from financial statements, which is a considerably greater number of variables compared to prior research. They include figures regarding intangible assets, growth opportunities, and alternative performance measures such as operating cash flows and special items. Their findings do not support the conclusions of prior research that the relevance of accounting information has declined. They reported a significant increase in the value relevance of recognized intangible assets and operating cash flows, among other items.

3.6 Value Relevance and Economic Downturn

After the financial crisis in 2008, there has also been conducted research focusing on how the global economic situation impacts the value relevance of financial statement information. Tahat and Alhabad (2017) found that during the financial crisis, there was an increase in the relevance of cash flow measures compared to book values and earnings. This is in alignment with research suggesting that cash flow measures are harder for managers to manipulate (Petersen and Plenborg, 2012, p. 47). As a result, investors may rely more heavily on cash flow variables over other metrics like book values and earnings. In contrast, Jenkins et al. (2009) discovered that current earnings are comparatively more relevant in periods of economic contractions, owing to the influence of earnings conservatism and the disconnection between historical earnings reporting and future growth prospects. This is supported by Kane et al. (2015) and their study which concluded with an increase in the value relevance of book values and earnings during an economic recession.

Research done by Schmalz and Zhuk (2019) revealed that stocks react more strongly (up to 70 percent) to news regarding earnings during economic downturns compared to upturns. This might result in negatively skewed stock returns, even in cases where the underlying fundamentals are not.

3.7 Return vs Levels Specification

Two types of regression models are generally used to study the association between stock market values and accounting numbers. These models are the levels (price) model and the return model. An issue that is often the subject of debate when investigating the connection between market values of stocks and accounting numbers is related to the difference between a levels specification and a return specification (Beisland, 2009). Landsman and Magliolo (1988) provide evidence that demonstrates that there is no single correct solution as to what the "best" model specification is. Even though the theoretical foundations of the two models come from the same origin, the residual income valuation model and the Ohlson (1995) model, different results are sometimes reported when both models are applied. Serious specification problems are said to exist in both the levels and the return models. The problem of "scale effects" seems to be present in the levels model while "accounting recognition lags" and "transitory earnings" appear to impact the return model (Ota, 2003).

It is generally understood that scale effects stem from the fact that large (small) companies will have large (small) market capitalizations (market values of equity), large (small) earnings, and large (small) book values of equity. As a result, a regression of market value of equity on earnings and book values might capture no more than "scale" that is present among firms. However, the definition of "scale" is a topic of debate among accounting researchers (Ota, 2003). Barth and Kallapur (1996) and Barth and Clinch (2009) consider the number of outstanding shares, total assets, book value, net income, revenue, and market value of equity as proxies for unidentifiable scale. Hand and Landsman (1999) support the proposal that accounting data are credible contenders for scale. Conversely, Easton (1998) and Easton and Sommers (2000) argue that the use of accounting data as proxies for scale is inferior to the application of market value of equity. Christie (1987) and Brown et al. (1999) also propose the use of market value of equity as a suitable proxy for scale. Therefore, they are arguing for the use of the return model, as the variables in the model are deflated by the lagged market value of equity and thus scale-free (Ota, 2003).

Easton (1998) claims that the statistical relationship between stock market values and earnings, book values, and any other independent variables in the model measured at levels might merely be a spurious effect of scale. That the regression results are driven by a fairly small subset comprising of the very largest firms in the sample. Brown et al (1999) provide evidence that under certain conditions the R^2 in scale-impacted regressions is greater than the R^2 in scale-free regressions.

As all variables in the return model are deflated by the lagged market value of equity, the return model is said to be scale-free, as opposed to the levels model. The return model is also said to be better specified than the levels model. However, the return model is not without issues. The low R^2 sometimes reported when the return model is applied could be a subject of worry. Though a low R^2 might not be a significant issue when it comes to drawing inferences from the results, it does however raise doubts regarding the suitability of the model specification. The weak return-earnings relation that is sometimes observed in the return model might be attributable to misspecification. If that is the case, the results derived from the return model might not reveal the true economic relationship between stock market values and accounting figures (Ota, 2003).

Several hypotheses have been proposed as an explanation for the weak return-earnings relation. The dominating hypotheses are the aforementioned effects of the accounting recognition lag and transitory earnings. The accounting recognition lag stems from the fact that accounting systems report the impacts of value relevant events with a lag. Transitory earnings have a weak association with returns as they are a component of earnings that are not as persistent as a permanent component of earnings. Furthermore, the effects of the accounting recognition lag and transitory earnings can sometimes offset one another and are difficult to unravel (Ota, 2003).

As a possible solution to the absence of a dominant approach, Kothari and Zimmerman (1995) and Ota (2003) propose applying both models, to “ensure that a study’s inferences are not sensitive to functional form.” Kothari and Zimmerman (1995) present the two alternative model specifications in their paper as follows:

$$Price\ model: P_i = \alpha + \beta X_t + \varepsilon_t$$

$$Return\ model: \frac{P_t}{P_{t-1}} = \alpha + \frac{\beta X_t}{X_{t-1}} + \varepsilon_t$$

3.8 Beyond Accounting Information

Through fundamental analysis, investors calculate the value of companies by for instance discounting expected future cash flows or looking at the multiples of comparable companies. Valuation methods are associated with a great deal of uncertainty and often yield value estimates that deviate from observed market values by over 50 percent, indicating potential inefficiencies in capital markets (Henschke, 2009). If the market is efficient, it will reflect all the available information (Fama, 1991). However, there could also exist information in the market that is not publicly available. Sloan (1996) states that the capital markets are indeed not efficient and that stock prices are not a complete reflection of all information.

For their valuation techniques, investors often rely on models focusing on accounting factors like earnings, book value, cash flows, and R&D costs or those that include financial market data like beta, market value, and interest rates (Belesis, Sorros and Karagiorgos, 2020). A study by Belesis et al. (2020) compared the effectiveness of the two approaches and found that incorporating macroeconomic and financial market information leads to more reliable value estimates, indicating that accounting data alone are less valuable to investors. This conclusion is consistent with earlier research on Enhanced Business Reporting (EBR) done by Reitmaier and Schultze in 2017. Their research was motivated by the suggested inability of financial reporting to provide investors with enough information to make decisions. The concept of EBR, which aims to present greater insight to satisfy investors' information needs, includes for example business reporting, intellectual capital reporting, value reporting, corporate social responsibility reporting and integrated reporting. Their objective is to reduce information asymmetry and bridge the gap between intrinsic market values and current market values. The paper finds there to be value-relevant information to investors in these additional disclosures.

Research done by Penman and Sougiannis (1998) suggests that valuation techniques based on (accrual) earnings are less prone to errors than cash flow and dividend discounting ones. Errors reflect the difference between the valuation relative to the market price. This view is supported by Francis, Olsson, and Oswald (2000) who also conclude that the discounted cash flow and dividend models are less reliable and accurate than earnings models. On the other hand, Lundholm and O'Keefe (2001) argue that the result from these studies is misguiding and that if properly implemented, the discounted cash flow model and the residual income model will yield the same result. Research by Kaplan and Ruback (1995) also finds that the discounted cash flow model performs at least as well as comparable methods. Nonetheless, the study also reveals that using the discounted cash flow and comparable methods together results in a significantly higher explanation of variation in values than using either method in isolation. In 2004 Demirakos, Strong and Walker examined what valuation models investors most commonly use and conclude that the discounted cash flow model is one of them.

The discounted cash flow (DCF) methodology has undergone continuous improvements over the years, with entire textbooks devoted to the specific model (Damodaran, 2012; Koller et al., 2020; Plenborg and Kinserdal, 2021). Even though the model has become a well-known framework for evaluating firms, it is still subject to uncertainties particularly concerning the model's ability to accurately forecast future cash flows. Nevertheless, the model remains a widely accepted and frequently used method for fundamental analysis. One of the reasons for its popularity is its flexibility, as it allows analysts to incorporate various assumptions and scenarios into the cash flow projections. More recent research on fundamental analysis has taken several different approaches. Some studies focus on specific aspects of the valuation methodology such as the forecasting horizon and the calculation of risk premiums (Botosan and Plumlee, 2005; Jennergren, 2008). Other studies examine whether the discounted cash flow or other valuation methods can in fact find abnormal returns in the market and defy the efficiency theory (Bartram and Grinblatt, 2018; Curtis, 2012; Fama and French, 2008; Richardson, Tuna and Wysocki, 2010).

As both the discounted cash flow model and comparable methods are widely used by investors, it is interesting to investigate whether the valuation methods are more reliable in terms of estimating the true value of a firm than the regression models. Looking into this will

create a greater understanding of what information investors use to evaluate firms, and whether accounting numbers alone are the predominant data reflected in the market values. This relationship has also been investigated by Aboody, Hughes and Liu in 2002 who give compelling evidence that traditional value regression models fall short of capturing the pricing implications of all market information.

3.9 Summary

The literature review highlights that there are numerous approaches to analyzing the relationship between accounting data and capital market values. It is also made clear that previous research on this topic has yielded mixed results. While for example Ely and Waymire (1999) and Francis and Schipper (1999) find the combination of earnings and book values to be significantly value relevant, other studies such as Amir and Lev (1996) and Srivastava (2014) come to the opposite conclusion. Furthermore, research indicates that financial statement information on intangible assets is of interest in regard to value relevance (Lev and Sougiannis, 1996; Aboody and Lev, 1998). Recent studies by Subramanyam and Venkatachalam (2007) and Akbar et al. (2011) also imply the value relevance of cash flow figures. However, these results are contradicted by Lev and Zarowin (1999) and Mostafa (2016). Barth et al. (2023) do not find that value relevance has decreased over time. They also report a significant increase in the value relevance of recognized intangible assets and operating cash flows. As none of these studies have utilized recent Danish capital market data, the results in this setting are currently undetermined.

In addition to value relevance studies, capital market theory research has also been continuously examining fundamental analysis and valuation methods. While some studies on fundamental analysis focus on specific aspects of the valuation methodology (Botosan and Plumlee, 2005; Jennergren, 2008), other studies examine whether valuation methods can find abnormal returns in the market and defy the efficiency theory (Bartram and Grinblatt, 2018; Curtis, 2012; Fama and French, 2008; Richardson, Tuna and Wysocki, 2010). There has also been conducted a variety of research examining which valuation methods are most efficient and reliable as well as most often used by investors (Demirakos et al., 2004; Francis et al.,

2000; Kaplan and Ruback, 1995; Lundholm and O'Keefe, 2001; Penman and Sougiannis, 1998).

The relationship between valuation methods and market values has been investigated, with evidence suggesting that traditional value regression models, utilizing only financial statement data, fall short of capturing the pricing implications of all market information. Some studies suggest that including additional information sources has the potential of improving the accuracy and reliability of the valuation estimate (Belesis et al., 2020; Reitmaier and Schultze, 2017).

4 Hypothesis Development

In line with the research question the main objective of this thesis is to examine whether accounting data is value relevant and if it sufficiently reflects market values in the Danish equity market or if there are other sources of information that are valuable for investors to make informed decisions. In the following section, we will break the research question down into three hypotheses that we will later test and analyze. The hypotheses developed are closely related to the literature review and our research on previous studies.

Studies have focused on net income and book value of equity as they are considered to be the primary summary measures of the income statement and balance sheet (Barth et al., 1998). Various papers examining this have found a significant relationship between earnings and market values, as well as the book value of equity and market values (e.g., Collins, Maydew and Wiess, 1997; Barth et al., 1998; Barth et al., 2023). As similar research has not been conducted using data from the Danish equity market, during the same time period we analyze, we want to investigate the results of a comparable analysis using accounting data of Danish companies. Hence, we form our first hypothesis:

> $Hypothesis\ 1$: *Accounting earnings and book values are positively and significantly related to market values and returns using data from the equity market of Denmark.*

Rejecting $Hypothesis\ 1$ is interpreted as evidence that accounting earnings and book values are not positively and significantly related to market values and returns in the context of this study.

The findings of Barth et al. (2023), among others, indicate that the value relevance of accounting information has developed beyond the reliance on earnings and equity book value to a more elaborate relationship between accounting numbers and market values. Therefore, we find it interesting to also analyze whether additional variables, specifically intangible assets and cash flows, prove relevant in terms of explaining the relationship between market

values and accounting numbers. Therefore, built on previous literature, we arrive at our next hypothesis:

> *Hypothesis 2: Cash flows and intangible assets are positively and significantly related to market values and returns using data from the equity market of Denmark.*

Rejecting *Hypothesis* 2 is interpreted as evidence that cash flows and intangible assets are not positively and significantly related to market values and returns in the context of this study.

Value relevance and fundamental analysis are two of the main areas of interest to capital market researchers. The connection between the two is interesting, especially with a focus on the discounted cash flow model as this is one of the most frequently employed valuation methods by investors (Demirakos et al., 2004). If the two hypotheses above hold and accounting data is significantly related to market values, as well as captures much of its variation, then the effort of fundamental analysis and absolute valuation methods would be of limited value to investors. This would indicate that financial statement data is a sufficient information source when evaluating Danish firms. The results from the analyses can therefore give insight into whether or not valuation methodology is still worthwhile to investors. This leads us to our third hypothesis:

> *Hypothesis 3: Financial statement data is a sufficient information source in evaluating Danish firms.*

Rejecting *Hypothesis* 3 is interpreted as evidence that it is not sufficient for investors to rely solely on financial statement data and that incorporating other information sources will provide them with additional value.

5 Methodology

The methodology chapter of this thesis is dedicated to outlining the research approach and design, the sample selection and data collection, definition of variables, as well as giving an overview of the statistical and fundamental analysis theory applied to test the constructed hypotheses. The chapter will describe the methodological considerations that led to the adaption of the specific approach. In the first section of the chapter, we will elaborate on the research philosophy and approach to the study. This is followed by a chapter which describes the sample selection process and data construction. Then we present the dependent and independent variables analyzed. Subsequently, we will delve into statistical theory, where we provide an overview of the theoretical framework for the statistical analysis conducted in this thesis. The final section provides a brief theoretical background of fundamental analysis theory and methodology.

5.1 Research Approach and Design

Before moving on to the subsequent chapters and the main analyses, it is important to discuss the research philosophy and methods applied in this study. The beliefs and presumptions about the nature of knowledge and reality that guide the research design are referred to as the research philosophy (Saunders, Lewis and Thornhill, 2021, p. 130). The most commonly used philosophies in business and management studies include positivism, critical realism, interpretivism, postmodernism and pragmatism. The frameworks each have their own contribution and the choice of one depends on the research conducted. For this thesis, we have been influenced by a positivist research philosophy, assuming that knowledge can be objectively assessed and verified by empirical data. Positivism believes in one reality and that the researcher should attempt to maintain objectivity and detachment from their research and data in order to prevent their findings from being influenced. As it is not possible to alter the substance of the quantitative data that is collected within this approach, it is plausible to remain neutral (Saunders, Lewis and Thornhill, 2021, p. 144-147).

Positivist research is often driven by a deductive method of analysis. This approach is utilized by drawing from the existing literature on value relevance and valuations to formulate the hypotheses and models. As identified in the literature review, there has been constructed a variety of different theories and models to test the value relevance of accounting data, and these are used to divide our research question. Empirical testing was then conducted to verify or refute the proposed hypotheses.

The overall research design of our thesis is based on a quantitative approach to the analysis. Quantitative research is often used when examining the relationship between numerical variables (Saunders et al., 2021, p. 178). The quantitative approach used in our research design provides a structured and systematic way of collecting and analyzing data, which is particularly useful for investigating complex phenomena with many variables. After researching the data utilizing statistical techniques, the patterns and relationships among the variables are identified. The results are then interpreted to draw a conclusion about the research question and hypotheses being studied.

In conclusion, the research design of this thesis is based on a positivist research philosophy, utilizing a deductive method and a quantitative approach to the data analysis. It must however be mentioned that the approach and design are not without limitations, mostly regarding the complexity and qualitative aspects of the research topic. As such, it is important to carefully consider the topic of analysis when deciding on the research design and methodology. The choices made in this thesis project were made based on the nature of the research question and hypotheses, and the desire to maintain objectivity and reliability in the findings.

5.2 Sample Selection and Data Construction

The procedure of collecting and analyzing data is an important aspect of research studies, and the field of capital market research is no exception. In this chapter, we will present a detailed description of how the data were structured in this study, and the methods we applied for the sample selection. We start by outlining how the data were collected. We then describe the process we used to select our sample, including the data cleaning. By offering a

comprehensive outline of the data and sample selection process, we aim to provide clarity and transparency into the methods applied to generate our results.

5.2.1 Data Collection

The data collected and used in this thesis are secondary data that mainly come from two widely used databases, Compustat Capital IQ and S&P Capital IQ. Compustat is a financial database providing global financial statement information and market data for publicly traded companies (WRDS, n.d.). It was founded in 1964 and has been used by researchers for decades (S&P Global, n.d.). It is owned by S&P Global which also provides information through the database S&P Capital IQ. For the fundamental analysis, accounting data is collected from the firm's annual reports, from 2006 to 2022. The practice of secondary data analysis is widely recognized in quantitative social research and is frequently employed in academic discussions.

When analyzing secondary data, it is essential to ensure the validity and reliability of the data collected. The quality of a research project can be greatly impacted by the quality of its data. As a result, it is essential to reflect on the accuracy and reliability of the data sources, as noted by Aityan (2022, p. 87). The financial databases used to collect the data for this thesis are both sources used in numerous studies published in top-rated journals, suggesting a high level of reliability. Furthermore, both databases are updated regularly and have strict quality control measures in place to ensure accuracy. However, it is important to acknowledge that errors and inconsistencies may still exist. In order to ensure the validity and reliability of the secondary data, we conducted several checks and validations, including cross-referencing data between the two databases, verifying outliers and inconsistencies, and confirming the data with the firm's annual reports. Overall, we have confidence in the reliability and validity of the secondary data sourced from S&P Capital IQ, Compustat and annual reports, and we believe it provides a strong foundation for our analysis.

The Danish stock market was chosen as the target of analysis for various reasons. The main reason was the fact that after browsing through a vast amount of prior literature we were not able to find newly published work using Danish data to examine this topic. Also, we thought

examining the Danish stock exchange would be interesting for us as students studying in Copenhagen who have gotten to know the market and the firms it consists of through our studies.

5.2.2 Data Cleaning

Data for all large, mid, and small cap firms were collected, which was then cleaned as described below. Due to the limited sample size, analyzing the different market capitalizations separately was considered unsuitable as it might not provide an accurate representation of the data. Data on annual income statement items and the market capitalization for the firms in the sample were collected. The income statement items could be collected from both Compustat Capital IQ and S&P Capital IQ while the data on the firm's market capitalization was collected from S&P Capital IQ.

The sample consists of firms that have available financial statement and market capitalization data for the years 2006 to 2022. This time period was chosen so that all the inconsistencies and variations of the stock market are represented in the data, and to maximize observations in the sample and minimize selection bias. The data for example includes the extreme booms and busts of the past years, the 2008 financial crisis and the Covid-19 pandemic. As mentioned earlier, as of 2006 all Danish public companies were required to follow the IFRS Standards. Therefore, we did not find it appropriate to include data prior to this regulation due to discrepancies in financial reporting. We opted for this specific data period as we aimed to avoid cherry-picking certain periods based on favorable stock market performance and wanted to include as much data as possible. Additionally, the data cleaning involved removing firms that do not have a fiscal-year end as of December 31, this follows various prior research (e.g., Kothari and Zimmerman, 1995; Onali, Ginesti, and Vasilakis, 2017) and is done to eliminate inconsistencies. We also eliminate firms from the sample that have gone through major changes during the examination period (Park, 2011), for example the power company Ørsted A/S had to be removed from the sample as the firm went through an extensive organizational change in 2017. In the chapter on descriptive statistics, later on in the thesis, we will delve into the treatment of outliers in the data. After cleaning the data, the sample consists of 17 yearly observations of 34 firms, totaling 578 observations.

Accounting rules for Danish firms are regulated by the Danish Financial Statement Act (DFSA) (Årsregnskabsloven, 2019). As banks have important responsibilities in a country, the banking sector requires close monitoring in order for the government and residents to maintain confidence in them. For this reason, banks are subject to different, more specific, regulations through the Financial Business Act with the intention of ensuring financial stability (DFSA, n.d.b). Following prior literature, banks are therefore removed from the sample to maintain consistency (Cordazzo and Rossi, 2020; Oliveira, Rodrigues, and Craig, 2010; Roca, 2021).

Nasdaq Nordic classifies listed firms by industries. The top three industries of the final sample are industrial, health care, and consumer discretionary firms. Industrial firms dominate the final sample, with roughly 41 percent of the sample firms being part of the industrial category. Healthcare firms are roughly 16 percent of the sample firms while consumer discretionary firms are roughly 14 percent.

American punctuation style is used in this thesis, e.g., DKK 1,000.05.

5.3 Definition of Variables

5.3.1 Dependent Variable

In the regression analysis, the market value of equity, or market capitalization, was used as the dependent variable. Various prior literature employs price per share as the dependent variable, following the original model of Ohlson, but to avoid distortions from stock splits we replace price per share with its equivalent total value, the market value of equity, following Roca (2021) among others. These total values are then deflated by other appropriate scalers. The scaling-process is described in more detail later on in this thesis.

To address the problem of look-ahead bias, which was recognized by Banz and Breen (1986), the market value of equity representing the published annual report is pushed forward. That is, the chosen date for the market value of equity variable is a five-day average after the publication date of the annual report. This is done to ensure that the information from the

annual reports is available and represented in the market value of equity (Barth et al., 2008; Harris and Muller, 1999). There are various ways prior published work has dealt with this issue, for example Shan (2015) and Tsalavoutas, André and Evans (2012) use the market value of a company four months after the end of the financial period under examination, others use values three months after the fiscal year end (e.g., Black and White, 2003; Oswald, 2008; Ou and Sepe, 2002), while some use values at the end of the calendar year (Barth et al., 1998; Marquardt and Wiedman, 2004). We felt a five-day average after the publication of the annual reports would represent the data better, as we can be sure that every firm in the sample has published their report and we can avoid the potential issue of other information impacting the market value. Since our sample is relatively small compared to other literature it was fairly straightforward to collect this information. The publication date of all annual reports in the sample was gathered from S&P Capital IQ and based on those dates a five-day average market value of equity following the publication was calculated.

5.3.2 Independent Variables

The independent variables of interest in the regression model are net income, book value of equity, intangible assets and free cash flows. We define free cash flows as operating cash flows net investing cash flows following Ball and Nikolaev (2022), among others. The definition of the cash flow variable varies within the literature, many apply only operating cash flows (e.g., Amir and Lev, 1996), and others define the cash flows as the sum of operating cash flows, investing cash flows and financing cash flows (e.g., Dinh Thi and Schultze, 2011). We found the free cash flow definition most appropriate in regard to the research question of this thesis. The independent variables are all constructed using data available in the annual reports of the firm and that data were collected from S&P Capital IQ.

The original model of Ohlson employs earnings per share and book value per share in its model but as mentioned previously, to avoid distortions from stock splits these variables were replaced by their equivalent total values, net income and book value of equity. These total values are then deflated by other appropriate scalers. The scaling-process is described in more detail later on in this thesis. As mentioned in the literature review, over the years researchers have adjusted the Ohlson model and taken additional accounting elements into consideration in their research.

5.4 Statistical Theory

In this chapter, we aim to provide an overview of the theoretical aspects of regression analysis and panel data analysis in the context of value relevance studies. Specifically, we will explore the use of fixed effects models and the various statistical issues that commonly arise in this area. These issues include identifying and correcting for heteroskedasticity and autocorrelation, measuring multicollinearity, and the interpretation of the coefficient of determination, R^2.

5.4.1 Regression Analysis

To examine the relationship between a dependent variable and one or more independent variables it is common among researchers to apply a regression analysis. The goal of the analysis is to identify the strength of the connection between the variables. There are several regression models one can utilize and which one to use depends on the nature of the data and the research question. For the ordinary least squares (OLS) estimators to be the best available, there are several assumptions, referred to as the classical assumptions, that must be met. These assumptions include that the regression model is linear, correctly specified, and includes an additive error term, that the error term has a zero population mean, that all independent variables are uncorrelated with the error term, and that there is no serial correlation, heteroskedasticity or perfect multicollinearity present in the model (Studenmund, 2016).

5.4.2 Panel Data

Panel data or longitudinal data consists of cross-sections that are observed over several different time periods (Kennedy, 2008). Typically, a panel data set contains a cross-section variable and a time-series variable. With panel data, one could be working with either a balanced or unbalanced panel (Stock and Watson, 2015). A balanced panel will have all observations intact, meaning there are data on all cross-sections across all time periods. If observations are missing, the panel data will be unbalanced. As our data consists of a cross-section of firm's annual report data and market capitalization over several time periods, we are working with panel data. Since there are no missing data points in our data set, we have a

balanced panel data set. As the same firms are observed in each period, the panel data is a fixed panel and not a rotating panel (Greene, 2008, p. 388).

There are several techniques to analyze panel data, mainly pooled ordinary least squares (OLS), fixed effects, and random effects models. Panel data models can take into account cross-sectional effects, time effects, or both and are a powerful tool for controlling for unobserved heterogeneity or individual effects (Kennedy, 2008). These unobserved effects can either be fixed or random. If cross-sectional or time specific effects do not exist, pooled OLS regressions will produce efficient parameter estimates. However, if these effects are present in the data it may suffer from heteroskedasticity and/or autocorrelation which violates the classical assumptions mentioned above. Panel data models provide a way to deal with these problems, through for instance applying a fixed effects model or random effects model (Park, 2011).

5.4.3 Random and Fixed Effects models

One variant of regression analysis is the random effects model. The random effects model examines the differences in the error variance between individuals or periods of time (Park, 2011). The model implies that the effects at the individual level are not correlated with the other variables, an assumption that might not always be realistic.

Another variant is the fixed effects model which is a model frequently utilized when analyzing panel data. The model assumes entity-specific fixed effects that are constant over time. The fixed effects model will have a different intercept for all entities and will examine the differences between them (Stock and Watson, 2015).

$$Random\ effects\ model: y_{it} = \alpha + X'_{it}\beta + (u_i + v_{it})$$

$$Fixed\ effects\ model: y_{it} = (\alpha + u_i) + X'_{it}\beta + v_{it}$$

u_i represents a fixed or random effect that is unique to an individual (group) or time period not included in the regression. The errors are independently and identically distributed $v_{it} \sim IID(0, \sigma_v^2)$ (Park, 2011).

It is important that the random effects estimator is only applied when its error is not correlated with the explanatory variables (Kennedy, 2008). To determine this, one can use a Hausman test. The test evaluates the insignificance of the difference between the random effects estimate and the unbiased fixed effects estimate. If the null hypothesis is rejected, the fixed effects model is preferred.

Baltagi (2005) states that the fixed effects model is suitable if the goal is to focus on a specific set of firms and deduction is limited to this set of firms. Therefore, the fixed effects model is an appropriate specification form for most accounting research (Jager, 2008).

There are several ways to estimate a fixed effects model. Those most commonly used in the literature are the least squares dummy variable model (LSDV) and the "within" estimation. The LSDV model uses dummy variables while the "within" estimation does not. Both of these strategies produce the same parameter estimates of regressors for non-dummy explanatory variables. The LSDV model involves dropping a dummy out of the set of dummies. In contrast to the LSDV model, the "within" estimation approach does not require the use of dummies as it uses variations within each entity instead of a large number of dummy variables (Park, 2011). The R^2 from the LSDV regression is usually rather high compared to the "within" estimation. This is because it includes a dummy variable for each cross-sectional unit, which explains a lot of the variation in the data. One should not get too excited about this large R^2 value as it is not surprising that the LSDV model can explain much of the variation in the dependent variable by including a dummy variable for each cross-sectional unit (Wooldridge, 2020, p. 466).

5.4.4 Heteroskedasticity and Autocorrelation

When analyzing panel data, variables often exhibit autocorrelation. This means they are correlated over time within a specific entity (Stock and Watson, 2015). Another recurring

issue is heteroskedasticity, which indicates that the errors do not have the same variance but change across the sample. The data can be tested for heteroskedasticity with a Breusch-Pagan test while the Breusch-Godfrey test tests for autocorrelation. In order to control for potential heteroskedasticity and autocorrelation the standard errors of the regression must be adjusted. Hence, one can apply what is referred to as heteroskedasticity- and autocorrelation-consistent (HAC) standard errors (Hanck et al., n.d.). These standard errors will be valid whether or not the data shows signs of heteroskedasticity, autocorrelation, or both.

5.4.5 Multicollinearity

To identify correlation, and its strength, between the independent variables in the model the variance inflation factor (VIF) can be applied. The VIF results start at one and have no upper bound. A VIF value equal to one implies that there exists no correlation between the independent variable inspected and any other independent variable (Studenmund, 2016). Setting a threshold for a VIF value above which multicollinearity can be deemed a "problem" is arbitrary, and sometimes the value of 10 is chosen (Wooldridge, 2020, p. 92). Previous literature in the field has also chosen the value of 10 (e.g., Cordazzo and Rossi, 2020; Oliveira et al, 2010).

5.4.6 The Coefficient of Determination

The coefficient of determination, or R^2, is a statistical metric applied in regression analysis to measure the percent of variability in the dependent variable explained by the explanatory variable(s). That is, the R^2, provides information about the explanatory power of the model. R^2 can vary from 0 to 1 and a greater R^2 value implies a better regression fit, ceteris paribus (Newbold, Carson, and Thorne, 2013, p. 413-415). When stock market values or returns are regressed on accounting figures, R^2 is a measure of how much of the variation in stock market prices or returns can be explained by the accounting figures in the regression. Thus, R^2 is a measure of value relevance (Beisland, 2009). The adjusted R^2 is a modified version of R^2 which takes into account the number of explanatory variables in the model. The adjusted R^2 imposes a penalty for adding additional explanatory variables to the model (Wooldridge, 2020, p. 196).

5.4.7 RStudio

To conduct our analysis, we used a programming language and software environment called RStudio, designed for statistical computing (R Project, n.d.). The program is widely used in statistical modelling as well as data analysis and visualization as it provides the user with an extensive variety of statistical and graphical techniques. RStudio makes it easy to process and examine the data and provides reliable output for further analysis. We were most comfortable working with RStudio as it is the programming language we were taught to use in the applied econometrics course in our master's studies.

5.5 Fundamental Analysis Theory

Financial statement analysis is often applied by active stock investors to determine the fundamental value of a company and assess their respective stock prices. In fact, one of the goals of financial reporting is to provide equity investors with relevant information for estimating firm value. Stock investors utilize various approaches to evaluate and interpret a firm's financial position. The dividend discount model, discounted cash flow model, models that depend on multiples, the residual income model, and the economic value-added model are some commonly used valuation methods.

The dividend discount model depends on the assumption that a stock's value is derived by discounting the expected future dividend payments (Subramanyam and Venkatachalam, 2007). While the dividend discount model is not the most popular of the present value approaches, it forms the foundation for other present value models. If a perpetual dividend stream is assumed and a constant discount factor, then a firm's market value of equity can be calculated as:

$$P_0 = \sum_{t=1}^{\infty} \frac{div_t}{(1 + r_e)^t}$$

Where P_0 is the estimated market price of equity at time 0, div_t is the dividends at time t, and r_e is the investor's required rate of return on equity (Petersen and Plenborg, 2012, p. 213).

The discounted cash flow model is unquestionably the most widely applied present value technique. It is extensively adopted by professionals, and there exist entire textbooks devoted to this valuation approach. There are two ways to specify the discounted cash flow model. One approach is used to determine the enterprise value of a firm, while the other estimates its equity value. The discounted cash flow model asserts that the value of a firm can be derived from the present value of future free cash flows. Free cash flows to the firm are discounted to obtain the enterprise value, while free cash flows to equity are discounted to find the firm's equity value (Petersen and Plenborg, 2012, p. 216). If we assume an infinite stream of cash flows, the discounted cash flow model can be expressed as:

$$Enterprise\ value_0 = \sum_{t=1}^{\infty} \frac{FCFF_t}{(1 + WACC)^t}$$

Or

$$Equity\ value_0 = \sum_{t=1}^{\infty} \frac{FCFE_t}{(1 + r_e)^t}$$

Where $FCFF_t$ is the free cash flow to the firm at time t, $WACC$ is the weighted average cost of capital, $FCFE_t$ is the free cash flow to equity at time t, and r_e is the investor's required rate of return on equity. When performing a discounted cash flow valuation, it is more common to use the enterprise value approach in order to provide a more comprehensive picture of the total value of the company's operations. The enterprise value is also more useful when comparing companies as it is not affected by differences in capital structure.

In order to apply these present value models, it is essential to have information about a firm's future profitability, growth rates and risk. To obtain this information, it is necessary to estimate the future economic potential of the firm. Financial statement analysis plays a vital

role in this process as it provides insights into the firm's historical profitability, growth rates, and risk. By examining financial statements one can identify historical levels and trends in a firm's economic performance, which serves as a good starting point for making forecasts (Peterson and Plenborg, 2012, p. 5).

Firm valuation using multiples is a commonly adopted approach by practitioners. One explanation for its popularity is due to its perceived simplicity and efficiency in conducting a valuation. However, conducting a comprehensive valuation using multiples can be both a complicated and time-consuming process. A valuation based on multiples depends on the relative pricing of peer company's earnings. Multiples can be deduced from present value methods which implies that, ideally, multiples should yield value estimates that are equivalent to present value methods.

In recent years, excess return approaches such as the economic value-added model and the residual income model have gained increasing attention. Unlike the dividend discount and discounted cash flow models, which both rely on cash flow data, the economic value-added and residual income models rely on accrual accounting information. Despite the discrepancy, these models are theoretically equivalent valuation methods. The economic value-added model estimates the enterprise value of a firm, whereas the residual income model estimates the equity value of a firm.

The economic value-added model asserts that the value of a firm is derived from the initial invested capital plus the present value of all future economic value-added figures. If an infinite expected lifetime is assumed, the economic value-added model can be expressed as:

$$Enterprise\ value_0 = Invested\ capital_0 + \sum_{t=1}^{\infty} \frac{EVA_t}{(1 + WACC)^t}$$

Where EVA_t is the economic value added at time t and $WACC$ is the weighted average cost of capital.

The residual income model measures the value of a firm from an equity standpoint and can be defined as:

$$Market\ value\ of\ equity_0 = Book\ value\ of\ equity_0 + \sum_{t=1}^{\infty} \frac{RI_t}{(1 + r_e)^t}$$

Where RI_t is the residual income at time t and r_e is the investor's required rate of return on equity.

The distinction between the economic value-added and the residual income models is the transactions with debt holders. The economic value-added model measures the value from both equity and debt perspectives, i.e., enterprise value, whereas the residual income model only considers the value from an equity perspective (Peterson and Plenborg, 2012, p. 221).

In 1995, James A. Ohlson published the paper Earnings, Book Values, and Dividends in Equity Valuation. This paper introduced a valuation model based on the residual income model. The model estimates the intrinsic value of a firm's equity based on its earnings, book value, and dividends. The paper is a significant contribution to the field of accounting and finance research, the Ohlson model has been widely applied in value relevance literature to study the relationship between accounting information and stock prices.

The models mentioned above are all applied by equity investors to estimate a firm's value. One of the goals of financial reporting is to assist investors with equity valuation. In order for financial statement information to be value relevant, accounting figures must be related to current firm value. If there is no association between accounting numbers and firm value, accounting information cannot be considered as value relevant. Consequently, financial reports are not able to fulfil one of their primary purposes.

6 Regression Analysis

In this chapter, we present the estimation results of the regression analysis conducted to examine the relationship between various accounting figures and the market value of equity. We begin by specifying the models applied for analysis, then we present descriptive statistics for our sample, which includes descriptive statistics for the undeflated sample, levels model and return model. We then provide the results of diagnostic tests which ensure that the assumptions of regression analysis are met. Next, we present the regression results, which include estimated coefficients and their statistical significance. Furthermore, we include measures of goodness-of-fit to evaluate how well the model fits the data. In order to test the robustness of our results, we conduct several additional analyses, which include deflating the levels model with an alternative deflator and correcting the data for possible inflation-effects. Finally, we will discuss the limitations of our study and analyze the implications of our findings.

6.1 Model Specification

As stated earlier, pooled OLS overlooks a possible source of bias, which is the heterogeneity of entities (firms in this case). Market values are likely to be impacted by variables specific to each firm that are often unobservable. If these firm-specific effects are not appropriately considered, estimation results could be biased (Wooldridge, 2020). After conducting an F-test, we conclude that the fixed effects model fits the data better than a pooled OLS model. Therefore, we develop our analysis using the within fixed effects model.

The Ohlson (1995) levels model has been applied extensively in many previous studies. The model expresses a company's value as a linear relationship between earnings and book value of equity. The levels model has various appealing qualities making it a valuable framework for studying the relationship between stock prices and accounting figures (Ohlson, 1995). Alternatively, the return model can equally be applied in testing the hypotheses previously stated.

As presented in the literature review, both model specifications have drawbacks. Given the lack of a conclusive solution to the problems related to the levels and return specifications, Kothari and Zimmerman (1995) and Ota (2003) suggest that studies will be enriched by analyzing both specifications as it has the potential to yield more convincing evidence. Papers that research similar topics have applied the levels model to a greater extent but to ensure that our study's inferences are not sensitive to functional form we apply both methods. This is also done in multiple other value relevance studies (e.g., Amir and Lev, 1996; Lev and Zarowin, 1999; Hellström, 2006; Tsalavoutas, André, and Evans, 2012).

6.1.1 The Levels Specification

The Ohlson (1995) price or levels model has been extensively applied in prior value relevance research (e.g., Barth et al., 2008; Collins et al, 1999; Hung and Subramanyam, 2007). The levels specification is as follows:

$$\text{Model 1: } MVE_{it} = \beta_0 + \beta_1 NI_{it} + \beta_2 BVE_{it} + \varepsilon_{it}$$

Where MVE_{it} is a five-day average market value of equity of company i following the publication of the annual report of fiscal year t. NI_{it} is the net income of company i over fiscal year t and BVE_{it} is the book value of equity of company i over fiscal year t.

As previously mentioned, a common downfall of the levels specification is scale bias. The majority of prior literature has applied the number of shares outstanding as a deflator to account for these scale effects. As our data are affected by stock splits, deflating variables by per share would lead to biased results. This is because the number of outstanding shares changes after a stock split, which is not necessarily followed by an according change in prices, which would affect the per-share calculation. Consequently, deflating the variables by shares might not accurately account for scale effects. Additionally, outstanding shares might not be the most suitable proxy for firms' size, which the scaler is supposed to correct for, as firms control the number of outstanding shares and small firms can, just as well as large firms, have a great number of outstanding shares. Therefore, as to avoid distortions from stock splits and the potential irrelevance of outstanding shares as a good proxy, the total values of

variables, are used. These total values are then deflated by assets to account for potential scale effects. Assets are commonly used as a deflator in prior literature (e.g., André, Dionysiou, and Tsalavoutas, 2018; Barth and Kasznik, 1999; Sloan, 1996).

As a result, we obtain the following model:

$$\text{Model 2: } \frac{MVE_{it}}{TA_{it}} = \beta_0 + \beta_1 \frac{NI_{it}}{TA_{it}} + \beta_2 \frac{BVE_{it}}{TA_{it}} + \varepsilon_{it}$$

Where:

$\frac{MVE_{it}}{TA_{it}}$	Is a five-day average market value of equity of company i following the publication of the annual report of fiscal year t, scaled by the total assets of company i over fiscal year t.
$\frac{NI_{it}}{TA_{it}}$	Is the net income of firm i over fiscal year t, scaled by the total assets of company i over fiscal year t.
$\frac{BVE_{it}}{TA_{it}}$	Is the book value of equity of firm i over fiscal year t, scaled by the total assets of company i over fiscal year t.

More recent literature suggests that the model presented above can be improved by adding additional variables such as cash flows and intangible assets (e.g., Barth et al., 2023). Building upon these insights, we plan to see if our model can be enhanced by incorporating cash flows and intangible assets as additional variables in the model. Therefore, we present the following model:

$$\text{Model 3: } \frac{MVE_{it}}{TA_{it}} = \beta_0 + \beta_1 \frac{NI_{it}}{TA_{it}} + \beta_2 \frac{BVE_{it}}{TA_{it}} + \beta_3 \frac{IA_{it}}{TA_{it}} + \beta_4 \frac{FCF_{it}}{TA_{it}} + \varepsilon_{it}$$

Where:

$\frac{MVE_{it}}{TA_{it}}$	Is a five-day average market value of equity of company i following the publication of the annual report of fiscal year t, scaled by the total assets of company i over fiscal year t.
$\frac{NI_{it}}{TA_{it}}$	Is the net income of firm i over fiscal year t, scaled by the total assets of company i over fiscal year t.

$\frac{BVE_{it}}{TA_{it}}$	Is the book value of equity of firm i over fiscal year t, scaled by the total assets of company i over fiscal year t.
$\frac{IA_{it}}{TA_{it}}$	Are the intangible assets of firm i over fiscal year t, scaled by the total assets of company i over fiscal year t.
$\frac{FCF_{it}}{TA_{it}}$	Are the operating cash flows of firm i net investing cash flows of firm i over fiscal year t, scaled by the total assets of company i over fiscal year t.

6.1.2 The Return Specification

The return model we apply is built on the evidence presented by Easton (1998) and Christie (1987), among others, that the lagged market value of equity is the most suitable to account for scale effects. Scaling by the lagged market value of equity essentially transforms the levels model into a return model (Aboody, Hughes, and Liu, 2002; Brown, Lo, and Lys, 1999). As a result, we obtain the following model:

$$\text{Model 4: } \frac{MVE_{it}}{MVE_{it-1}} = \beta_0 + \beta_1 \frac{NI_{it}}{MVE_{it-1}} + \beta_2 \frac{BVE_{it}}{MVE_{it-1}} + \varepsilon_{it}$$

Where:

$\frac{MVE_{it}}{MVE_{it-1}}$	Is a five-day average market value of equity of company i following the publication of the annual report of fiscal year t, scaled by the lagged market value of equity.
$\frac{NI_{it}}{MVE_{it-1}}$	Is the net income of firm i over fiscal year t, scaled by the lagged market value of equity.
$\frac{BVE_{it}}{MVE_{it-1}}$	Is the book value of equity of firm i over fiscal year t, scaled by the lagged market value of equity.

Once more, in order to determine if the model can be improved by adding cash flows and intangible assets, we apply the following model:

$$\text{Model 5: } \frac{MVE_{it}}{MVE_{it-1}} = \beta_0 + \beta_1 \frac{NI_{it}}{MVE_{it-1}} + \beta_2 \frac{BVE_{it}}{MVE_{it-1}} + \frac{IA_{it}}{MVE_{it-1}} + \frac{FCF_{it}}{MVE_{it-1}} + \varepsilon_{it}$$

Where:

$\frac{MVE_{it}}{MVE_{it-1}}$	Is a five-day average market value of equity of company i following the publication of the annual report of fiscal year t, scaled by the lagged market value of equity.
$\frac{NI_{it}}{MVE_{it-1}}$	Is the net income of firm i over fiscal year t, scaled by the lagged market value of equity.
$\frac{BVE_{it}}{MVE_{it-1}}$	Is the book value of equity of firm i over fiscal year t, scaled by the lagged market value of equity.
$\frac{IA_{it}}{MVE_{it-1}}$	Are the intangible assets of firm i over fiscal year t, scaled by the lagged market value of equity.
$\frac{FCF_{it}}{MVE_{it-1}}$	Are the operating cash flows of firm i net investing cash flows of firm i over fiscal year t, scaled by the lagged market value of equity.

6.2 Descriptive Statistics

Descriptive statistics are calculated and presented below for dependent and independent variables in order to obtain a better understanding of the nature of the data that will be analyzed. The three tables below present the descriptive statistics for the sample of firms from 2006 to 2022. Following Bugeja and Gallery (2006) and Tsalavoutas et al. (2012), among others, we present descriptive statistics for all variables both on an undeflated and deflated basis.

From the descriptive statistics on the undeflated variables, we observe that there are very large differences within each variable, as can be seen in the difference between the minimum and maximum values of the variables and the standard deviation. The large differences are not surprising and stem from the nature of the data. The firms differ in size and operations, and hence have varying market and financial values.

The high standard deviation could indicate a lack of normality in the data. To normalize the data, one could exclude outliers. This can however prove to be difficult as it may influence the regression interpretation in an undesirable way and generally cause new outliers (Wooldridge,

2020). We are sure that the outliers in the data are genuine and not caused by a mistake in data entry, and due to the nature of the data it is ordinary that some observations are more extreme than others. Consequently, it would not be appropriate nor justifiable to remove the outliers (Hair et al., 2010). Moreover, outlier removal would cause the panel data to be unbalanced, which can entail computational and estimation issues (Park, 2011). Additionally, according to Hair et al. (2006) and Hayes (2018), one should consider normality as the least essential assumption in linear regression analysis. Larger sample sizes reduce the negative effects of non-normality, and for a sample size of 200 or more the effects may be negligible (Hair et al., 2010).

The descriptive statistics on the deflated variables show that the difference between observations is to some degree accounted for by the deflator as we can see that the difference between the minimum and maximum values are not as extreme, and the standard deviations are not as high. Prior literature has also found that scaling reduces the effect of outliers (e.g., Jorion and Talmor, 2001).

Descriptive statistics: Undeflated

Statistic	N	Mean	St. Dev.	Min	Max
MVE	578	47,551.710	153,658.400	20.849	2,127,262.000
NI	578	2,478.001	11,400.960	-13,656.200	203,217.800
BVE	578	14,323.520	40,021.390	-22.155	452,622.100
IA	578	5,186.259	14,449.800	0.000	91,895.000
FCF	578	1,883.321	8,846.337	-49,341.000	91,066.380

Data in million DKK.
MVE: Market value of equity, NI: net income, BVE: book value of equity, IA: intangible assets, FCF: free cash flows.

Table 1: Descriptive statistics - undeflated

Descriptive statistics: Levels model

Statistic	N	Mean	St. Dev.	Min	Max
MVE	578	1.644	2.185	0.025	16.028
NI	578	0.058	0.144	-1.002	0.849
BVE	578	0.511	0.473	-0.468	4.322
IA	578	0.169	0.494	0.000	11.316
FCF	578	0.030	0.138	-0.926	0.584

Data in million DKK.
MVE: Market value of equity, NI: net income, BVE: book value of equity, IA: intangible assets, FCF: free cash flows. All variables are deflated by assets.

Table 2: Descriptive statistics - levels model

Descriptive statistics: Return model

Statistic	N	Mean	St. Dev.	Min	Max
MVE	578	1.181	0.603	0.085	8.113
NI	578	0.028	0.232	-2.846	1.670
BVE	578	0.749	0.734	-0.806	4.408
IA	578	0.293	2.126	0.000	50.796
FCF	578	0.005	0.582	-12.169	1.677

Data in million DKK.
MVE: Market value of equity, NI: net income, BVE: book value of equity, IA: intangible assets, FCF: free cash flows. All variables are deflated by lagged market value of equity.

Table 3: Descriptive statistics - return model

6.3 Correlation Analysis

Tables 4 and 5 below show the correlations coefficients among the dependent and independent variables of the two model specifications. The correlation analysis does not consider the characteristics of panel data, therefore it would be premature to draw any indications from the correlation tables (Oliveira et al., 2012).

Levels model

	MVE	NI	BVE	IA	FCF
MVE	1				
NI	0.47352883	1			
BVE	0.19618427	0.46788683	1		
IA	-0.0332165	0.04173755	0.02021103	1	
FCF	0.33136177	0.5240654	0.17990495	0.00314734	1

Table 4: Correlation table - levels model

Return model

	MVE	NI	BVE	IA	FCF
MVE	1				
NI	0.14663136	1			
BVE	0.36937061	0.05024568	1		
IA	0.0417431	0.08627225	0.11905407	1	
FCF	-0.0206662	0.16545755	-0.1449848	0.01869061	1

Table 5: Correlation table - return model

6.4 Diagnostic Tests Results

In order to assess whether the individual effects are uncorrelated with the other regressors in the model we performed the Hausman specification test. In all models presented above, we obtained a significant p-value ($Prob > \chi^2$ smaller than 0.05). Therefore, the fixed effects model is preferred. The results from the tests can be found in the appendix.

To examine if the models suffer from multicollinearity problems, variation inflation factors (VIF) were computed for each model. For all models, the VIF values of all explanatory variables were lower than 10.00, so multicollinearity is not an issue. The results from the tests can be found in the appendix.

The Breusch-Godfrey/Wooldridge test confirmed the presence of autocorrelation and the Breusch-Pagan test for heteroskedasticity confirmed the presence of heteroskedasticity. Therefore, all results are reported with robust heteroskedasticity- and autocorrelation-consistent (HAC) standard errors.

6.5 Regression Results

In the following sub-chapters, we present the estimation results for both the levels and return specification models.

6.5.1 The Levels Specification

Table 6 below presents the estimation results of the levels models, Model 2 and Model 3, using the within fixed effects approach with robust standard errors.

Levels model results

	Dependent variable:	
	MVE	
	Model 2	Model 3
NI	3.943**	3.888**
	(1.787)	(1.891)
BVE	0.452	0.435
	(0.503)	(0.516)
IA		-0.041
		(0.037)
FCF		0.227
		(0.694)
Observations	578	578
R2	0.171	0.172
Adjusted R2	0.117	0.115
F Statistic	55.823*** (df = 2; 542)	27.955*** (df = 4; 540)

Note: *p<0.1; **p<0.05; ***p<0.01
Robust (HAC) SE in parenthesis.
Dependent variable: MVE is market value of equity.
Independent variables: NI is net income. BVE is book value of equity. IA is intangible assets. FCF is free cash flows.
All variables are deflated by total assets.

Table 6: Regression results - levels model

From the table above we see that the estimation results of Model 2 provide evidence that there is a positive statistically significant relationship between the independent variable net income,

scaled by assets, and the dependent variable market value of equity, scaled by assets. This relationship is significant at the 5 percent level. Furthermore, the estimation results of Model 2 indicate that there is a positive relationship between the independent variable book value of equity, scaled by assets, and the dependent variable market value of equity, scaled by assets. However, this relationship is not significant at any conventional level. The positive relationship was expected, built on evidence presented in prior literature (e.g., Barth et al., 1998; Barth et al., 2023; Collins, Maydew and Wiess, 1997;). The adjusted R^2 value of Model 2 is relatively low compared to previous research on comparable markets (Devalle, Onali, and Magarini, 2010). The adjusted R^2 value of 0.117 suggests that 11.7 percent of the variation in the dependent variable, market value of equity, can be explained by the independent variables, net income and the book value of equity.

From the estimation results of Model 3, where intangible assets and free cash flows are added to the regression model, we see that the overall results do not change. Net income is still positive and statistically significant at the 5 percent significance level and book value of equity remains positive and statistically insignificant. Surprisingly, the estimation results provide evidence that intangible assets and free cash flows add no meaningful explanatory power to the model. The estimated coefficient of both variables is insignificant at any conventional level and the R^2 value grows by only 0.001, while the adjusted R^2 value decreases from 0.117 to 0.115.

6.5.2 The Return Specification

Table 7 below presents the estimation results of the return models, Model 4 and Model 5, using the within fixed effects approach with robust standard errors.

Return model results

	Dependent variable:	
	MVE	
	Model 4	Model 5
NI	0.362**	0.355**
	(0.170)	(0.167)
BVE	0.572***	0.574***
	(0.127)	(0.134)
IA		-0.0002
		(0.003)
FCF		0.018
		(0.083)
Observations	578	578
R2	0.292	0.292
Adjusted R2	0.246	0.244
F Statistic	111.725*** (df = 2; 542)	55.732*** (df = 4; 540)

Note: *p<0.1; **p<0.05; ***p<0.01
Robust (HAC) SE in parenthesis.
Dependent variable: MVE is market value of equity.
Independent variables: NI is net income. BVE is book value of equity. IA is intangible assets. FCF is free cash flows. All variables are deflated the lagged market value of equity.

Table 7: Regression results - return model

From the table above we can see that there is some difference between the estimation results of the levels model and return model. The findings from Model 4 provide evidence of a significant positive relationship between net income and market value of equity at the 5 percent significance level and that there is evidence of a positive significant relationship between book value of equity and market value of equity at the 1 percent significance level. The adjusted R^2 value of Model 4 implies that 24.6 percent of the variation in the dependent variable, market value of equity, can be accounted for by the independent variables, earnings and book value of equity. Again, the adjusted R^2 value of the return model is relatively low compared to previous research on comparable markets (Devalle, Onali, and Magarini, 2010).

Upon incorporating free cash flow and intangible assets to the model we see the results of Model 5 are essentially identical to the results of Model 4. Net income remains significant at the 5 percent significance level. Likewise, book value of equity remains significant at the 1 percent significance level. The relationship of the independent variables, intangible assets and free cash flow, with the dependent variable, market value of equity, is not statistically significant, as was the case in the levels model. The estimation results provide evidence that intangible assets and free cash flows provide no additional explanatory power to the model. The R^2 value remains unchanged at 0.292 while the adjusted R^2 value decreases by 0.002, from 0.246 to 0.244.

6.5.3 Summary and Discussion

Based on the estimation results of the levels specification, scaled by assets, we find the earnings variable to have a positive statistically significant relationship with market values of equity. The book value of equity has a positive association with the market value of equity, however, it is not statistically significant. When including additional explanatory variables, such as cash flows and intangible assets, the coefficients on earnings and the book value of equity remain close to their original value. The coefficients on both cash flows and intangible assets are insignificant. The results imply that adding these variables does not provide additional explanatory power to the model since the adjusted R^2 value decreases. Consequently, it is clear that evidence from the levels regression analysis suggests statistically significant relevance of earnings but fails to find statistically significant relevance of book value of equity, intangible assets and cash flow figures.

According to research done by Kothari and Zimmerman (1995) and Ota (2003) analyzing data using both a levels and return specification could potentially improve the reliability of the results, as it assures that the inferences drawn are not sensitive to functional form. The return specification estimation results provide a positive statistically significant relationship between the dependent variable and both net income and book value of equity. Similar to the levels specification, adding intangible assets and free cash flow to the model does not lead to an increase in explanatory power, and both variables have an insignificant relationship with the market value of equity. The estimation results from the return specification suggest evidence

of statistically significant relevance of earnings and book value but not statistically significant relevance of intangible assets and free cash flow.

In terms of Hypothesis 1, the estimation results of the two models are conflicting. The levels models suggests that we reject Hypothesis 1, while the return model suggests that we fail to reject Hypothesis 1. However, both models fail to find a statistically significant association between the additional independent variables, intangible assets and cash flow, and the dependent variable, which implies a clear rejection of Hypothesis 2.

The earnings coefficient from the return model is smaller in comparison to the coefficients in the levels model, these results are comparable to some prior studies (Kothari and Zimmerman, 1995; Aboody et al., 2002; Janjic et al., 2012; Cupic, Todorovic and Benkovic, 2022). Drawing from the estimation output, the return model seems to fit the data better, based on both the coefficient significance and the adjusted R^2 values. However, the fact that there are differences in the results may imply that the relevance of the return model can only be attributed to the deflator, the lagged market value of equity, and not accounting information. Moving forward, the robustness of the results will be tested in order to provide a final conclusion in terms of the hypotheses presented.

The implications of the estimation results provided in this chapter will be discussed further in Chapter 6.8, where we summarize and discuss the findings presented in Chapter 6.

6.6 Robustness Tests

As previously mentioned, various papers have applied both the levels specification and the return specification as a robustness test following the suggestion of Kothari and Zimmerman (1995), that "when possible, using both functional forms will help ensure that a study's inferences are not sensitive to functional form." As reported above, the results of the two specifications in our case present some differences. This could indicate that the results are susceptible to the model specification and deflator applied, and therefore are not robust. These findings are contrary to what some prior literature has found. For example, Lev and Zarowin

(1999) apply both the levels and return model and report that the results of both models are qualitatively similar. Similarly, Sami and Zhou (2004) and Chen, Chen, and Su (2001) find that the results of the return specification are consistent with the results of the levels specification. However, our findings are in line with Aboody, Hughes and Liu (2002) who also identify notable differences between the return and levels specifications.

Prior work that has utilized the levels model in their research has applied alternative deflators to check the robustness of their results as according to prior literature, the levels model is sensitive to the choice of deflator (e.g., Brown et al., 1999; Kothari and Zimmerman, 1995). As touched on in the literature review, Barth and Kallapur (1996) and Barth and Clinch (2009) consider the number of outstanding shares, total assets, book value, net income, revenue, and market value of equity as appropriate deflators. Therefore, previous work has altered their model by swapping out the deflator in their main model with another appropriate deflator (e.g., André et al., 2018; Core, Guay, and Van Buskirk, 2003; Oswald, 2008). To check the robustness of our results, we apply revenue as an alternative deflator. The estimation results of the re-deflated levels model can be found in the appendix. The results change considerably when the deflator is modified. The adjusted R^2 of the levels Models 2 and 3 deflated by revenue, instead of assets, is 0.403 and 0.402, respectively. This is considerably higher than the adjusted R^2 of the asset-deflated levels models. The coefficient's signs and statistical significance also change. This demonstrates that the deflator plays a great role in our estimation results and indicates that the results are not robust to changes in the deflator. These results are in contrast with a significant number of results reported by various prior published works, which often state that alternative scaling factors do not lead to qualitatively different conclusions (e.g., André et al., 2018; Lev and Zarowin, 1999; Sami and Zhou, 2004).

Since the variables in the models are likely to be subject to inflation, we follow Agostino, Drago, and Silipo (2011) and Core et al. (2003) and re-estimate the model with inflation-adjusted values. The variables were adjusted to constant December 2022 DKK using the CPI deflator. The results, which can be found in the appendix, are not substantially altered by this re-estimation which is in line with the results of Agostino et al. (2011).

When both the book value of equity and the total amount of intangible assets recognized in the balance sheet are included in the regression, some prior literature redefines the book value of equity (e.g., Oliveira et al. 2010; Sahut et al., 2011). The book value of equity is then redefined as the book value of equity minus total intangible assets. This is done to ascertain their value relevance (Bugeja and Gallery, 2006). We also ran a model where the book value of equity had been redefined. This change did not have a significant impact on the results, which can be seen in the appendix.

The robustness tests conducted in this analysis aimed to examine the sensitivity of the results to changes in specific factors. The results indicate that the data is indeed sensitive to factors such as modification of the deflator and model specification, as they have a significant impact on the study's inferences. However, the results are not sensitive to CPI adjustments. These findings highlight that drawing a definite conclusion from the estimation results can prove difficult, as the origin of the value relevance of the variables is unclear. Whether the value relevance can truly be contributed to the financial statement numbers or whether the chosen deflator is the source of value relevance is ambiguous.

6.7 Limitations

This regression analysis above, like most others, suffers from several limitations. In this chapter, we will examine the limitations of our study and assess their implications. We find that the primary limitations of the analysis pertain to the data.

The data preparation and cleaning might impact the results. The sample only consists of firms that have been listed on the Copenhagen Stock Exchange for the entire period of analysis, from 2006 to 2022. That is, firms that were not listed on the exchange the whole time were excluded from the analysis. This might entail that the sample is over-presented by mature companies which could influence the outcomes, this is further discussed in Chapter 6.8. Additionally, the data cleaning required the removal of a number of firms, due to missing information, varying fiscal-year ends, or substantial organizational changes, leading to a relatively small sample size.

Based on the findings of previous literature (e.g., Davis-Friday, Eng, and Liu, 2006; Hayn 1995), the association between market values and earnings can differ between loss and profit firms. As roughly 18 percent of net income in our data is negative, our results could be impacted by these findings. Some researchers have dealt with this possible issue by removing firms that exhibit negative earnings from their data. However, since 26 firms in our sample incur losses over the period analyzed, and some of them numerous times, we were unable to justify the removal of these firms from the sample as it would substantially decrease our sample size. It was also unviable to remove the specific loss-years as our panel data set would become severely unbalanced, which can entail computational and estimation issues (Park, 2011). Furthermore, the presence of negative earnings prohibits the use of logarithmic transformations of the earnings variable. Various studies have applied logarithmic transformations to their variables of interest to correct for possible estimation biases like heteroskedasticity or non-normality of the data.

Finally, the study could benefit from the application of other statistical methods or approaches of analysis. The literature on value relevance is vast and researchers have applied multiple different methods to analyze the data. In addition, there is a large variety of different variables being included in previous research, as there is a possibility that the omission of variables potentially impacts the outcome of the analysis. Furthermore, as previously mentioned, the model specifications are not without flaws. The levels model could suffer from scale effects while the return model could be impacted by the accounting recognition lag and/or transitory earnings. Some prior literature has focused on these implications (e.g., Brown et al., 1999; Easton et al., 1992), however, that topic is outside the scope of this thesis. It is nonetheless important to keep in mind when making inferences from the findings.

To sum up, the main limitations are related to the data as the sample is relatively small and possibly impacted by too many mature firms and the presence of negative earnings. Additionally, the methodological approach and model specification issues could introduce certain limitations.

6.8 Summary and Discussion – Regression Analysis

The estimation results of Model 2, the levels model, indicate a statistically significant relationship between net income and the market value of equity, but the same does not hold for the book value of equity. The explanatory power of the model is low, suggesting that net income and the book value of equity in firms' annual statements are not solely able to explain fluctuations of market values, even though net income has a statistically significant effect. However, the return specification, Model 4, provides a contrary result, indicating that both variables have a significant effect on market values. However, this model also provides low explanatory power. Utilizing both a levels and return specification is done in accordance with research stating that it will ensure that the conclusions drawn from the study are robust to changes in functional form (Kothari and Zimmerman, 1995).

The use of the lagged market value of equity as a deflator in the return specification reveals a greater statistical significance between the dependent and independent variables, suggesting that there may be valuable insight for investors within the return model. Our study's findings correspond with those of previous research by Aboody, Hughes and Liu (2002), who also identify differences between the return and levels regressions. Aboody et al. (2002) argue that the levels regression is less likely to have economic significance, even if the coefficients are statistically significant. This could be explained by the fact that measurement errors are often corrected over time and hence it is assumed that market inefficiencies relate to "new information". In contrast, a return regression takes into account recent trends and can therefore better correct for inefficiencies compared to the levels regression, which reflects data accumulated since the beginning.

The levels model suggests that the book value of equity does not have a significant effect on market value, therefore rejecting Hypothesis 1, that both variables are statistically significant. In the return model however, both variables have a statistically significant association with market value, suggesting that we fail to reject Hypothesis 1. These conflicting findings lead to an inconclusive result in terms of Hypothesis 1.

When incorporating additional variables into both models, namely intangible assets and free cash flows, the results show no statistical significance of these variables and no meaningful additional explanatory power. This indicates that information regarding intangible assets and cash flows does not have a statistically significant relationship with the market values of Danish companies. These results are consistent for both the levels and return specification and hence provide a clear rejection of Hypothesis 2.

The literature review presents evidence from prior papers that intangible assets are value relevant in the "new economy" where intangible assets have become increasingly important. The fact that intangible assets seem to provide no additional value relevance in our model is surprising as a considerably large part of our sample consists of firms in intangible asset-intensive industries, such as pharmaceutical and biotechnology firms. However, our estimation results presented above are not unique. Glova and Mrázková (2018) examined the impact of intangible assets on European public companies, over the period 2011 to 2015, and conclude that they are unable to confirm their hypothesis that there is a positive significant relationship between intangible assets and market values as the estimated coefficient on intangible assets was insignificant.

The addition of a cash flow statement variable exhibits no significance or additional explanatory power to either model. These results are supported by some of the prior studies done by for instance Lev and Zarowin (1999) and Mostafa (2016). The fact that free cash flows are not significant in explaining the market value of equity could be explained by the findings of Black (1998). Black (1998) investigated the relative value relevance of earnings and cash flow measures at various stages of a firm's life cycle. The results provided evidence that cash flow measures hold more value relevance at growth stages than earnings, and that for mature firms, earnings become more valuable in terms of relevance than cash flows. As our data cleaning process entailed the removal of firms that have not been listed on the Copenhagen Stock Exchange since 2006, that is all the firms in our sample have been listed from 2006, our sample may be over-represented by mature firms. These are also the findings of Ball and Nikolaev (2022).

Neither intangible assets nor free cash flow seems to be value relevant in relation to market values of equity. The only variable that provides statistical significance in both the levels and return model is earnings. Therefore, it appears as if investors place greater emphasis on income statement figures compared to both balance sheet and cash flow values. This is consistent with findings by Mostafa (2016) who states that earnings are more relevant for valuation purposes. This statement is supported by Ball and Nikolaev (2022) as they find earnings to be better predictors of future cash flows than current cash flows.

After checking the robustness of our results, it is made clear that modifications to the deflator and model specification are proven to cause changes to the results. As the estimation results obtained from the regression analysis are highly sensitive to adjustments, it would be inaccurate to draw any definitive conclusions based on the findings.

As briefly touched upon in the summary of the regression results, it seems to be unclear what the source of value relevance, or information, models actually is. We observe that when different deflators are applied, the results we obtain vary. It is therefore possible that the deflator itself provides valuable information concerning the underlying factors that affect a firm's market value. Furthermore, the interaction between the deflator and the explanatory variables might also influence the estimation results of the regression. Therefore, it is possible that the deflator itself, or the interaction between the deflator and the explanatory variables, is providing investors with meaningful information, rather than solely the explanatory variables themselves. This might be due to the variation in information captured by different deflators. The return model, using the lagged market value of equity as a deflator, may better capture the dynamic relationship between the variables, as it reflects market perceptions. The deflator in the return model is also more closely related to the factors that drive market values than the deflator in the levels model, assets.

To summarize the analysis above, evidence from the levels specification suggests that earnings have a statistically significant association with the market value of equity, whereas the book value of equity does not. On the other hand, the returns specification results present evidence that there is a statistically significant relationship between both earnings and the book value of equity and the dependent variable, the market value of equity. These results

indicate mixed conclusions in terms of the first hypothesis presented. It holds for both model specifications that there is no statistical evidence to suggest a significant relationship between cash flows and intangible assets with the dependent variable, the market value of equity. These results imply a clear rejection of the second hypothesis. The reliability of the estimations is checked by performing robustness tests including changes to the deflator. We fail to find evidence of a robust relationship between the independent variables and the market value of equity, as the tests indicate that the results are affected by changes to important input factors. Therefore, these findings imply that drawing a definite conclusion from the estimation results can be challenging, as the origin of the value relevance of the variables is unclear. It is, however, worthwhile to note, that the return model, where the variables are deflated by the lagged market value of equity, seems to provide investors with some valuable information.

7 Fundamental Analysis

As the regression results presented previously are not robust and seem to provide little explanatory power due to the low adjusted R^2, it is hard to argue that one can use a similar model to successfully determine or forecast stock prices or estimate the value of a firm. Therefore, in terms of Hypothesis 3 it would be inaccurate to conclude that accounting numbers alone can provide an indication of whether a firm is undervalued or overvalued in the market without considering other available information sources. Thus, the analysis from the previous chapter suggests a rejection of hypothesis 3, and the evidence indicates that fundamental analysis still seems to hold importance and benefits for investors, conditional on it being able to provide an estimate reflecting the true value of the firm. Hypothesis 3 will be further investigated in this chapter.

To examine Hypothesis 3, we will perform a fundamental analysis of one of the firms in our sample, the Danish brewing company Royal Unibrew A/S, hereby referred to as Royal Unibrew. The chapter will start by explaining the link between the value relevance analysis and the fundamental analysis. Following the introduction, we present Royal Unibrew and conduct a strategic analysis of internal and external factors affecting the company's performance. Next, we perform a discounted cash flow valuation of the selected firm through three possible scenarios, representing the bearish, base, and bullish expectations of the future. Finally, we test our value estimate by conducting a sensitivity analysis on changes to important input factors followed by a summary of the findings in the fundamental analysis.

7.1 Introduction

Fundamental analysis is a method applied to assess the intrinsic value of a stock. It helps evaluate a company by examining its financial statements, assessing macroeconomic trends, and analyzing industry dynamics. Both methods, the regression model and fundamental analysis, rely on information from the financial reports published by firms. However, a possible advantage of the fundamental analysis over the regression model presented above, is that it also includes other sources of information available. In addition to accounting data, the

analysis incorporates investors' beliefs and micro- and macroeconomic factors which might lead to more reliable estimates of the firm's true value. This is also one of the disadvantages of fundamental analysis, as it is a comprehensive method that requires knowledge of accounting, finance, and economics, as well as being a time-consuming task.

As mentioned, a fundamental analysis incorporates both a strategic analysis of the firm's operational environment and a financial analysis. The strategic analysis of the micro- and macroeconomic environment is performed prior to the financial analysis as the financial forecasts build on the findings in the strategic analysis. There are various ways to perform a financial valuation, and one of those is the discounted cash flow model. The discounted cash flow model is a widely adopted method by investors to determine the true value of a firm (Demirakos et al., 2004). The connection between a discounted cash flow valuation and the value relevance literature is that the goal of both methods is to analyze what drives the value of a firm and what factors are essential in estimating a fair value. The discounted cash flow valuation is a financial model that estimates the present value of expected future cash flows based on historic accounting figures as well as expectations for the future and the value relevance literature examines how well accounting values explain market values.

The residual income model demonstrated by Ohslon (1995), which has been widely applied in various forms in the value relevance literature, is theoretically equivalent to the discounted cash flow model, but it expresses firm value in terms of accrual accounting numbers (Petersen and Plenborg, 2012, p. 219). The discounted cash flow model, on the other hand, estimates future cash flow and discounts them back using the weighted average cost of capital. The ability of the residual income model to explain cross-sectional prices is comparable to the discounted cash flow model (Lee, Myers and Swaminathan, 1999).

The goal of this section of the thesis is to estimate the true value of a representative company from our sample and compare it with the current market value of the firm. Since the market value of a firm is essentially a reflection of what investors believe to be its actual worth, it is interesting to investigate whether the discounted cash flow value estimate aligns with the capital market values. If the discounted cash flow model provides a true value of the firm that does not indicate a greatly over- or undervalued stock, it suggests that investors take other

sources of information into account besides accounting data when evaluating firms. Thus, leading the market values to reflect a similar result as the fundamental analysis. This will signal that the expectations of the future trajectory of the firm hold useful information for investors and are reflected in the market value of the firm.

As it would be extremely time consuming to perform a fundamental analysis on all the firms in our sample, we chose a single firm from the sample to evaluate. After cleaning the data used in the regression analysis, Royal Unibrew is among the firms remaining in the sample, which means it has all the information available that is needed to perform a closer analysis of the company. To ensure comparability between the fundamental analysis and the regression analysis, we adopted similar underlying assumptions, particularly concerning the historical time period examined.

7.2 Royal Unibrew

Royal Unibrew A/S, formerly known as Bryggerigruppen A/S, was founded in 1989 and is the second largest brewing company in Denmark (Capital IQ, n.d.b). The company changed their name to Royal Unibrew in 2005. As of the end of 2022, the company had 3,365 employees and their headquarters are located in Faxe, Denmark (Royal Unibrew A/S, 2022).

Royal Unibrew produces and sells both alcoholic and non-alcoholic beverages as they maintain a focus on being tailored to the needs of their customers (Royal Unibrew A/S, 2022, p. 16). Their main market is the Nordic region, but they also have strong positions in the Baltic countries, Italy, France and Canada. In addition to this, their product is sold globally in over 70 countries in total.

Royal Unibrew is considered a large-cap firm by Nasdaq Nordic and is chosen as a representative company for the Danish market. Royal Unibrew has a large amount of available public information and no missing information data in the previous regression and is hence a fitting subject for further analysis. To ensure that Royal Unibrew was representative for the sample, a regression analysis, similar to the one performed for the over-all sample

above, was conducted solely with Royal Unibrew data. As the results were similar to the ones from the overall regression on the market, we concluded that Royal Unibrew fit the criteria for the fundamental analysis.

7.3 Strategic Analysis

Prior to a financial analysis, it is important to analyze the macro- and microeconomic environment of a firm. A strategic analysis of the macro- and microeconomic factors enables financial analysts to gain a deeper understanding of a firm's financial performance relating to its overall strategy and objectives. It helps to understand the context in which a firm operates and can therefore be beneficial in identifying risks and opportunities that might impact the firm's financial performance. By achieving a deeper understanding of a firm's strategic goals, analysts can perform a more effective financial analysis as the strategic analysis serves as a foundation for the financial forecast of the firm's future outlook and reveals important factors that cannot be recognized through a financial analysis alone.

A strategic value driver can be defined as either a strategic or an operational initiative that a firm can implement to improve its value. Strategic value drivers can be industry and firm specific. The relation between strategic and financial value drivers implies that a firm's strategic and operational performance impacts its financial value drivers (Petersen and Plenborg, 2012, p. 175).

The methods adopted in analyzing the macro- and microeconomic environment a firm operates in are a PESTEL analysis and the Porter's five forces framework (Petersen and Plenborg, 2012, p. 188). The aim of a PESTEL analysis is to analyze the macroeconomic factors that may impact a firm's cash flow potentials and risk. PESTEL is an acronym for Political, Economic, Social, Technological, Environmental, and Legal which are the specific macroeconomic factors studied using the PESTEL framework (de Bruin, 2016). The microeconomic factors that can influence a firm's performance can be analyzed using the Porter's five forces framework which evaluates the drivers of profitability in an industry through five competitive forces. These five forces, threat of new entrants, supplier and

customer bargaining power, threat of substitutes, and internal competition, can give an understanding of the long-term profit potential of an industry (LIUPost, 2022; Beecham, 2022).

In the following two sub-chapters, all information is gathered from the Royal Unibrew 2022 annual report, unless something else is stated.

7.3.1 PESTEL Analysis

Political, legal, and social factors can have a great impact on firms operating in the alcohol industry. Royal Unibrew's activities are bound by national legislation in the countries it is present. Modifications in applicable legislations can impact the ability to operate for example in terms of restrictions on production, packaging, marketing, and sales or due to higher taxes on raw materials and consumption. Products that contain less sugar as well as products with no or low alcohol are now on the agenda of many governments which can affect operations. Royal Unibrew is also conscious of the global challenges formulated by WHO, regarding obesity and potential alcohol abuse.

Royal Unibrew's products are marketed and sold in markets that are usually impacted by economic cycles. Macroeconomic uncertainty, including but not limited to changes in free trade agreements, low growth over a long time, or geopolitical instability can affect earnings negatively. Royal Unibrew is currently experiencing changes in consumer behavior due to the inflationary environment as consumers use discount stores to a greater extent in their daily shopping. Royal Unibrew expects high inflation to be a challenge in 2023. Russia's invasion of Ukraine in 2022 has also caused high levels of uncertainty in all domains, which was further intensified by the energy crisis that followed. The war led to price increases of supplies as well as energy that is used in production which is a trend expected to continue in 2023.

The operations of Royal Unibrew are to a large extent dependent on the functionality of its IT systems and the quality of IT security solutions. Any prolonged system breakdown,

unintended malfunction, or unauthorized intrusion into the systems that support the sales and supply processes can involve a significant risk of interruption of Royal Unibrew's operations.

Royal Unibrew are ambitious of operating in respect to climate action and the demand for sustainable products and have a long-term sustainability strategy. Their strategy has been affected by the geopolitical situation in the world, but they are on track to deliver on their short-term targets (2022/25) as well as their long-term targets (2030). As consumers become more aware of the environmental impacts of large corporations it becomes increasingly important to behave operations in an environmentally conscious manner or else they might risk losing customers.

7.3.2 Five Forces

The threat of new entrants is considered low since start-up costs are very high as production requires a significant amount of capital. Veterans in the industry also reap scale benefits of production, which new entrants would not do right away.

The threat of substitute products and the bargaining power of customers in the beverage industry is strong due to the homogenous nature of the product market and low switching costs (Kasi, 2019). As can be seen in these times of high inflation, Royal Unibrew is impacted by consumers' decisions to choose the cheapest brands.

Competitive rivalry in the market for beer and soft drinks is tough. There is great price competition and intensive marketing from many firms. Royal Unibrew expects that their investment in digital solutions and continuous improvements across the Group will limit the negative effect from severe competition in the industry.

The bargaining power of suppliers in the beverage industry is low as there is a great number of available suppliers of raw materials for production and due to Royal Unibrew's size suppliers are incentivized to keep them as a client.

7.3.3 Summary

As expected, Royal Unibrew's main threats in today's economy are the significant increases in raw material and packaging costs and the inflationary pressure that is expected to continue in 2023. As a response to this hurdle of expenses, Royal Unibrew aims to raise its revenues in 2023 by passing some of the costs onto consumers through increased prices. However, the price increase will be somewhat limited due to the consumers heightened price sensitivity as well as the significant price rivalry in the industry. In addition, the increased costs will limit the revenue growth in the immediate future.

7.4 Financial Valuation

In the following chapter, we will perform a financial valuation of Royal Unibrew. To accomplish this, we must first reorganize the financial statements in order to distinguish the value drivers of the firm. Following the reorganization of the income statement and the balance sheet, we analyze the profitability of Royal Unibrew. Subsequently, we proceed with the forecast of the base scenario. First, the revenues are forecasted through the explicit forecasting period, then we forecast the firm's costs and balance sheet items, followed by the forecasted free cash flow. After the financial items have been forecasted, the same process is repeated in a bearish and bullish scenario. The forecasts are followed by a calculation of the weighted average cost of capital, the terminal value and ultimately the enterprise and equity value. The valuation is concluded with a sensitivity analysis followed by a brief summary of the analysis.

7.4.1 Reorganizing the Financial Statements

In order to analyze Royal Unibrew's financial statements, it is necessary to distinguish between accounting items that belong to operating activities and separate them from financial items. The core operating activities is what creates value in the firm (Petersen and Plenborg, 2012, p. 70). Reorganizing the income statement and the balance sheet gets us to the analytical financial statements that are used for further analysis.

7.4.1.1 Income Statement

The income statement requires three main adjustments. Firstly, financial income and expenses should be removed. Secondly, non-operating income derived from assets that are not part of the invested capital should also be excluded. Lastly, taxes must be recalculated based only on operational items that are included in the reorganized income statement (Koller et al., 2020, p. 208-209). In addition to this, special, non-recurring items need to be excluded from further analysis as these are not part of the core operations and are hard to forecast. After these adjustments are made, we arrive at NOPAT (net operating profit after tax) which is further used in the cash flow model.

7.4.1.2 Balance Sheet

For the reorganization of the balance sheet, it is likewise important to separate between financial and operating items. After reorganizing the balance sheet, one is left with invested capital that is also used in the free cash flow analysis. The formula used to arrive at a company's invested capital is according to Koller et al. (2020, p. 206):

$$Invested\ capital = Operating\ assets - Operating\ liabilities$$

Hence, we have made the distinction between which posts are used in the company's operations and what balance sheet items are considered financial. For further information, both the reorganized balance sheet and income statement are displayed in the appendix.

7.4.2 Profitability Analysis

Profitability analysis is a critical aspect of evaluating the financial health of a firm and is therefore a key area of financial analysis (Petersen and Plenborg, 2012, p. 93). A company's ability to generate profit is essential for its long-term success and sustainability. It is also important for firms to ensure a satisfactory return to its shareholders, which is dependent on their ability to create value and profit. In order to study a firm's historic performance and profitability, many metrics are applied. Two of the important aspects to investigate is the firm's revenue development and their return on invested capital (ROIC) (Koller et al., 2020). Revenue development provides insight into a company's ability to generate income over time,

while ROIC is a measure of how effectively the company is utilizing its capital to generate profits. In this chapter we will delve into these metrics to obtain knowledge on Royal Unibrew's historic performance. Section 7.4.1 introduced the reorganized income statement and balance sheet, which serve as the foundation for the profitability analysis. The analytical financial statements can be found in the appendix.

7.4.2.1 Revenue Development

Firstly, we will delve into the revenue development of Royal Unibrew over the historic period. By evaluating a company's revenue growth over time, we can identify trends and patterns that help us to understand the company's overall financial performance.

The figure below is a representation of Royal Unibrew's revenue over the historic period in addition to the revenue growth.

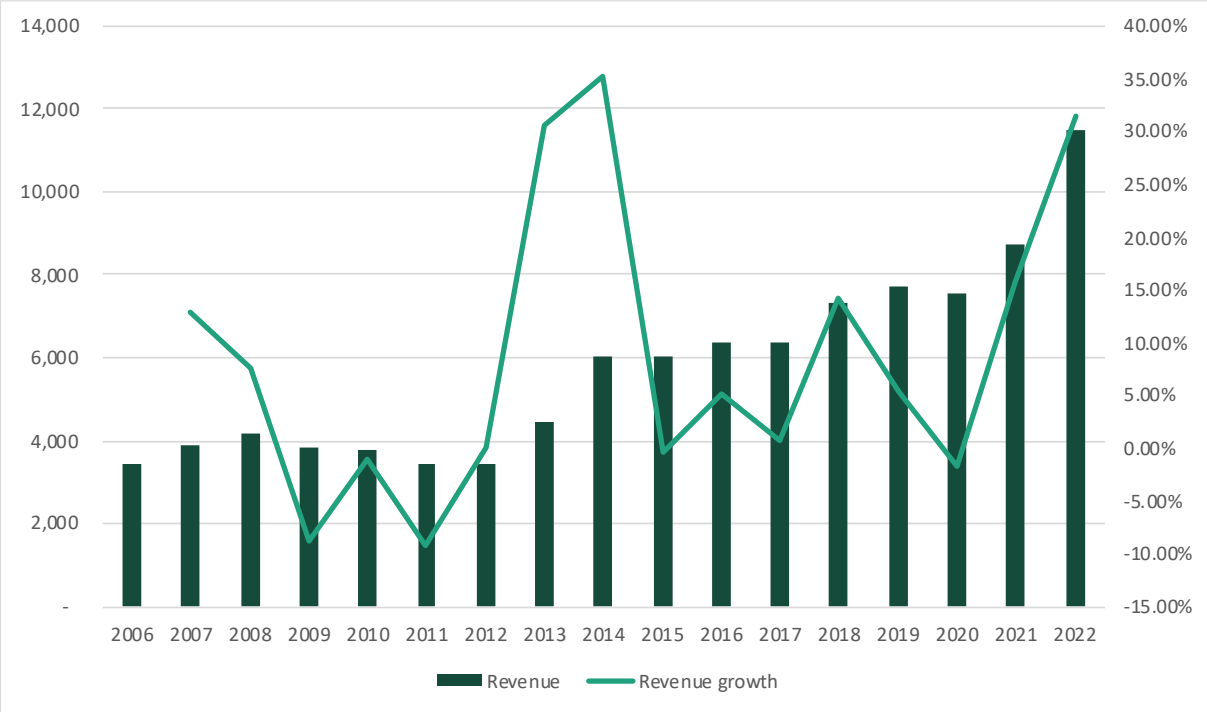

Figure 3: Revenue development (Own creation based on data from Royal Unibrew 2006-2022 annual reports)

As can be seen in Figure 3, the growth in revenue was at its weakest during and after the financial crisis in 2008. Royal Unibrew experiences negative revenue growth from 2009 until 2012, but the trend started to shift thereafter. The largest spike in revenue growth happened in

2014, with a growth of 35.15 percent, following the company's large Oy Hartwall acquisition. In 2020 there is a clear decrease in the revenue growth of the company, caused by the Covid-19 pandemic and economic uncertainty. However, the company seems to have swiftly recovered from the setback and achieved a notable 31.34 percent increase in revenue in 2022, indicating their sustained profitability. During the whole historic period, from 2006 till 2022, the company has experienced a 234 percent growth in their revenue.

7.4.2.2 Return on Invested Capital

Next, we will examine the return on invested capital, a highly important measure of a company's profitability (Koller et al., 2020). According to Koller et al. (2020, p. 17), creating value for a company occurs when it generates a return on invested capital that exceeds its opportunity cost of capital. Through this analysis, we can gain a deep understanding of a company's financial health and its ability to generate sustainable profits over the long-term.

The formula for the return on invested capital is (Koller et al., 2020):

$$ROIC = \frac{NOPAT}{Invested\ Capital}$$

The measure of ROIC can also be divided into profit margin and turnover rate of invested capital to get a better understanding of what drives the return:

$$Profit\ margin = \frac{NOPAT}{Net\ revenue}$$

$$Turnover\ rate\ of\ IC = \frac{Net\ revenue}{Invested\ capital}$$

The profit margin refers to the relationship between revenue and expenses and represents operating income as a percentage of net revenue (Petersen and Plenborg, 2012, p. 107). A higher profit margin indicates that a company is generating more profit for each dollar of revenue it earns. It is an essential metric for investors to evaluate a company's financial health

and sustainability, as it provides insight into the company's ability to manage its costs and pricing.

The turnover rate of invested capital is a measure of how efficiently a company is using its invested capital to generate revenue (Petersen and Plenborg, 2012, p. 108). A higher turnover rate indicates that a company is generating more revenue for each dollar of capital invested. It is an important metric for investors to assess the effectiveness of a company's capital allocation and to evaluate its ability to generate sustainable profits.

The following figure displays Royal Unibrew historic return on invested capital as well as the metrics ROIC is made up of, profit margin and the turnover rate of invested capital.

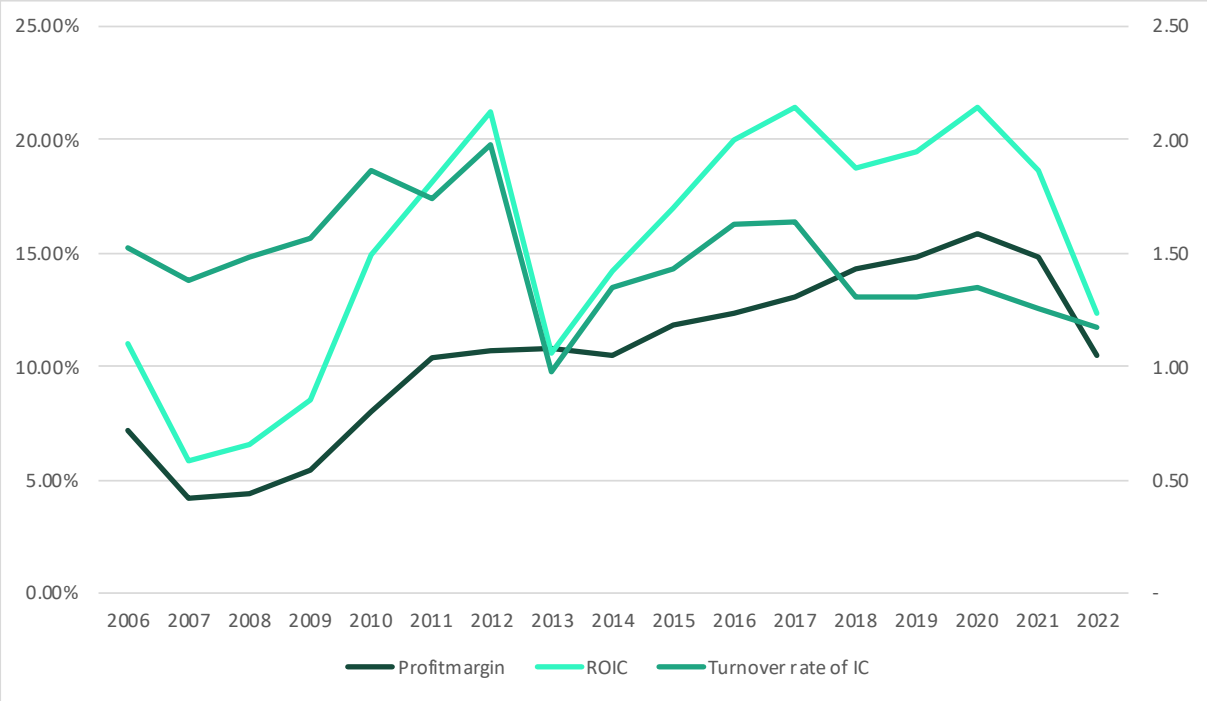

Figure 4: Historic return on invested capital (Own creation based on data from Royal Unibrew 2006-2022 annual reports)

The graph indicates an overall increase in the return on invested capital over the historic period. However, there is a clear decrease in the ROIC in 2013 as well as recently in 2022. In 2013 this decline is driven by a decrease in the turnover rate of invested capital, whereas in 2022 it is mainly due to a decreased profit margin. As previously mentioned, Royal Unibrew made a large acquisition in 2013, leading to a steep increase in the company's invested capital (Royal Unibrew A/S, 2013). The decrease in profit margin in 2022 is coherent with the rising

inflation seen in the market, which is leading to higher expenses for the firm (Nationalbanken, 2022).

7.4.2.3 Summary

In summary, despite economic turmoil over the historic period, Royal Unibrew has managed to remain profitable in the long term. Their revenue has been increasing from 2006 until 2022, even though the company has experiences dips in growth mainly due to overall economic situations. Royal Unibrew's return on invested capital has also experienced some fluctuations but has nevertheless grown over the historic period. This implies that the company has healthy financial outlooks, and that it has the possibility of creating return for their investors in the future.

7.4.3 Forecast – Base Scenario

7.4.3.1 Forecasting Revenue

To forecast revenue, we have divided the figure into volume and revenue per hl. This is done to better reflect where the growth stems from and to better predict future values. The average growth rate of volume over the historic period is 5.35 percent and is set as the base for 2023. This growth rate will be sustained by the company's focus on sustainable products, innovation, and technological improvement. However, the growth rate is not assumed to remain this high over the forecasting period, as it will naturally stabilize at a lower growth rate towards the terminal period. Hence there will be a yearly 0.5 percent decrease until the growth rate in volume normalizes at 3.35 percent in 2027.

According to their 2022 annual report, Royal Unibrew is aiming at a net revenue of between DKK 13,000m and 14,000m in 2023. As it is assumed that their prediction is rather overly optimistic than pessimistic, we set net revenue to DKK 13,000m in 2023. This results in a revenue per hectoliter in 2023 of DKK 920.90 which is a 7.4 percent increase from 2022. As we are currently in a period of high inflation, prices are increasing globally and high growth in revenue per hectoliter in 2023 is expected. Royal Unibrew has also stated that they will increase the prices of their products in 2023 in line with the market developments. However, the average growth rate in revenue per hectoliter over the historic period is 3.08 percent and it

is assumed that their long-term growth rate in revenue per hectoliter will stabilize somewhere closer to this. For this reason, the revenue per hectoliter is expected to steadily decrease over the forecasting period until it stabilizes at 3 percent in 2026. Lastly, the revenue per hectoliter is multiplied by the total volume to get to the total revenue for the year.

7.4.3.2 Forecasting Costs

PRODUCTION COSTS

As with revenue, the production costs are separated into volume and cost per hectoliter. The volume produced in the forecasting period will be the same as previously calculated and hence the basis of the revenue and production cost forecasts will be the same. The average growth rate in production costs per hectoliter over the historic period has been 4.69 percent. From the strategic analysis, it is known that Royal Unibrew is exposed to risks associated with the raw materials and energy used in its production. Since 2023 is a period characterized by high inflation and an increased overall price level in the market (European Commission, 2023), we think the growth in 2023 will be somewhat higher than this and set it to an average +0.5 percent. This is still a decrease from the abnormally high growth in 2022, which is in line with inflation expectations made by the Danish national bank (Nationalbanken, 2022). This higher level of costs is not expected to continue over the entire forecast period (European Commission, 2023), and the growth in production costs per hectoliter is set to decrease slowly and stabilize at around 3 percent. The production costs per hectoliter are multiplied by the total volume to get to the total production cost for the year.

SALES AND DISTRIBUTION EXPENSES

The sales and distribution expenses are forecasted as a percentage of revenue. Analyzing the trend over the historic period one can see a decreasing trend. The post has decreased by on average 0.68 percent each year. This decreasing trend has been consistent over the historic period and is expected to continue into the forecasted years.

ADMINISTRATIVE EXPENSES

The administrative expenses are, similar to the sales and distribution expenses, calculated as a percentage of revenue. Also in this post, we notice a decreasing trend, of 0.13 percent.

Although not as impactful as the decrease in sales and distribution expenses, it is still expected to follow into the forecasting period.

DEPRECIATION AND AMORTIZATION

Depreciation as a percentage of tangible and intangible assets has on average been approximately 5.25 percent in the last years. Royal Unibrew's annual reports do not state any expected changes to their depreciation standards in the nearby future and we hence expect this percentage to remain stable at the average in the forecasting period.

TAXES

The effective tax rate of Royal Unibrew in Denmark has remained fairly consistent with the country's corporate tax rate of 22 percent. For this reason, the corporate tax rate is set as the expected tax rate in the forecasting period.

NET FINANCIAL EXPENSES – INTEREST RATE

Financial expenses are divided by the firm's total interest-bearing liabilities to get to the interest rate for the historic period. It is clear that the interest rate is higher early in the historic period and that it has decreased towards 2022. As we know that we are in a period of high inflation in the market and that interest rates are continuously increasing we expect the rate to grow somewhat over the coming years (Nationalbanken, n.d.). The average interest rate over the historic period is 3.63 percent and we expect it to increase yearly and stabilize when it reaches the average. Hence, we have added a 0.5 percent increase for the next couple of years before it normalizes at 3.63 percent.

FORECASTED INCOME STATEMENT

The above estimations lead to the following forecasted income statement for both the explicit forecast period and the terminal year.

mDKK	Forecast					Terminal
INCOME STATEMENT	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
Net revenue	13,000	14,370	15,508	16,588	17,658	18,796
Production costs	- 7,087	- 7,779	- 8,458	- 9,108	- 9,713	- 10,359
Gross profit	**5,913**	**6,591**	**7,051**	**7,481**	**7,945**	**8,438**
Sales and distribution expenses	- 2,945	- 3,158	- 3,303	- 3,421	- 3,522	- 3,749
Administrative expenses	- 453	- 482	- 500	- 513	- 523	- 556
EBITDA	**2,516**	**2,951**	**3,248**	**3,547**	**3,900**	**4,133**
Depreciation and amortisation	- 624	- 689	- 744	- 796	- 847	- 902
EBIT	**1,892**	**2,262**	**2,504**	**2,751**	**3,053**	**3,231**
Income tax	- 416	- 498	- 551	- 605	- 672	- 711
Tax shield on net financial expenses	- 23	- 30	- 38	- 41	- 43	- 46
NOPAT	**1,453**	**1,734**	**1,916**	**2,105**	**2,338**	**2,474**
Net financial expenses	**- 105**	**- 137**	**- 171**	**- 188**	**- 197**	**- 210**
Tax shield on net financial expenses	23	30	38	41	43	46
Net financial expenses after tax	**- 82**	**- 107**	**- 133**	**- 147**	**- 154**	**- 164**
Net earnings	**1,371**	**1,627**	**1,782**	**1,958**	**2,184**	**2,310**

Table 8: Forecasted income statement - base scenario (Own creation based on data from Royal Unibrew 2006-2022 annual reports)

7.4.3.3 Forecasting Balance Sheet Items

NON-CURRENT ASSETS

In 2013 Royal Unibrew acquired a company called Oy Hartwall Ab, hence we see a large increase in non-current assets between 2012 and 2013 (Royal Unibrew A/S, 2013). In the years following the acquisition, non-current assets as a percentage of revenue have been fairly stable. In order to stay competitive in the market, it is essential to invest in both intangible and tangible assets, which implies the necessity of maintaining a consistent proportion of investment. For this reason, we take an average of the years after the acquisition to obtain a more accurate value of the non-current assets.

INVENTORIES

Inventories as a percent of revenue have had an increasing trend of approximately 0.16 percent over the historic period. We expect inventories to increase in the same manner over the forecasting period.

CASH AND CASH EQUIVALENTS

When reorganizing the balance sheet, up to 2 percent of revenue was considered operating in accordance with Koller et al. (2020). If the sum of cash and cash equivalents exceeded that amount, the rest was considered excess cash and will be classified as financial. It is assumed that the same 2 percent of revenue will hold for operating cash in the forecast period.

OPERATING LIABILITIES

As with inventories, operating liabilities as a percentage of revenue have portrayed an increasing trend over the historic period. The post has increased by an average of 1 percent yearly and the increase is expected to continue in the forecast period.

NET INTEREST-BEARING LIABILITIES

Net interest-bearing liabilities are calculated as a percentage of invested capital. The liabilities are somewhat volatile and have been between 22.29 and 79.57 percent. Because of the volatility, we use an average of the years to estimate the item in the forecasting period. Net interest-bearing liabilities are hence set as 44.02 percent of invested capital.

OTHER BALANCE SHEET ITEMS

For the remaining balance sheet items, receivables, prepayments and net working capital, an average of the historic period is used as a basis for the forecasted years. All the items are calculated as a percentage of revenue.

FORECASTED BALANCE SHEET

By applying the aforementioned value drivers, we end up with the following forecasted balance sheet:

mDKK			Forecast			Terminal
BALANCE SHEET	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
Non-current assets	**11,884**	**13,136**	**14,177**	**15,164**	**16,142**	**17,182**
Inventories	1,393	1,563	1,711	1,856	2,003	2,133
Receivables	1,313	1,452	1,567	1,676	1,784	1,899
Prepayments	80	88	95	102	109	116
Cash and cash equivalents	260	287	310	332	353	376
Current assets	**3,047**	**3,390**	**3,683**	**3,966**	**4,249**	**4,523**
Total assets	**14,930**	**16,526**	**17,860**	**19,130**	**20,391**	**21,706**
Operating liabilities	5,387	6,102	6,745	7,385	8,042	8,561
Net working capital	- 1,475	- 1,631	- 1,760	- 1,882	- 2,004	- 2,133
Invested Capital	**9,543**	**10,424**	**11,115**	**11,745**	**12,349**	**13,145**
Net-interest-bearing debt (NIBD)	4,201	4,588	4,892	5,170	5,435	5,786

Table 9: Forecasted balance sheet - base scenario (Own creation based on data from Royal Unibrew 2006-2022 annual reports)

7.4.3.4 Forecasted Cash Flows

By forecasting both the income statement and balance sheet items, we are able to get to the firm´s free cash flow for the forecasting period and the terminal year. After deducting investments from earnings, the remaining amount available to investors will be displayed in the free cash flow (Koller et al., 2020, p. 30). The free cash flow does not take into account cash flows from non-operational activity. The formula for calculating the free cash flow is as follows:

$$FCFF = NOPAT + Depreciation\ \&\ Amortization - Changes\ in\ Net\ Working\ Capital - Investments$$

Applying this formula gives us the following FCFF for Royal Unibrew. The FCFE is also displayed.

mDKK	Forecast					Terminal
FREE CASH FLOW	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
NOPAT	1,453	1,734	1,916	2,105	2,338	2,474
Depreciation and amortisation	624	689	744	796	847	902
Changes in net working capital	911	155	129	123	121	129
Investments	- 1,159	- 2,285	- 2,078	- 2,066	- 2,108	- 2,217
Free cash flow to firm	**1,828**	**294**	**711**	**958**	**1,198**	**1,288**
Changes in net interest-bearing debt	- 394	388	304	277	266	350
Net financial expenses	- 105	- 137	- 171	- 188	- 197	- 210
Tax shield	23	30	38	41	43	46
Free cash flow to equity	**1,353**	**574**	**882**	**1,088**	**1,310**	**1,475**
Dividends	- 1,353	- 574	- 882	- 1,088	- 1,310	- 1,475
Cash surplus	-	-	-	-	-	-

Table 10: Forecasted free cash flow - base scenario (Own creation based on data from Royal Unibrew 2006-2022 annual reports)

7.4.4 Scenario Analysis

As there are conflicted opinions on how the global economy will evolve in the near future, we have constructed a total of three possible scenarios. This will provide a better understanding of how the assumptions and expectations of the future impact the value estimate and will, to some degree, model for the uncertainty in the market. In addition to the base scenario, we have created both a bullish and bearish scenario, considering varying perspectives on key input factors, where the bullish scenario represents an optimistic outlook of the economy's evolvement while the bearish scenario represents a pessimistic outlook.

7.4.4.1 Bearish Scenario

As of 2023, Denmark's, as well as the global, economy is facing several difficulties that might have an impact on its prospects for future growth. By the end of 2022, inflation numbers in Denmark were the highest they have been in over 40 years (Nationalbanken, 2022). The inflation was at 8.6 percent in 2022, but it is expected to decrease somewhat over the next couple of years. However, the high inflation is still of great concern to both Denmark and

nations all around the world. As a result of this, consumer prices as well as the firms' production costs are increasing which could contribute to limited profitability and investment opportunities.

In the base scenario, a cost increase is incorporated, but this might not fully reflect the impact of the ongoing economic situation. Hence, in our bearish scenario, we anticipate that the economic recession will have a more pronounced negative impact on the company compared to the base scenario. This will lead to higher cost levels for the firm and their production costs will exhibit higher growth than in our base scenario. In addition to the cost growth being higher at the start of the forecasting period, the extraordinary increase will be stickier and hence decrease in a slower fashion. This results in the production cost per hectoliter normalizing at a higher level compared to the base scenario.

As for revenue, we believe the firm will not be able to reach its 2023 target revenue of DKK 13,000m – 14,000m, as the overall purchasing power of its customers will decrease. This, in conjunction with increased raw material prices, will result in the company not being able to reach the same level of volume growth as expected.

mDKK	Forecast					Terminal
FREE CASH FLOW	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
NOPAT	995	1,293	1,501	1,587	1,653	1,617
Depreciation and amortisation	576	636	686	723	755	788
Changes in net working capital	602	367	343	297	286	162
Investments	63	- 2,077	- 1,893	- 1,611	- 1,529	- 1,571
Free cash flow to firm	**2,237**	**219**	**638**	**996**	**1,166**	**996**
Changes in net interest-bearing debt	- 823	345	271	176	140	206
Net financial expenses	- 94	- 123	- 153	- 166	- 171	- 178
Tax shield	21	27	34	36	38	39
Free cash flow to equity	**1,341**	**468**	**789**	**1,043**	**1,172**	**1,063**
Dividends	- 1,341	- 468	- 789	- 1,043	- 1,172	- 1,063
Cash surplus	**-**	**-**	**-**	**-**	**-**	**-**

Table 11: Forecasted free cash flow - bearish scenario (Own creation based on data from Royal Unibrew 2006-2022 annual reports)

7.4.4.2 Bullish Scenario

In contrast to the bearish scenario, the bullish one will portray a more positive view of the economic situation today, and in the future. As it is difficult to anticipate what direction the economy is heading, we want to account for a future where the global situation recovers quicker than envisioned.

Despite the challenges elaborated on in the bearish scenario, there are also causes for optimism regarding Denmark's economic future. For instance, the nation has a highly educated workforce and lower unemployment rates than most other European countries (Nationalbanken, 2022). In addition to this, the country has a robust social welfare system and a history of innovation. The Danish government have also put in place a number of initiatives to promote investments, specifically in sustainable products and production as well as digital transitions (European Commission, n.d.).

The bullish scenario will build upon a less severe growth in inflation and hence prices. This means that the production costs per hectoliter in the bullish scenario will increase by less than in the base and bearish scenarios. The cost increase in 2023 will also steadily decrease as in our base case.

Since the cost level in the market will not increase by as much as feared, the company will be able to produce higher volumes. The company will be able to maintain investments in important projects and in return be able to sustain a higher growth in volume compared to the two other scenarios. This is supported by increased purchasing power in the population and will enable the firm to reach its preferred revenue of DKK 14,000m for 2023.

mDKK	Forecast					Terminal
FREE CASH FLOW	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
NOPAT	1,859	2,535	3,007	3,421	3,913	4,314
Depreciation and amortisation	672	786	881	970	1,063	1,164
Changes in net working capital	936	571	536	540	590	454
Investments	- 2,355	- 3,545	- 3,202	- 3,129	- 3,321	- 3,603
Free cash flow to firm	**1,112**	**347**	**1,223**	**1,803**	**2,244**	**2,329**
Changes in net interest-bearing debt	- 71	706	566	505	516	650
Net financial expenses	- 113	- 156	- 202	- 229	- 248	- 271
Tax shield	25	34	44	50	54	60
Free cash flow to equity	**953**	**931**	**1,631**	**2,129**	**2,567**	**2,767**
Dividends	- 953	- 931	- 1,631	- 2,129	- 2,567	- 2,767
Cash surplus	**-**	**-**	**-**	**-**	**-**	**-**

Table 12: Forecasted free cash flow - bullish scenario (Own creation based on data from Royal Unibrew 2006-2022 annual reports)

7.4.5 Cost of Capital: WACC

To be able to discount the forecasted cash flows, a weighted average cost of capital is calculated by using the following formula:

$$WACC = \frac{E}{NIBD + E} * R_E + \frac{NIBD}{NIBD + E} * R_D * (1 - t)$$

7.4.5.1 Capital Structure

To accurately reflect the opportunity cost of investors and lenders, the capital structure is determined using the market values of equity and debt (Plenborg and Kinserdal, 2021, p. 299). As the market value of equity often differs from its book value, we have used the MVE collected from Capital IQ. According to Penman (2013, p. 116), book values may be a reliable approximation for debt, since it is commonly recorded in the balance sheet with a value that closely aligns with its market value. The result of these calculations is an equity ratio of 84.02 percent and a debt ratio of 15.98 percent.

7.4.5.2 Risk-Free Rate

A long-term government bond is considered to be the asset that comes closest to being risk-free (Plenborg and Kinserdal, 2021, p. 304). Royal Unibrew is a Danish company, conducting the majority of its business in Denmark and reports its financial statements in Danish Krone. Consequently, the most appropriate government bond to use as a risk-free rate is the Danish one. The risk-free rate used is an average of the yield on Danish government bonds over the historic period.

7.4.5.3 Beta

The beta measures an asset's level of risk in relation to market risk, providing insight into a company's level of exposure to systematic risk. Since the value of beta cannot be directly observed, it is calculated by performing a regression of historic Royal Unibrew stock prices relative to the Danish market index (OMXC20). Koller et al. (2020, p. 298) recommend that at least 60 data points are included, and that the regression is based on monthly returns. For this reason, we have regressed the last 5 years of monthly stock returns on the OMXC20 index. This results in a beta of 0.92 with a 95 percent confidence interval of ±0.4.

7.4.5.4 Market Risk Premium

The market risk premium is a reflection of the additional return expected by an investor for holding risky assets. There are various methods available for determining the market risk premium, such as assessing historical risk premiums in the market. According to Koller et al. (2020, p. 311), the quality of the estimated market risk premium is increased by additional data. For this reason, the premium is determined by looking at several different historic estimations of the premium. Plenborg and Kinserdal (2021, p. 322) provide a list of historic premiums between 2012 and 2019 in Denmark, which averages 5.68 percent. Research done by PriceWaterhouseCooper on the market risk premium in Denmark in 2020 determined that the average premium amounted to 5.8 percent (PwC, 2020). This is consistent with data from Statista that states a market risk premium of 5.8 percent as of 2022 (Statista, 2022). Saabye (2003) looked at the historic premium in Denmark between 1970 and 2002 and ended with an estimate of 5.2 percent. New data from Damodaran (2023) states that the current market risk

premium in Denmark is somewhat higher at 5.94 percent. For this thesis, an average of these estimations is used, hence the market risk premium is calculated to be 5.68 percent.

7.4.5.5 Return on Equity

The return on equity can be obtained by plugging in the values from the previous calculations into the CAPM formula:

$$R_E = 1.86\% + 0.92 * 5.68\% = 7.10\%$$

7.4.5.6 Cost of Debt

Plenborg and Kinserdal (2021, p. 323) use the following formula to calculate the required rate of return on debt:

$$R_D = \left(R_f + R_s\right) * (1 - t)$$

For this, information on Royal Unibrew's credit spread, or risk premium on debt, is needed. Since no official credit rating of Royal Unibrew is available, the credit ratings of the company's closest competitors are used as a basis. We have looked into credit ratings done by Moody's Investor Service and Fitch Group, two of the largest agencies performing such ratings. Based on the ratings given for Carlsberg, Heineken and Anheuser Inbev, we have found Royal Unibrew's credit spreads using a credit spread table from 2023 created by Damodaran (Damodaran, 2023). Carlsberg and Heineken have received Baa2/BBB ratings while Anheuser-Busch InBev has received an A3/A- rating (Anheuser-Busch InBev, n.d.; Carlsberg Group, n.d.; Heineken, n.d.). An average of the competitors results in a credit spread of 1.87 percent which we use as a fair estimate of the expected spread for Royal Unibrew.

>	≤ to	Rating is	Spread is
-100000	0.199999	D2/D	20.00%
0.2	0.649999	C2/C	17.50%
0.65	0.799999	Ca2/CC	15.78%
0.8	1.249999	Caa/CCC	11.57%
1.25	1.499999	B3/B-	7.37%
1.5	1.749999	B2/B	5.26%
1.75	1.999999	B1/B+	4.55%
2	2.2499999	Ba2/BB	3.13%
2.25	2.49999	Ba1/BB+	2.42%
2.5	2.999999	Baa2/BBB	2.00%
3	4.249999	A3/A-	1.62%
4.25	5.499999	A2/A	1.42%
5.5	6.499999	A1/A+	1.23%
6.5	8.499999	Aa2/AA	0.85%
8.50	100000	Aaa/AAA	0.69%

Table 13: Credit spread (Damodaran, 2023)

The cost of debt is hence estimated in the following way:

$$R_D = (1.86\% + 1.87\%) * (1 - 22\%) = 2.92\%$$

7.4.5.7 Summary

Finally, we add this data together to calculate the weighted average cost of capital.

$$WACC = 84.02\% * 7.10\% + 15.98\% * 2.92\% * (1 - 22\%) = 6.33\%$$

7.4.6 Terminal Value

According to Kaldestad and Møller (2016, p. 50), creating long-term forecasts will, in addition to being impractical, result in a large amount of uncertainty. Therefore, when estimating cash flows and considering value creation beyond the explicit forecast period, it is common practice to use a terminal value. This terminal value assumes that all items will grow at the same rate in the future and that the company has reached a steady state environment

(Plenborg and Kinserdal, 2012, p. 177). Although no company can grow indefinitely, the terminal value is a solution to a complex problem, as noted by Plenborg and Kinserdal (2012, p. 214). The Gordon's growth formula is typically used to calculate the terminal value:

$$Terminal\ value = \frac{FCF_{n+1}}{WACC - g}$$

The growth rate used in Gordon's growth formula has important implications for the outcome of the valuation. From the strategic and profitability analysis, it is known that Royal Unibrew has a track record of profitability. In addition, the company has competitive advantages over new entrants as the barriers to entering the industry are significant mainly caused by the high need for initial investments.

Similar to other companies in the industry, Royal Unibrew has been affected by the geopolitical situation and the ongoing crisis in Ukraine. However, from the strategic analysis, we know that Royal Unibrew is on track to deliver on its short- and long-term goals despite these difficulties. It is also known that some of the company's competitors have higher stakes in countries affected by the war and are hence more heavily impacted by the war. For example, around 13 percent of Carlsberg's revenue and about 9 percent of its operating profit in 2021 came from the Russian and Ukraine markets (Carlsberg Group A/S, 2021). Royal Unibrew had limited business activity in Russia and shut down their import and export quickly following the news of the invasion (Royal Unibrew, 2022). The leading Western player in Russia is Carlsberg, followed by AB InBev and Heineken (Reuters, 2022).

Companies that are in a mature phase of growth tend to be linked to the overall economic growth. As seen in the profitability analysis, Royal Unibrew's main periods of decrease in growth has been due to overall economic situations. According to the Organization for Economic Cooperation and Development (OECD), global GDP growth is expected to be around 2.5 percent per annum until 2060, although this projection is subject to uncertain assumptions given the unpredictability of the future (OCED, 2021). Despite the uncertainty, this estimate suggests that Royal Unibrew may benefit from the growth in the global

economy. Because of overall profitability in the industry as well as the impact of competitive advantages, we set the long-term growth rate to 3 percent.

This growth rate and the WACC calculated above results in the following terminal value for our base scenario:

$$Terminal\ value = \frac{1{,}288.16}{6.33\% - 3\%} = 38{,}689.75$$

7.4.7 Getting to Value of Equity

Moving forward, the forecasted free cash flows have to be discounted back using the weighted average cost of capital. Summing up the discounted cash flows from the explicit forecast period and adding the terminal value gives us the company's enterprise value. The enterprise value reflects the value of the whole company, both attributable to share- and debtholders.

$$Enterprise\ value = \sum_{t=1}^{n} \frac{FCFF_t}{(1 + WACC)^t} + \frac{FCFF_{n+1}}{WACC - g} * \frac{1}{(1 + WACC)^n}$$

To be able to compare the valuation estimate to market values we must calculate the company's equity value which is the amount owned by the shareholders (Koller et al., 2020, p. 335). The equity value of the company is equal to the enterprise value net of the interest-bearing debt. To make the discounted cash flow valuation in line with the value relevance regression analysis, we use the market value of equity as our final value estimate. One can also proceed to calculate the value per share and compare this to the stock price in the market, which would have given the same conclusion. Below we display the final estimate for all the three scenarios calculated.

Bearish scenario	
Present value of FCF - explicit period	4,464,719,453
Present value of the terminal value	22,008,425,086
Enterprise value	**26,473,144,539**
Net interest bearing debt	4,595,000,000
Equity value	**21,878,144,539**
Market value of equity 01.03.2023	25,010,016,192
Downside	-12.5%
Number of shares outstanding	50,200,000
Value per share	436
Share price 01.03.2023	504

Table 14: Value of equity - bearish scenario

Base scenario	
Present value of FCF - explicit period	4,201,529,329
Present value of the terminal value	28,466,106,815
Enterprise value	**32,667,636,144**
Net interest bearing debt	4,595,000,000
Equity value	**28,072,636,144**
Market value of equity 01.03.2023	25,010,016,192
Upside	12.2%
Number of shares outstanding	50,200,000
Value per share	559
Share price 01.03.2023	504

Table 15: Value of equity - base scenario

Bullish scenario	
Present value of FCF - explicit period	5,431,079,359
Present value of the terminal value	51,456,167,694
Enterprise value	**56,887,247,053**
Net interest bearing debt	4,595,000,000
Equity value	**52,292,247,053**
Market value of equity 01.03.2023	25,010,016,192
Upside	109.1%
Number of shares outstanding	50,200,000
Value per share	1,042
Share price 01.03.2023	504

Table 16: Value of equity - bullish scenario

From the three scenarios, we get a valuation range of DKK 21,878m – DKK 52,292m. As made clear by the estimations, a more positive economic outcome will lead to a larger deviation from the base scenario than our estimated bearish scenario. This could be explained by the base scenario already being largely impacted by a downturn in the global economy and increased inflation levels. A bearish scenario will hence lie closer to the reality portrayed in the base scenario than the bullish scenario, as the latter is often characterized by strong growth and low inflation.

7.4.8 Sensitivity Analysis

As previously mentioned, there is a significant degree of uncertainty involved in estimating future accounting figures, which in turn affects the process of valuing a company. To look further into the effects of changes in the input factors of the valuation, a sensitivity analysis has been performed.

7.4.8.1 Revenue and Production Cost

Volume is the driver for both revenue and production cost, therefore it poses great importance for the final value estimate of the company. The volume produced by the company depends on multiple unpredictable factors which makes the estimate uncertain. In order to investigate the consequence of these uncertainties, the effects of a 1 percent increase and decrease in the volume growth are portrayed below.

In addition to volume, the revenue received per hectoliter will also have implications for the value estimate. This value holds great uncertainty at a time when prices are steadily increasing to offset the increased raw material cost in the market. A slight change in price levels will have a greater impact compared to a minor change in volume, as the latter will affect both the revenue and cost. To determine the effects of such changes, a sensitivity analysis was conducted by increasing and decreasing the price growth by 1 percent.

As previously mentioned, the cost to produce goods is rapidly rising in the current global economy. However, it is difficult to predict how the economy will develop in the long term and it is therefore useful to see how a change in the cost per hectoliter would change the

outcome of our analysis. The growth in the cost is changed by 1 percent upwards and downwards, and we get the following results. The impact on the market value of equity is shown in DKK million.

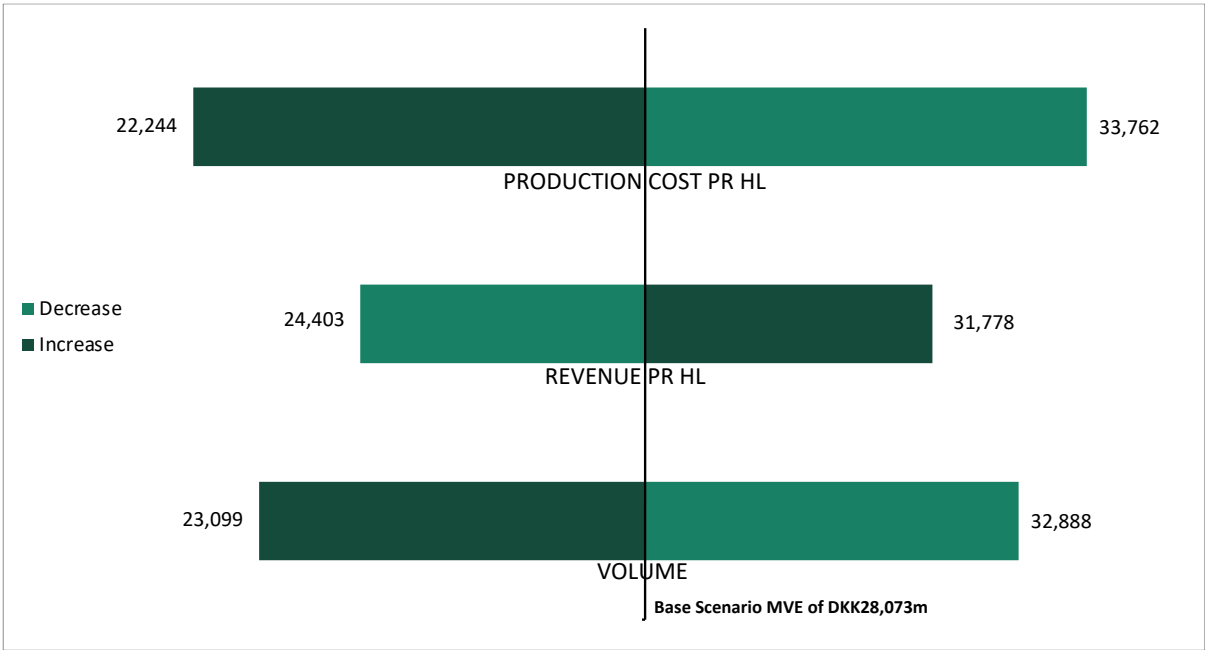

Figure 5: Sensitivity analysis of revenue and production cost

7.4.8.2 Risk-Free Rate

In order to discount the cash flows the DCF model uses a weighted average cost of capital. This discount factor is significantly influenced by the risk-free rate. However, this rate can be impacted by unforeseen macroeconomic events, which makes it challenging to predict its long-term trajectory. To calculate the risk-free rate, we analyzed the historic data from 2006 until 2022, which fluctuated between -0.1 and 4.3 percent. To determine the effect of these changes, we will examine how the firm value varies when the risk-free rate is adjusted within this range. The results are displayed in the graph underneath where the market values are in DKK million.

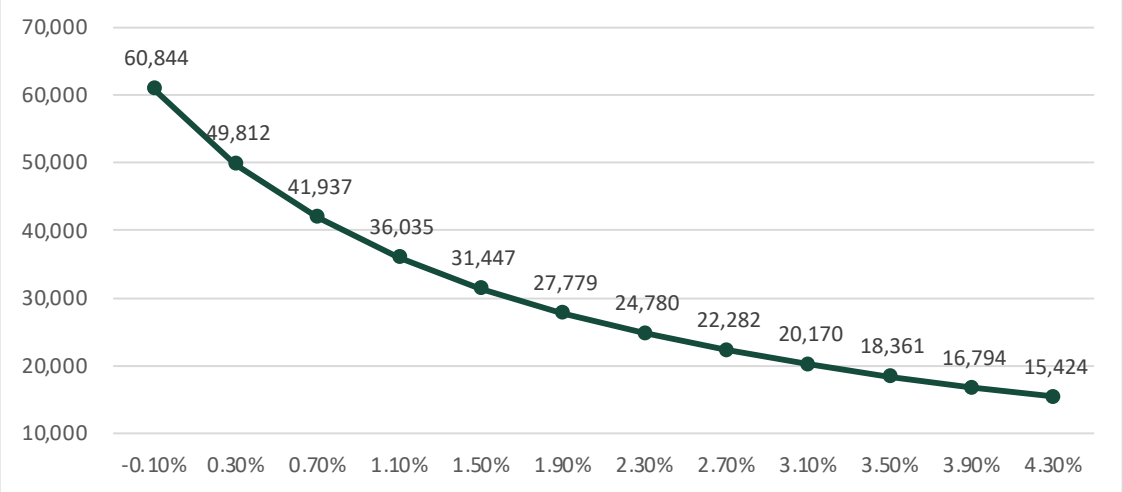

Figure 6: Sensitivity analysis of the risk-free rate

7.4.8.3 Beta

The weighted average cost of capital is also considerably impacted by beta, thereby impacting the final value estimate of the valuation. To calculate the beta, historic data from the past five years were used in the regression analysis. Using a different time frame would not have resulted in the same outcome implying the need to investigate the beta further. In order to analyze how a change in the beta will affect the result, we use the 95 percent confidence interval generated by the regression. Adjusting beta to the lower and upper boundaries of the interval, namely 0.52 and 1.33, will produce the following outcomes:

Figure 7: Sensitivity analysis of beta

7.4.8.4 Growth Rate in Terminal Value

Because the terminal value constitutes 87 percent of the enterprise value, it is crucial that we exercise caution when estimating the parameters in Gordon's Growth formula. We will slightly vary the long-term growth rate to see how changes to the terminal value input affect the firm value. The growth rate is changed between 1 and 5 percent.

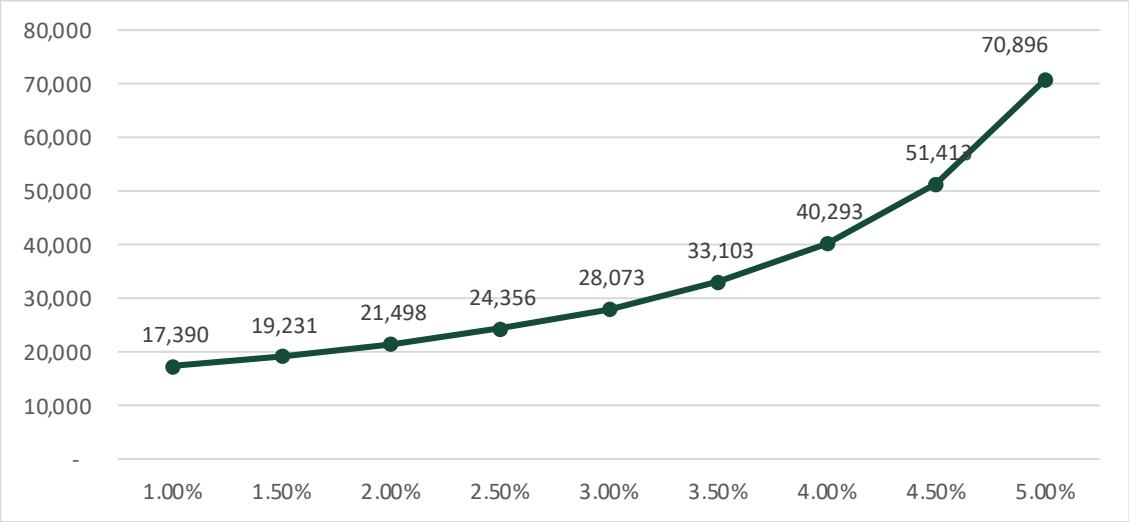

Figure 8: Sensitivity analysis of the terminal growth rate

These results underline how crucial the growth rate of the terminal value is and hence the implications it might have for the final result. The value of the firm will change a lot with only a small change in the growth rate. It is also implied by the picture that the value changes relatively more with an increase in growth rate compared to a decrease.

7.5 Summary and Discussion – Fundamental Analysis

The objective of a discounted cash flow model is to arrive at an estimated true value of the company being analyzed. By doing so, investors will obtain important insights into a firm's financial health and prospects for future growth. In our thesis, the main reason behind performing the discounted cash flow valuation of Royal Unibrew is to investigate whether incorporating additional information sources other than financial statement data is useful to investors when estimating a firm's fair value. For the analysis to be consistent with variable specifications from the regression analysis we focus on estimating the company's market

value of equity instead of the price per share. Through a fundamental analysis of the company, we have examined its strengths and weaknesses as well as future growth prospects and key value drivers. Identifying the value drivers of the company and forecasting these enabled us to predict future cash flows both explicitly and through a terminal value. By discounting these forecasts, we have arrived at what we assume to be a fair value for the enterprise as well as its equity value.

Through a strategic analysis of the company, we have learned what factors are associated with doubt and utilized that to create several future scenarios. By analyzing different possible situations, we gain a better understanding of how they impact the final value estimate. The main issue for the company at the moment seems to be connected to the global economic situation, which is what was incorporated into the scenarios. From the sensitivity analysis, it is clear that changes in important input factors of the valuation lead to changes in the valuation estimate and that the number portrays uncertainty. Another limitation of our analysis is the fact that we only analyze one of the firms from the sample. This is due to the time limitations of the thesis but could mean that the conclusion is not applicable to other Danish firms. However, we have chosen a firm that is considered to be a good representation of our sample, but it is still important to keep in mind the possible limitations of our results. There are also several other methods for evaluating companies beyond the discounted cash flow model that could provide different results.

The valuation range provided by our scenario analysis is DKK 21,878m – DKK 52,292m. The final estimate of Royal Unibrew's equity value, according to our base scenario, is DKK 28,073m. The market value of equity displayed as of March 1, 2023, was DKK 25,010m, which indicates that the company is slightly undervalued in the market by approximately 12 percent. However, it is evident that the value of Royal Unibrew has increased in the subsequent months, as the value of equity observed in the market as of May 1, 2023, was DKK 29,505m. This indicates that the estimated undervalue of Royal Unibrew from the discounted cash flow valuation has since been corrected in accordance with efficient market theory and that the market value has followed the suggested trajectory implied by the valuation results. The correction of the market value provides evidence of the market's ability to adjust and incorporate information. However, it is important to mention that investors

should continuously monitor market values as conditions and company performance can change over time. Nevertheless, the result of our analysis suggests that investors do not solely rely on accounting figures when they evaluate firms and make investment decisions. Instead, they appear to be incorporating other information sources to obtain a more accurate reflection of a company's financial health, future growth prospects and actual worth. This implies a rejection of Hypothesis 3, stating that financial statement data is a sufficient information source in evaluating Danish firms. The rejection of this hypothesis highlights the importance of considering additional information sources when making investment decisions.

8 Discussion

There are various implications that can be drawn from the results presented above. The findings suggest that the market value of a firm reflects not only accounting numbers but also other sources of information. From the estimated regression results we are unable to present evidence of a robust, definitive relationship between the accounting data gathered from the Danish equity market and the market values of the companies included in our sample. The strongest association between market values and accounting numbers is found when analyzing the return specification, indicating that the model fits the data better as it accounts for "new information" to some extent. However, the explanatory power of the models considered in this thesis is not very high, the highest being below 25 percent, which suggests that less than 25 percent of the variation in market values is captured by accounting variables. These results illustrate that accounting information alone is not sufficient in determining the market value of a firm, and that other information circulating in the market is an important part of investors' decision-making process. This suggests that investors could benefit from conducting valuations that go beyond only examining accounting numbers, therefore implying that the results of utilizing absolute valuation methods, like the discounted cash flow model, might provide more reliable estimates of market values and their outlooks. This is underlined by the swift correction of the undervalue of Royal Unibrew implied by the discounted cash flow valuation and the fact that the true value estimate from the valuation was fairly close to the market value of equity as of March 1, 2023. With that being said, we are aware that the results from a discounted cash flow valuation are also impacted by uncertainty and assumptions, and that one should act on their conclusions with caution. Nevertheless, according to our findings, it seems that a discounted cash flow valuation is likely to provide an investor with more meaningful information than a regression valuation model based only on accounting figures.

These findings are in line with evidence presented in previous literature where researchers have examined the importance of information in addition to accounting figures for valuation purposes. Reitmaier and Schultze (2017) focus on enhanced business reporting (EBC) which aims to address the informational needs of investors when evaluating firms for investment

decisions. This involves utilizing integrated reporting, where key value-creating elements are included, discussing the relatedness of financial and non-financial aspects of the business. Their results also suggest that investors utilize fundamental valuation methods when making decisions and that integrated reporting helps bridge the information gap between firms and investors. In 2020, Belesis, Sorros and Karagiorgos studied whether accounting or financial market data reflected stock prices better. The conclusion from their research is that the stock markets' overall climate and prospects are trusted by investors, stating that accounting data is less valuable to them. They also mention that valuation methods including financial market data are better at estimating the market value of firms compared to methods only based on accounting data. These previous studies underline our suggestions that financial statements alone do not accurately reflect the true market value of a company or fulfill the information requirements of users, such as investors.

Even though the results are in line with some of the previous literature on the topic, there are several studies that have found robust significant value relevance and report a higher explanatory power of the model in the markets they analyze (Barth et al., 2023; Devalle et al., 2010; Ely and Waymire, 1999). A majority of the previous research on value relevance is conducted with US data since the United States have a large and liquid stock market with easily accessible data. However, the accounting standards in the US follow the GAAP regulations which might be one reason why the results from our study are not consistent with them. Another reason for differences between results could be the dissimilarities between investor behavior in Denmark and other markets. The results from our analysis indicate that investors incorporate additional information other than accounting figures in their decision-making. This might not be the case with investors worldwide as it is reliant on access to other information sources as well as normal practices in the specific country. How investors act depends on several factors, such as cultural norms, risk willingness and market structure, which might differ between the Danish equity market and other markets subject to research. Hence, in order to draw any conclusions regarding other equity markets, one would have to replicate the study using different data to see whether or not the same results hold for that market.

As touched upon previously, there are limitations to both methods examined in this thesis. The main limitations in terms of the regression analysis relate to the data, model specifications and methodological approaches. With regard to the discounted cash flow valuation, the primary limitations concern the impacts of the investor's assumptions and the fact that we only performed a valuation of one of the firms in the sample, and possibly the results are not applicable for all firms. However, based on the evidence presented, both by us and other researchers, it appears that fundamental analysis offers additional insight beyond accounting figures that is of value to investors. This stems from the fact that the discounted cash flow model incorporates a wider range of information that is relevant to a firm’s market value.

Therefore, we conclude that to successfully evaluate a firm’s market value it is beneficial to go beyond only incorporating accounting figures. The discounted cash flow valuation incorporates information beyond accounting numbers, including micro- and macroeconomic factors, industry and firm potential, and the global economic outlook. Incorporating these aspects is likely to provide investors with a more informative estimate of a firm’s true value. Hence, it provides a foundation for making informed investment decisions about Danish firms.

9 Conclusion

Although the capital market research field is vast, there are still gaps in the literature, therefore this subject remains relevant to analyze today. Mainly, we found a gap regarding the value relevance of accounting information using Scandinavian market data, more specifically data from the Danish market. In addition, it was challenging to find studies making the link between the value relevance of financial statement data and one of the most utilized valuation models by investors, the discounted cash flow method. The purpose of this thesis has therefore been to examine whether accounting data is value relevant and if it sufficiently reflects market values in the Danish equity market or if there are other sources of information that are valuable for investors to make informed decisions. After a great deal of research on previous literature, and to help answer this research question, we created three hypotheses that we analyzed and tried to answer throughout the thesis. The first involves examining the value relevance of earnings and the book value of equity through regression analysis. The second goes one step further and includes additional accounting variables, cash flows and intangible assets, in the regression analysis. Lastly, we wanted to investigate whether accounting data is a sufficient information source for investors when evaluating Danish firms.

Our research started by specifying which model we should apply that would provide the necessary estimates to answer the first and second hypotheses and research question, which were deemed to be the levels and return models. The results of the levels model suggest that we reject Hypothesis 1, as the coefficient on the book value of equity is not statistically significant at any conventional significance level. The return model however provides contrary results. The estimation results of the return model indicate that both earnings and the book value of equity are significantly associated with the market value of equity. Which in turn implies that we fail to reject Hypothesis 1. These conflicting results indicate that we are unable to provide a clear answer to our first hypothesis. When intangible assets and free cash flows were added to the models, the models were not improved. Neither of the variables has a statistically significant coefficient, and the explanatory power of the model does not improve. This is the case for both the levels and return specification. Therefore, the results provide a clear rejection of our second hypothesis.

These results indicate that investors place greater emphasis on income statement figures, compared to both balance sheet and cash flow values, as they are better reflected in the current market values of our sampled Danish firms. The application of both the levels and return specification is done since prior literature claims it ensures that inferences are not sensitive to functional form (Kothari and Zimmerman, 1995). In addition to this, further robustness tests are conducted. The robustness tests provide evidence that the results are sensitive to important input factors and model specifications. Based on these findings, it would be inaccurate to draw any robust conclusions from the regression models. Additionally, the explanatory power of both specifications is relatively low compared to the findings of previous research on comparable markets (Devalle, Onali, and Magarini, 2010). The low explanatory power indicates that the independent variables in the model do not sufficiently explain the variation in the dependent variable, market value of equity.

The results with respect to Hypotheses 1 and 2 give an indication that our third hypothesis may not hold. However, to further investigate this, we performed a fundamental analysis on a representative firm from our sample, the Danish brewing company Royal Unibrew. After conducting both a strategic and financial analysis, the firm's future free cash flows and terminal value were forecasted and discounted back using the weighted average cost of capital. Through this method, we arrived at an estimated true value of equity for Royal Unibrew of DKK 28,073m. This result is fairly close to the market value as of 1 March 2023 but indicates a slight undervaluation in the market of 12 percent. The rise in the market value of equity since the valuation date supports this conclusion, as the market value of equity on 1 May 2023 was DKK 29.505m. Therefore, it seems that the stock price has since been corrected by the market. In addition to the base case, which is the future scenario we assume is most likely to occur, two supplementary scenarios were created, simulating a bullish and bearish version of the future. We also performed a sensitivity analysis to get insight into how changes to input factors affect the final value estimate of the firm.

Even though both methods are affected by uncertainty, the results underline that fundamental analysis, in this case the discounted cash flow model, still provides investors with useful information. Accounting data is concluded to not be a sufficient sole source of information to make informed decisions regarding market values in Denmark. This is shown through

regression analysis, where we examine the relationship between market and accounting values and fail to find a robust significant association between the two in addition to the explanatory power being low. The results from the following fundamental analysis suggest that information beyond accounting data is important when making decisions regarding the Danish equity market. This leads us to reject our third hypothesis stating that financial statement data is a sufficient information source for evaluating Danish firms.

10 For Further Analysis

As portrayed in this thesis, there are several different approaches to capital market research, and hence there are multiple other aspects that could be investigated further. In this chapter we will introduce some interesting topics of analysis that can expand upon our research.

Although our results are consistent with some prior studies, there is also a large number of published papers that report a greater value relevance, in terms of statistical significance and explanatory power, of financial statement numbers. For this reason, it could be interesting to further analyze why data from the Danish equity market provides contrasting conclusions. One approach could be examining country-specific factors, such as accounting standards, investor behavior or economic factors, and if these have any implications for value relevance of accounting data. Further studies can also look into the relationship between financial statement information and market values in other Scandinavian countries, to see if these results are similar to the findings in this thesis. This would be valuable as the other Scandinavian equity markets are comparable to that of the Danish one.

Furthermore, a few recent studies have looked into the effects of the economic downturn on the value relevance of accounting data (Jenkins et al. 2009; Tahat and Alhabad, 2017; Kane et al., 2019; Schmalz and Zhuk, 2019). As the global economy is currently facing a post Covid-19 downturn, amplified by the war in Ukraine and the energy crisis, the implications of a change in value relevance during economic crisis could have important ramifications for investor decision-making. Kane et al. (2015) concluded with an increased value relevance of accounting data during economic recession. On the other hand, Belesis et al. (2020) imply that financial market data provides more valuable information and is increasingly important to investors after periods of financial crisis, compared to accounting data. The findings in prior research are mixed and it could hence be interesting to further investigate this aspect in association with Danish capital market data. In addition, the complete social implications of the lack of value relevance in relation to accounting data could be more thoroughly explored. The impact of the decline in the usefulness of accounting information on society may not be

considerable if investors can obtain the information currently missing from financial reports from other sources without incurring any additional expenses (Sloan, 1996).

In addition to this, since our analysis suggests that investors place value on information beyond financial statement data, it could be valuable to investigate other potential sources of information and their relationship with market values. This could be done by adding additional non-financial variables to the regression analysis. Previous research has for instance investigated non-financial items among internet firms and found value relevance in variables such as web traffic metrics (Demers and Lev, 2001). As we are moving into a time of increasing media focus with a more consistent exposure of firm information there may also be additional variables that investors find useful. Other sources that might influence investors' decision-making are web pages, press releases or media coverage.

In addition to adding non-financial metrics to the regression model, there are other methods for examining information beyond accounting data. As a result of time limitations and the scope of this master's thesis, we had to limit our model specification to what would best fit our research question and hypotheses. As previously mentioned, there is an extensive range of methods and model specifications that can be applied to capital market research. For further analysis, an alternative approach could be taken to determine the extent to which the results align with those of this study. This could for example be to perform an event study to see how investors react to the publication of annual reports, to further investigate the efficiency of the Danish equity market. In addition to the variety of model specifications for the value relevance study, there are several different approaches to fundamental analysis used by investors today. Hence, an interesting aspect could be to look into other equivalent models, such as the dividend discount model or the residual income model and see whether they provide a similar result and conclusion when compared to the value relevance regression estimate.

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Appendix

Descriptive statistics: Levels model

Statistic	N	Mean	St. Dev.	Min	Max
MVE	578	1.644	2.185	0.025	16.028
NI	578	0.058	0.144	-1.002	0.849
BVE	578	0.511	0.473	-0.468	4.322
IA	578	0.169	0.494	0.000	11.316
FCF	578	0.030	0.138	-0.926	0.584

Data in million DKK.
MVE: Market value of equity, NI: net income, BVE: book value of equity,IA: intangible assets, FCF: free cash flows. All variables are deflated by assets.

Descriptive statistics: Levels model MVE

id	min	median	mean	max	sd
1	0.296	0.544	0.561	0.883	0.157
2	0.0245	0.188	0.192	0.515	0.139
3	0.559	1.40	1.92	4.90	1.29
4	0.220	0.738	0.785	1.23	0.304
5	0.277	0.589	0.782	2.46	0.613
6	1.64	2.88	3.47	9.51	1.84
7	0.692	1.29	2.11	7.13	1.85
8	0.304	1.45	1.49	2.54	0.585
9	0.332	0.621	0.738	1.55	0.317
10	0.927	6.65	6.48	16.0	4.20
11	0.331	2.02	1.86	4.20	1.02
12	0.270	0.385	0.401	0.596	0.0975
13	0.982	2.62	2.55	3.98	0.894
14	0.209	0.649	0.642	1.46	0.311
15	3.64	7.05	6.82	9.41	1.98
16	2.75	3.94	4.05	5.16	0.758
17	0.553	1.52	1.58	2.80	0.588
18	0.0591	1.85	1.90	3.79	0.992
19	0.179	0.617	0.608	1.15	0.280
20	3.67	6.63	7.57	14.0	2.93
21	0.152	0.275	0.334	1.45	0.294
22	0.345	0.699	0.706	1.07	0.226
23	0.153	1.18	1.27	2.95	0.660
24	0.0929	0.453	0.466	0.941	0.216
25	0.394	0.762	0.861	1.57	0.351
26	0.299	0.915	0.915	2.11	0.539
27	0.136	0.581	0.617	1.31	0.337
28	0.272	0.881	0.845	2.29	0.546

29	0.214	0.608	0.641	1.48	0.279
30	0.0707	0.573	0.801	1.85	0.580
31	0.119	0.318	0.395	0.743	0.186
32	0.187	0.742	0.686	1.47	0.378
33	0.101	0.210	0.277	1.12	0.278
34	0.200	0.505	0.562	1.37	0.322

Data in million DKK.
All variables are deflated by assets.

Descriptive statistics: Levels model NI

id	min	median	mean	max	sd
1	-0.0317	0.0496	0.0612	0.312	0.0892
2	-0.0211	0.0131	0.00862	0.0237	0.0125
3	-0.266	-0.0384	-0.0692	0.0575	0.0926
4	-0.0234	0.0353	0.0299	0.0542	0.0208
5	-0.234	0.0374	0.0625	0.437	0.175
6	0.0511	0.118	0.132	0.287	0.0611
7	0.152	0.288	0.355	0.849	0.210
8	0.00834	0.0629	0.0608	0.110	0.0242
9	-0.0284	0.0308	0.0357	0.0931	0.0311
10	-0.455	0.105	-0.0167	0.227	0.235
11	-0.00981	0.0751	0.0638	0.189	0.0493
12	-0.0422	0.0246	0.0242	0.0906	0.0324
13	-0.0447	0.0936	0.0800	0.161	0.0548
14	-0.0425	0.0212	0.0497	0.488	0.121
15	0.144	0.291	0.283	0.389	0.0782
16	0.107	0.133	0.136	0.170	0.0194
17	0.0284	0.0831	0.0816	0.180	0.0360
18	-0.120	0.105	0.0874	0.142	0.0641
19	-0.0885	0.0482	0.0548	0.166	0.0634
20	0.164	0.284	0.272	0.356	0.0622
21	-0.00363	0.0209	0.0243	0.0890	0.0190
22	0.0117	0.0444	0.0396	0.0751	0.0154
23	-0.138	0.0491	0.0310	0.0972	0.0643
24	-0.00899	0.0553	0.0507	0.0937	0.0292
25	-0.418	0.0645	0.0244	0.115	0.121
26	-0.0361	0.0384	0.0687	0.598	0.143
27	-0.164	0.0456	0.00925	0.0912	0.0806
28	-0.0824	0.0683	0.0961	0.338	0.117
29	-0.0512	0.0287	0.0380	0.112	0.0415
30	-0.0201	0.0441	0.0460	0.0978	0.0345
31	-0.571	-0.110	-0.117	0.332	0.238
32	-1.00	-0.0695	-0.149	0.240	0.305
33	-0.0146	0.00732	0.0150	0.117	0.0300
34	-0.190	0.0307	-0.0102	0.0675	0.0798

Data in million DKK.
All variables are deflated by assets.

Descriptive statistics: Levels model BVE

id	min	median	mean	max	sd
1	0.436	0.525	0.537	0.694	0.0696
2	0.0778	0.122	0.146	0.357	0.0767
3	0.265	0.649	0.626	0.795	0.116
4	0.301	0.409	0.407	0.485	0.0573
5	0.405	0.641	0.675	0.888	0.162
6	0.117	0.378	0.358	0.498	0.118
7	2.00	2.39	2.87	4.32	0.819
8	0.163	0.285	0.328	0.506	0.108
9	0.214	0.349	0.328	0.450	0.0621
10	0.226	0.891	0.723	0.950	0.247
11	0.222	0.554	0.489	0.676	0.148
12	0.229	0.275	0.290	0.410	0.0530
13	0.186	0.288	0.308	0.488	0.0841
14	0.303	0.437	0.424	0.545	0.0667
15	0.346	0.523	0.536	0.674	0.105
16	0.413	0.581	0.564	0.670	0.0812
17	0.662	0.726	0.728	0.786	0.0409
18	0.142	0.366	0.367	0.479	0.0846
19	0.395	0.511	0.522	0.637	0.0713
20	0.494	0.621	0.619	0.727	0.0668
21	0.0556	0.0749	0.0857	0.282	0.0516
22	0.167	0.208	0.232	0.487	0.0797
23	0.152	0.321	0.309	0.523	0.0826
24	0.302	0.419	0.444	0.603	0.0917
25	0.180	0.417	0.422	0.544	0.0845
26	0.390	0.560	0.514	0.648	0.0897
27	0.125	0.413	0.391	0.555	0.139
28	0.500	0.634	0.651	0.822	0.0895
29	0.319	0.379	0.379	0.431	0.0355
30	0.237	0.293	0.323	0.445	0.0699
31	-0.468	0.558	0.466	0.811	0.335
32	0.225	0.612	0.551	0.711	0.154
33	0.279	0.312	0.364	0.691	0.120
34	0.247	0.386	0.385	0.618	0.0874

Data in million DKK.
All variables are deflated by assets.

Descriptive statistics: Levels model IA

id	min	median	mean	max	sd
1	0.0301	0.0677	0.0644	0.117	0.0233
2	0	0.00102	0.0182	0.279	0.0673
3	0.0105	0.0667	0.177	0.778	0.243
4	0.344	0.591	0.550	0.608	0.0853
5	0	0	0	0	0

6	0.0305	0.349	0.307	0.428	0.135
7	0.0796	0.206	0.238	0.517	0.141
8	0.296	0.389	0.405	0.533	0.0672
9	0.0252	0.281	0.270	0.307	0.0646
10	0	0.0103	0.0200	0.0963	0.0267
11	0.0907	0.485	0.452	0.574	0.109
12	0	0	0	0	0
13	0.00697	0.0293	0.0310	0.0506	0.0142
14	0.0421	0.160	0.193	0.332	0.0801
15	0.0141	0.0235	0.0546	0.222	0.0683
16	0.0850	0.147	0.138	0.203	0.0339
17	0.0127	0.0572	0.0528	0.0846	0.0229
18	0.120	0.422	0.342	0.537	0.176
19	0.0590	0.115	0.133	0.222	0.0476
20	0.0100	0.0749	0.0931	0.227	0.0741
21	0.00946	0.0117	0.0145	0.0571	0.0110
22	0	0.0191	0.0535	0.287	0.0738
23	0.0800	0.126	0.122	0.162	0.0301
24	0.0548	0.125	0.150	0.238	0.0574
25	0.00744	0.0171	0.0312	0.0606	0.0220
26	0.336	0.453	0.491	0.664	0.105
27	0.0430	0.0605	0.0894	0.194	0.0568
28	0.0374	0.0811	0.0979	0.201	0.0473
29	0.00661	0.0293	0.0399	0.105	0.0333
30	0.120	0.137	0.139	0.160	0.0133
31	0.0215	0.102	0.105	0.218	0.0607
32	0.0289	0.130	0.152	0.346	0.0913
33	0.000246	0.00369	0.680	11.3	2.74
34	0.00234	0.00744	0.0369	0.132	0.0499

Data in million DKK.
All variables are deflated by assets.

Descriptive statistics: Levels model FCF

id	min	median	mean	max	sd
1	-0.0413	0.0569	0.0517	0.182	0.0732
2	-0.198	0.0347	0.0280	0.333	0.107
3	-0.389	-0.0887	-0.144	0.0849	0.149
4	-0.344	0.0523	0.0267	0.0857	0.0998
5	-0.0937	0.0407	0.0847	0.517	0.158
6	-0.0459	0.0570	0.0514	0.202	0.0701
7	-0.271	0.0960	0.114	0.475	0.224
8	-0.0937	0.0655	0.0571	0.163	0.0680
9	-0.118	0.0269	0.0171	0.0886	0.0543
10	-0.469	-0.0434	-0.0785	0.193	0.198
11	-0.279	0.0200	0.0353	0.332	0.118
12	-0.0771	-0.0308	-0.0336	0.00222	0.0234
13	-0.0957	0.0630	0.0592	0.186	0.0722
14	-0.213	0.0126	0.000294	0.198	0.0854

15	0.117	0.276	0.264	0.426	0.0861
16	-0.00238	0.0770	0.0912	0.229	0.0535
17	-0.0975	0.0377	0.0350	0.119	0.0530
18	-0.315	0.115	0.0642	0.242	0.140
19	-0.139	0.0276	0.0252	0.167	0.0733
20	0.0509	0.278	0.250	0.416	0.109
21	-0.0425	0.0196	0.0275	0.146	0.0465
22	-0.358	0.0420	0.0144	0.0755	0.0989
23	-0.131	0.0231	0.0315	0.179	0.0932
24	-0.105	0.0272	0.0337	0.206	0.0946
25	-0.169	0.0280	0.00677	0.108	0.0770
26	-0.0804	0.00951	0.0483	0.584	0.146
27	-0.249	0.00390	-0.0188	0.0972	0.0973
28	-0.0494	0.0734	0.0814	0.248	0.0842
29	-0.0738	0.00908	0.0260	0.212	0.0669
30	-0.0482	0.00623	0.00682	0.0517	0.0296
31	-0.704	-0.0233	-0.0992	0.247	0.229
32	-0.357	-0.0534	-0.0813	0.129	0.128
33	-0.926	0.000124	-0.0525	0.0512	0.230
34	-0.166	0.0227	-0.0000729	0.114	0.0888

Data in million DKK.
All variables are deflated by assets.

Descriptive statistics: Return model

Statistic	N	Mean	St. Dev.	Min	Max
MVE	578	1.181	0.603	0.085	8.113
NI	578	0.028	0.232	-2.846	1.670
BVE	578	0.749	0.734	-0.806	4.408
IA	578	0.293	2.126	0.000	50.796
FCF	578	0.005	0.582	-12.169	1.677

Data in million DKK.
MVE: Market value of equity, NI: net income, BVE: book value of equity,IA: intangible assets, FCF: free cash flows. All variables are deflated by lagged market value of equity.

Descriptive statistics: Return model MVE

id	min	median	mean	max	sd
1	0.510	1.01	1.08	1.80	0.407
2	0.211	1.19	1.14	1.57	0.337
3	0.479	1.17	1.29	3.70	0.800
4	0.665	1.08	1.13	2.09	0.320
5	0.322	1.14	1.17	2.03	0.499
6	0.553	1.09	1.08	1.84	0.289
7	0.480	0.981	1.18	2.07	0.426
8	0.396	1.19	1.26	2.65	0.470

9	0.283	1.01	1.11	2.72	0.515
10	0.333	1.26	1.39	3.34	0.760
11	0.306	1.17	1.13	2.34	0.510
12	0.730	1.11	1.08	1.51	0.210
13	0.442	1.09	1.11	1.52	0.242
14	0.258	1.09	1.22	3.42	0.748
15	0.724	1.19	1.21	1.62	0.223
16	0.791	1.11	1.11	1.44	0.198
17	0.390	1.16	1.12	1.87	0.376
18	0.0845	1.16	1.55	8.11	1.74
19	0.403	1.24	1.13	1.50	0.294
20	0.563	1.15	1.14	1.61	0.304
21	0.605	1.06	1.09	1.68	0.275
22	0.719	1.13	1.12	1.71	0.268
23	0.319	1.22	1.36	4.66	0.985
24	0.128	1.20	1.19	1.91	0.445
25	0.500	1.14	1.13	1.99	0.337
26	0.318	1.04	1.16	2.72	0.632
27	0.174	1.15	1.16	2.48	0.560
28	0.247	0.942	1.19	3.16	0.804
29	0.326	1.07	1.26	3.72	0.819
30	0.164	1.20	1.34	2.40	0.590
31	0.450	0.896	1.15	3.74	0.813
32	0.442	0.930	1.15	4.23	0.857
33	0.503	1.02	1.22	3.16	0.602
34	0.521	0.955	1.02	1.87	0.426

Data in million DKK.
All variables are deflated by lagged market value of equity.

Descriptive statistics: Return model NI

id	min	median	mean	max	sd
1	-0.0826	0.0852	0.106	0.503	0.161
2	-0.891	0.0632	-0.0256	0.138	0.253
3	-0.281	-0.0334	-0.0646	0.0360	0.0868
4	-0.0345	0.0533	0.0492	0.114	0.0339
5	-0.329	0.0652	0.0751	0.624	0.232
6	0.0206	0.0402	0.0408	0.0667	0.0108
7	0.124	0.213	0.221	0.393	0.0779
8	0.0241	0.0504	0.0494	0.0674	0.0131
9	-0.0392	0.0509	0.0534	0.242	0.0570
10	-0.278	0.0192	-0.0391	0.0436	0.100
11	-0.0268	0.0339	0.0443	0.304	0.0718
12	-0.0943	0.0678	0.0614	0.223	0.0776
13	-0.0156	0.0421	0.0420	0.0964	0.0319
14	-0.164	0.0375	0.0524	0.484	0.144
15	0.0364	0.0495	0.0501	0.0646	0.00755
16	0.0286	0.0374	0.0374	0.0474	0.00544
17	0.0354	0.0569	0.0542	0.0816	0.0118
18	-0.171	0.0537	0.0589	0.197	0.0721

19	-0.199	0.0753	0.101	0.367	0.139
20	0.0234	0.0427	0.0435	0.0759	0.0146
21	-0.0169	0.0857	0.0839	0.183	0.0448
22	0.0224	0.0642	0.0664	0.134	0.0323
23	-0.631	0.0403	-0.00830	0.0878	0.168
24	-0.0124	0.128	0.124	0.296	0.0763
25	-0.720	0.0720	0.0141	0.146	0.199
26	-0.111	0.0530	0.0557	0.408	0.108
27	-0.889	0.0735	-0.0675	0.153	0.270
28	-0.273	0.0750	0.104	0.432	0.162
29	-0.0776	0.0625	0.0655	0.236	0.0679
30	-0.271	0.0770	0.0680	0.270	0.109
31	-1.49	-0.360	-0.290	1.67	0.777
32	-0.177	-0.0879	-0.0870	-0.0332	0.0442
33	-2.85	-0.110	-0.303	0.276	0.697
34	-0.144	0.0651	0.0684	0.527	0.146
35	-0.596	0.0339	-0.0511	0.166	0.226

Data in million DKK.
All variables are deflated by lagged market value of equity.

Descriptive statistics: Return model BVE

id	min	median	mean	max	sd
1	0.612	1.06	1.03	1.57	0.261
2	0.433	0.851	1.28	3.37	0.942
3	0.145	0.501	0.468	0.744	0.189
4	0.224	0.593	0.708	1.89	0.421
5	0.449	1.15	1.14	1.71	0.374
6	0.0146	0.137	0.135	0.218	0.0644
7	0.620	1.86	2.08	4.41	0.989
8	0.170	0.236	0.294	0.766	0.148
9	0.207	0.467	0.528	0.961	0.238
10	0.0747	0.175	0.175	0.336	0.0645
11	0.0889	0.267	0.428	1.70	0.428
12	0.497	0.762	0.802	1.24	0.190
13	0.0652	0.119	0.161	0.403	0.104
14	0.306	0.750	0.870	1.80	0.490
15	0.0544	0.0756	0.110	0.267	0.0636
16	0.114	0.152	0.157	0.230	0.0361
17	0.323	0.482	0.552	1.28	0.233
18	0.106	0.218	0.485	4.16	0.956
19	0.576	1.01	1.13	2.62	0.523
20	0.0459	0.0858	0.105	0.213	0.0465
21	0.182	0.288	0.305	0.520	0.0949
22	0.194	0.358	0.389	0.835	0.160
23	0.135	0.269	0.407	1.43	0.344
24	0.491	1.22	1.33	3.84	0.874
25	0.311	0.548	0.614	1.00	0.260
26	0.309	0.604	0.773	1.78	0.464
27	0.318	0.669	0.853	3.66	0.767

28	0.230	0.923	1.10	2.10	0.630
29	0.333	0.659	0.748	2.00	0.378
30	0.255	0.546	0.852	3.19	0.792
31	-0.806	1.27	1.41	4.02	1.17
32	0.240	0.791	1.21	3.77	0.992
33	0.757	1.98	2.07	4.37	0.940
34	0.376	0.777	0.771	1.13	0.260

Data in million DKK.
All variables are deflated by lagged market value of equity.

Descriptive statistics: Return model IA

id	min	median	mean	max	sd
1	0.0403	0.127	0.124	0.224	0.0493
2	0	0.00416	0.0572	0.665	0.159
3	0.00306	0.0584	0.207	1.28	0.346
4	0.317	0.848	0.947	2.59	0.566
5	0	0	0	0	0
6	0.00378	0.140	0.121	0.204	0.0679
7	0.0389	0.125	0.167	0.384	0.114
8	0.196	0.313	0.385	1.21	0.231
9	0.0248	0.391	0.434	0.825	0.191
10	0	0.00148	0.00391	0.0302	0.00723
11	0.0417	0.261	0.368	1.44	0.329
12	0	0	0	0	0
13	0.00392	0.0106	0.0151	0.0289	0.00911
14	0.0622	0.311	0.422	1.28	0.342
15	0.00225	0.00552	0.00949	0.0423	0.0116
16	0.0241	0.0398	0.0379	0.0528	0.00932
17	0.00658	0.0417	0.0386	0.0635	0.0169
18	0.0892	0.190	0.316	2.00	0.447
19	0.125	0.230	0.272	0.590	0.122
20	0.00141	0.00982	0.0132	0.0324	0.00970
21	0.0311	0.0517	0.0503	0.0921	0.0162
22	0	0.0414	0.0717	0.327	0.0814
23	0.0508	0.111	0.178	0.696	0.195
24	0.101	0.474	0.431	1.04	0.250
25	0.00808	0.0396	0.0373	0.0684	0.0195
26	0.288	0.621	0.702	1.43	0.350
27	0.0504	0.165	0.175	0.419	0.102
28	0.0275	0.0762	0.189	0.696	0.181
29	0.00983	0.0481	0.0718	0.186	0.0579
30	0.0721	0.276	0.442	2.16	0.536
31	0.0344	0.267	0.330	1.15	0.271
32	0.0821	0.209	0.236	0.447	0.105
33	0.00214	0.0293	3.03	50.8	12.3
34	0.00228	0.0239	0.0774	0.357	0.113

Data in million DKK.
All variables are deflated by lagged market value of equity.

Descriptive statistics: Return model FCF

id	min	median	mean	max	sd
1	-0.141	0.101	0.0952	0.369	0.144
2	-3.70	0.267	0.0654	1.51	1.11
3	-0.484	-0.0660	-0.119	0.0643	0.147
4	-1.04	0.0636	0.0143	0.334	0.282
5	-0.164	0.0389	0.177	1.20	0.358
6	-0.0169	0.0198	0.0129	0.0313	0.0178
7	-0.257	0.0616	0.0261	0.226	0.155
8	-0.122	0.0574	0.0462	0.169	0.0668
9	-0.122	0.0500	0.0350	0.281	0.0955
10	-0.197	-0.00990	-0.0343	0.0420	0.0722
11	-0.180	0.0197	0.0302	0.240	0.0916
12	-0.214	-0.0856	-0.0971	0.00612	0.0735
13	-0.0335	0.0283	0.0340	0.0993	0.0376
14	-0.211	0.0174	0.00522	0.405	0.148
15	0.0229	0.0463	0.0469	0.0669	0.0114
16	-0.000675	0.0264	0.0244	0.0569	0.0129
17	-0.0687	0.0244	0.0269	0.121	0.0433
18	-0.414	0.0629	0.121	1.68	0.429
19	-0.141	0.0456	0.0782	0.522	0.176
20	0.00726	0.0386	0.0413	0.102	0.0248
21	-0.227	0.0772	0.0660	0.385	0.144
22	-0.613	0.0525	0.0170	0.120	0.166
23	-0.235	0.0236	0.0685	0.947	0.248
24	-0.301	0.0589	0.167	1.10	0.389
25	-0.212	0.0324	0.0173	0.211	0.108
26	-0.0732	0.0117	0.0620	0.399	0.128
27	-0.616	0.00325	-0.0410	0.227	0.214
28	-0.126	0.127	0.122	0.730	0.187
29	-0.126	0.0209	0.0536	0.418	0.123
30	-0.149	0.00433	0.0260	0.191	0.0833
31	-2.07	-0.0926	-0.234	0.628	0.626
32	-1.20	-0.109	-0.123	0.231	0.321
33	-12.2	0.000660	-0.676	0.256	2.96
34	-0.299	0.0662	0.0165	0.321	0.177

Data in million DKK.
All variables are deflated by lagged market value of equity.

```
     Hausman Test levels model

data:  MVE ~ NI + BVE
chisq = 11.108, df = 2, p-value = 0.003872
alternative hypothesis: one model is inconsistent
```

```
     Hausman Test return model

data:  MVE ~ NI + BVE
chisq = 137.25, df = 2, p-value < 2.2e-16
alternative hypothesis: one model is inconsistent
```

```
VIF test model 1
    NI      BVE
1.280275 1.280275
```

```
VIF test model 2
    NI      BVE       IA      FCF
1.723992 1.289985 1.002232 1.389763
```

```
VIF test model 4
    NI      BVE
1.002531 1.002531
```

```
VIF test model 5
    NI      BVE       IA      FCF
1.040106 1.041783 1.021606 1.054221
```

Levels model revenue results

	Dependent variable:	
	MVE	
	Model 2	Model 3
NI	-0.599	-0.510
	(1.743)	(1.743)
BVE	4.288**	4.140**
	(1.822)	(1.822)
IA		0.035***
		(0.071)
FCF		-0.276
		(0.685)
Observations	578	578
R2	0.439	0.441
Adjusted R2	0.403	0.402
F Statistic	212.329***(df = 2; 542)	106.384***(df = 4; 540)

Note: *p<0.1; **p<0.05; ***p<0.01

CPI adj levels model

	Dependent variable:

	MVE	
	Model 1	Model 3
NI	3.827**	3.810**
	(1.615)	(1.728)
BVE	0.375	0.364
	(0.496)	(0.507)
IA		-0.068
		(0.056)
FCF		0.103
		(0.707)
Observations	578	578
R2	0.162	0.163
Adjusted R2	0.108	0.106
F Statistic	52.478*** (df = 2; 542)	26.277*** (df = 4; 540)

Note: *p<0.1; **p<0.05; ***p<0.01

CPI adj return model

	Dependent variable:	
	MVE	
	Model 4	Model 5
NI	0.371**	0.364**
	(0.179)	(0.175)
BVE	0.594***	0.597***
	(0.131)	(0.140)
IA		0.001
		(0.004)
FCF		0.017
		(0.082)
Observations	578	578
R2	0.311	0.312
Adjusted R2	0.267	0.264
F Statistic	122.508*** (df = 2; 542)	61.103*** (df = 4; 540)

Note: *p<0.1; **p<0.05; ***p<0.01

Outliers removed levels model

	Dependent variable:

	MVE	
	Model 2	Model 3
NI	3.035**	3.016*
	(0.409)	(1.587)
BVE	0.392	0.386
	(0.423)	(0.436)
IA		-0.010
		(0.032)
FCF		0.080
		(0.481)
Observations	549	549
R2	0.140	0.140
Adjusted R2	0.081	0.077
F Statistic	41.603*** (df = 2; 513)	20.738*** (df = 4; 511)

Note: *p<0.1; **p<0.05; ***p<0.01

Outliers removed return model

	Dependent variable:	
	MVE	
	Model 4	Model 5
NI	0.303**	0.271**
	(0.120)	(0.108)
BVE	0.241***	0.239***
	(0.043)	(0.034)
IA		-0.0005
		(0.001)
FCF		0.093*
		(0.050)
Observations	547	547
R2	0.114	0.118
Adjusted R2	0.054	0.054
F Statistic	32.991*** (df = 2; 511)	17.077*** (df = 4; 509)

Note: *p<0.1; **p<0.05; ***p<0.01

Levels model results

	Dependent variable:
	MVE

	Model 2	Model 3
NI	3.943**	3.888**
	(1.787)	(1.891)
BVE	0.452	
	(0.503)	
BVEIA		0.435
		(0.516)
IA		0.394
		(0.524)
FCF		0.227
		(0.694)
Observations	578	578
R2	0.171	0.172
Adjusted R2	0.117	0.115
F Statistic	55.823*** (df = 2; 542)	27.955*** (df = 4; 540)

Note: *p<0.1; **p<0.05; ***p<0.01

	MVE	NI	BVE	IA	FCF	BVEIA
MVE	1					
NI	0.47352883	1				
BVE	0.19618427	0.46788683	1			
IA	-0.0332165	0.04173755	0.02021103	1		
FCF	0.33136177	0.5240654	0.17990495	0.00314734	1	
BVEIA	0.16129466	0.29640662	0.68385006	-0.7156522	0.12338466	1

Return model results

	Dependent variable:	
	MVE	
	Model 4	Model 5
NI	0.362**	0.355**
	(0.170)	(0.167)
BVE	0.572***	
	(0.127)	
BVEIA		0.574***
		(0.134)
IA		0.574***
		(0.135)
FCF		0.018

		(0.083)
Observations	578	578
R2	0.292	0.292
Adjusted R2	0.246	0.244
F Statistic	111.725*** (df = 2; 542)	55.732*** (df = 4; 540)
Note:		*p<0.1; **p<0.05; ***p<0.01

	MVE	NI	BVE	IA	FCF	BVEIA
MVE	1					
NI	0.14663136	1				
BVE	0.36937061	0.05024568	1			
IA	0.0417431	0.08627225	0.11905407	1		
FCF	-0.0206662	0.16545755	-0.1449848	0.01869061	1	
BVEIA	0.08418702	-0.067694	0.22198611	-0.9416867	-0.0674904	1

id	firm name
1	A.P. Møller - Mærsk A/S
2	Alm. Brand A/S
3	Bavarian Nordic A/S
4	Carlsberg A/S
5	Dampskibsselskabet Norden A/S
6	Demant A/S
7	DFDS A/S
8	DSV A/S
9	FLSmidth & Co. A/S
10	Genmab A/S
11	GN Store Nord A/S
12	Jeudan A/S
13	Københavns Lufthavne A/S
14	NKT A/S
15	Novo Nordisk A/S
16	Novozymes A/S
17	Rockwool A/S
18	Royal Unibrew A/S
19	Schouw & Co.
20	SimCorp A/S
21	Topdanmark A/S
22	Tryg A/S
23	Vestas Wind Systems A/S
24	Brødrene A & O Johansen A/S
25	Brødrene Hartmann A/S

26	Columbus A/S
27	H+H International A/S
28	North Media A/S
29	Solar A/S
30	SP Group A/S
31	Aalborg Boldspilklub A/S
32	Brøndbyernes IF Fodbold
33	Silkeborg IF Invest A/S
34	SKAKO A/S

mDKK	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Net revenue	**3,439**	**3,882**	**4,179**	**3,816**	**3,775**	**3,431**	**3,430**	**4,481**	**6,056**	**6,032**	**6,340**	**6,384**	**7,298**	**7,692**	**7,557**	**8,746**	**11,487**
Production costs	- 1,569	- 2,003	- 2,267	- 2,048	- 1,818	- 1,610	- 1,627	- 2,091	- 2,711	- 2,676	- 2,856	- 2,892	- 3,298	- 3,435	- 3,428	- 4,309	- 6,395
Gross profit	**1,870**	**1,879**	**1,912**	**1,768**	**1,957**	**1,821**	**1,803**	**2,390**	**3,345**	**3,356**	**3,484**	**3,493**	**4,000**	**4,257**	**4,129**	**4,437**	**5,092**
Sales and distribution expenses	- 1,175	- 1,247	- 1,363	- 1,105	- 1,161	- 1,052	- 1,040	- 1,394	- 1,903	- 1,845	- 1,900	- 1,872	- 2,032	- 2,119	- 1,940	- 2,022	- 2,680
Administrative expenses	- 196	- 231	- 216	- 207	- 200	- 176	- 158	- 251	- 312	- 286	- 278	- 258	- 295	- 324	- 328	- 395	- 415
Other operating income	44	9	4	4	4	4	5	3	-	-	-	-	-	-	-	-	-
Other operating expenses	-	-	-	-	-	-	-	- 15	-	-	-	-	-	-	-	-	-
EBITDA	**542**	**411**	**337**	**460**	**600**	**596**	**609**	**732**	**1,130**	**1,225**	**1,306**	**1,362**	**1,673**	**1,814**	**1,861**	**2,020**	**1,997**
Depreciation and amortisation	- 195	- 167	- 203	- 217	- 183	- 122	- 124	- 172	- 304	- 308	- 305	- 293	- 334	- 345	- 346	- 368	- 481
EBIT	**348**	**244**	**135**	**243**	**417**	**474**	**485**	**560**	**826**	**917**	**1,001**	**1,069**	**1,339**	**1,469**	**1,515**	**1,652**	**1,516**
Income tax	- 90	- 65	- 30	- 24	- 97	- 110	- 108	- 69	- 176	- 191	- 214	- 225	- 288	- 318	- 307	- 349	- 294
Tax shield on net financial expenses	- 10	- 19	- 24	- 16	- 17	- 6	- 9	- 6	- 13	- 10	- 7	- 7	- 7	- 8	- 9	- 9	- 18
Tax on special items	1	4	105	5	-	-	-	-	-	-	-	-	-	-	-	-	-
NOPAT	**249**	**164**	**186**	**208**	**303**	**358**	**368**	**486**	**637**	**717**	**780**	**837**	**1,045**	**1,143**	**1,199**	**1,294**	**1,204**
Financial income	20	27	34	33	47	40	6	4	8	9	4	3	5	5	3	7	10
Financial expenses	- 59	- 99	- 139	- 190	- 120	- 68	- 44	- 50	- 69	- 54	- 35	- 34	- 36	- 41	- 46	- 49	- 103
Net financial expenses	- 39	- 72	- 105	- 158	- 73	- 28	- 38	- 45	- 60	- 46	- 31	- 31	- 31	- 36	- 43	- 42	- 93
Tax shield on net financial expenses	10	19	24	16	17	6	9	6	13	10	7	7	7	8	9	9	18
Net financial expenses after tax	**- 29**	**- 53**	**- 82**	**- 142**	**- 56**	**- 21**	**- 30**	**- 40**	**- 48**	**- 36**	**- 24**	**- 25**	**- 25**	**- 28**	**- 34**	**- 33**	**- 75**
Net earnings	**220**	**111**	**104**	**66**	**246**	**336**	**339**	**446**	**589**	**680**	**756**	**812**	**1,020**	**1,115**	**1,165**	**1,261**	**1,129**

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Operating assets																	
Intangible assets	507	775	486	480	402	391	371	2,944	2,941	2,920	2,884	2,862	4,108	4,516	4,408	5,861	7,558
Project development properties	-	-	400	404	406	411	276	291	238	198	-	-	-	-	-	-	-
Property, plant and equipment	1,427	1,557	1,679	1,610	1,365	1,190	1,203	2,418	2,331	2,241	2,142	2,122	2,530	2,501	2,455	2,734	3,680
Investments in associates	231	226	88	111	136	291	130	133	136	135	144	128	124	126	131	153	99
Receivables from associates	25	25	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other receivables	22	12	12	13	6	5	10	-	-	-	-	-	-	-	-	-	-
Non-current assets	**2,212**	**2,595**	**2,686**	**2,617**	**2,316**	**2,288**	**1,989**	**5,786**	**5,647**	**5,494**	**5,170**	**5,112**	**6,762**	**7,143**	**6,994**	**8,748**	**11,337**
Inventories	277	352	415	238	187	173	180	330	312	317	336	335	440	463	517	780	1,213
Receivables	525	674	803	485	457	408	402	506	536	570	534	587	666	736	639	1,188	1,500
Corporation tax	-	-	-	-	-	-	-	12	-	-	-	16	-	-	-	-	-
Prepayments	-	-	-	-	-	-	-	23	20	22	19	34	36	59	54	89	131
Cash and cash equivalents	69	78	84	76	37	19	69	90	121	121	7	128	145	72	81	86	214
Current assets	**870**	**1,104**	**1,302**	**799**	**682**	**600**	**651**	**961**	**989**	**1,030**	**896**	**1,100**	**1,287**	**1,330**	**1,291**	**2,143**	**3,058**
TOTAL OPERATING ASSETS	**3,082**	**3,698**	**3,988**	**3,417**	**2,998**	**2,888**	**2,640**	**6,746**	**6,637**	**6,523**	**6,066**	**6,212**	**8,049**	**8,473**	**8,285**	**10,891**	**14,395**
Non-interest-bearing liabilities																	
Deferred tax	128	128	179	172	170	167	145	458	432	375	362	378	542	546	554	747	1,011
Other payables	-	-	-	-	13	23	9	17	25	14	14	13	44	105	52	26	9
Non-current liabilities	**128**	**128**	**179**	**172**	**183**	**190**	**154**	**475**	**456**	**390**	**376**	**391**	**587**	**651**	**606**	**773**	**1,020**
Repurchase obligation, returnable packaging	91	98	74	62	57	42	36	-	-	-	-	-	-	-	-	-	-
Trade payables	344	350	523	419	430	398	431	807	811	914	858	1,026	975	1,018	1,047	1,721	1,934
Provisions	-	-	-	-	-	-	-	-	-	-	-	21	16	17	10	11	11
Corporation tax	61	55	-	6	8	0	-	-	22	7	21	-	10	29	9	18	8
VAT, excise duties, etc.	75	99	61	98	66	68	65	-	-	-	-	-	-	-	-	-	-
Other payables	126	163	336	228	226	222	220	886	872	985	912	867	899	894	1,028	1,427	1,669
Current liabilities	**697**	**765**	**994**	**814**	**787**	**730**	**752**	**1,693**	**1,705**	**1,906**	**1,791**	**1,913**	**1,900**	**1,958**	**2,094**	**3,177**	**3,622**
TOTAL NON-INTEREST-BEARING LIABILITIES	**825**	**892**	**1,174**	**986**	**969**	**920**	**906**	**2,168**	**2,161**	**2,296**	**2,167**	**2,305**	**2,487**	**2,609**	**2,700**	**3,950**	**4,642**
Net working capital	**173**	**339**	**307**	**- 14**	**- 105**	**- 130**	**- 101**	**- 733**	**- 715**	**- 877**	**- 895**	**- 813**	**- 613**	**- 628**	**- 803**	**- 1,034**	**- 564**
Invested Capital (Net Operating Assets)	**2,258**	**2,806**	**2,814**	**2,431**	**2,029**	**1,968**	**1,734**	**4,578**	**4,475**	**4,228**	**3,899**	**3,907**	**5,563**	**5,864**	**5,585**	**6,941**	**9,753**

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Total equity	**1,148**	**1,119**	**575**	**995**	**1,281**	**1,321**	**1,348**	**2,133**	**2,818**	**2,935**	**2,911**	**2,814**	**2,908**	**3,107**	**3,332**	**3,342**	**5,158**
Interest-bearing liabilities																	
Mortgage debt	594	750	735	736	596	594	592	748	1,013	1,000	859	858	855	851	831	1,003	1,009
Credit institutions	650	790	969	773	0	-	-	1,097	859	462	-	381	1,710	1,303	1,293	1,995	2,677
Non-current liabilities	**1,244**	**1,540**	**1,704**	**1,509**	**596**	**594**	**592**	**1,845**	**1,872**	**1,462**	**859**	**1,240**	**2,565**	**2,154**	**2,124**	**2,998**	**3,686**
Mortgage debt	59	1	-	-	2	2	2	14	164	14	5	4	4	4	19	14	2
Credit institutions	138	228	599	-	209	54	1	764	8	41	134	416	98	619	131	610	986
Current liabilities	**197**	**229**	**599**	**-**	**211**	**56**	**3**	**778**	**172**	**55**	**139**	**420**	**102**	**623**	**150**	**624**	**988**
TOTAL INTEREST-BEARING LIABILITIES	**1,441**	**1,769**	**2,303**	**1,509**	**807**	**649**	**594**	**2,623**	**2,044**	**1,517**	**998**	**1,660**	**2,667**	**2,777**	**2,274**	**3,622**	**4,674**
Financial assets																	
Other non-current investments	3	3	57	57	59	3	3	24	17	12	10	10	12	20	21	23	79
Cash and cash equivalents	300	80	7	16	-	-	205	154	370	213	-	557	-	-	-	-	-
Non-current assets held for sale	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL FINANCIAL ASSET	**331**	**83**	**64**	**73**	**59**	**3**	**208**	**178**	**387**	**224**	**10**	**567**	**12**	**20**	**21**	**23**	**79**
Net-interest-bearing debt (NIBD)	**1,109**	**1,686**	**2,239**	**1,436**	**748**	**647**	**387**	**2,445**	**1,657**	**1,293**	**988**	**1,093**	**2,654**	**2,757**	**2,253**	**3,599**	**4,595**
Invested Capital	**2,258**	**2,806**	**2,814**	**2,431**	**2,029**	**1,968**	**1,734**	**4,578**	**4,475**	**4,228**	**3,899**	**3,907**	**5,563**	**5,864**	**5,585**	**6,941**	**9,753**

Forecasted Income Statement – Bearish Scenario

mDKK	Forecast					Terminal
INCOME STATEMENT	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
Net revenue	12,000	13,258	14,306	15,070	15,731	16,421
Production costs	- 6,985	- 7,572	- 8,144	- 8,692	- 9,205	- 9,749
Gross profit	**5,015**	**5,687**	**6,162**	**6,377**	**6,525**	**6,673**
Sales and distribution expenses	- 2,718	- 2,914	- 3,047	- 3,108	- 3,137	- 3,275
Administrative expenses	- 418	- 444	- 461	- 466	- 466	- 486
EBITDA	**1,878**	**2,329**	**2,654**	**2,804**	**2,923**	**2,911**
Depreciation and amortisation	- 576	- 636	- 686	- 723	- 755	- 788
EBIT	**1,303**	**1,692**	**1,968**	**2,081**	**2,168**	**2,124**
Income tax	- 287	- 372	- 433	- 458	- 477	- 467
Tax shield on net financial expenses	- 21	- 27	- 34	- 36	- 38	- 39
NOPAT	**995**	**1,293**	**1,501**	**1,587**	**1,653**	**1,617**
Net financial expenses	**- 94**	**- 123**	**- 153**	**- 166**	**- 171**	**- 178**
Tax shield on net financial expenses	21	27	34	36	38	39
Net financial expenses after tax	**- 73**	**- 96**	**- 119**	**- 129**	**- 133**	**- 139**
Net earnings	**922**	**1,197**	**1,382**	**1,457**	**1,520**	**1,478**

Forecasted Balance Sheet – Bearish Scenario

mDKK	Forecast					Terminal
BALANCE SHEET	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
Non-current assets	**10,970**	**12,120**	**13,078**	**13,776**	**14,380**	**15,011**
Inventories	1,286	1,442	1,578	1,686	1,785	1,863
Receivables	1,212	1,339	1,445	1,522	1,589	1,659
Prepayments	74	82	88	93	97	101
Cash and cash equivalents	240	265	286	301	315	328
Current assets	**2,572**	**2,863**	**3,111**	**3,301**	**3,471**	**3,623**
Total assets	**13,542**	**14,983**	**16,189**	**17,077**	**17,851**	**18,634**
Operating liabilities	4,973	5,630	6,222	6,709	7,165	7,479
Net working capital	- 2,400	- 2,767	- 3,110	- 3,407	- 3,694	- 3,856
Invested Capital	**8,569**	**9,353**	**9,967**	**10,368**	**10,686**	**11,155**
Net-interest-bearing debt (NIBD)	3,772	4,117	4,387	4,564	4,704	4,910

Forecasted Income Statement – Bullish Scenario

mDKK	Forecast					Terminal
INCOME STATEMENT	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
Net revenue	14,000	16,380	18,373	20,220	22,148	24,261
Production costs	- 7,254	- 8,151	- 9,073	- 10,004	- 10,926	- 11,932
Gross profit	**6,746**	**8,229**	**9,299**	**10,215**	**11,222**	**12,328**
Sales and distribution expenses	- 3,171	- 3,600	- 3,913	- 4,170	- 4,417	- 4,839
Administrative expenses	- 487	- 549	- 592	- 625	- 655	- 718
EBITDA	**3,087**	**4,080**	**4,794**	**5,421**	**6,149**	**6,771**
Depreciation and amortisation	- 672	- 786	- 881	- 970	- 1,063	- 1,164
EBIT	**2,415**	**3,294**	**3,913**	**4,451**	**5,087**	**5,608**
Income tax	- 531	- 725	- 861	- 979	- 1,119	- 1,234
Tax shield on net financial expenses	- 25	- 34	- 44	- 50	- 54	- 60
NOPAT	**1,859**	**2,535**	**3,007**	**3,421**	**3,913**	**4,314**
Net financial expenses	**- 113**	**- 156**	**- 202**	**- 229**	**- 248**	**- 271**
Tax shield on net financial expenses	25	34	44	50	54	60
Net financial expenses after tax	**- 88**	**- 122**	**- 158**	**- 179**	**- 193**	**- 212**
Net earnings	**1,771**	**2,413**	**2,850**	**3,243**	**3,720**	**4,103**

Forecasted Balance Sheet – Bullish Scenario

mDKK	Forecast					Terminal
BALANCE SHEET	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
Non-current assets	**12,798**	**14,974**	**16,795**	**18,483**	**20,246**	**22,177**
Inventories	1,500	1,781	2,027	2,262	2,513	2,753
Receivables	1,414	1,655	1,856	2,043	2,237	2,451
Prepayments	86	101	113	124	136	149
Cash and cash equivalents	280	328	367	404	443	485
Current assets	**3,281**	**3,864**	**4,363**	**4,834**	**5,330**	**5,838**
Total assets	**16,079**	**18,838**	**21,158**	**23,317**	**25,576**	**28,016**
Operating liabilities	5,801	6,956	7,990	9,001	10,087	11,049
Net working capital	- 2,520	- 3,091	- 3,627	- 4,168	- 4,758	- 5,211
Invested Capital	**10,277**	**11,882**	**13,168**	**14,316**	**15,489**	**16,966**
Net-interest-bearing debt (NIBD)	4,524	5,230	5,796	6,301	6,818	7,468

Weighted Average Cost of Capital – Beta

Regression Statistics	
Multiple R	0.50996251
R Square	0.26006176
Adjusted R Square	0.24752043
Standard Error	0.06922924
Observations	61

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.099383015	0.09938301	20.7363843	2.69177E-05
Residual	59	0.282768576	0.00479269		
Total	60	0.382151591			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.0014405	0.009122103	-0.1579117	0.87506563	-0.01969377	0.0168128	-0.0196938	0.0168128
X Variable 1	**0.92133018**	0.202324642	4.55372203	2.6918E-05	0.516479505	1.32618085	**0.51647951**	**1.32618085**