How does sustainability reporting matter?

An event study on the value relevance of sustainability reporting in the Nordics

Likang Lu 41365   Wanting Guo 41370

Abstract

We examine stock market's reaction to corporate sustainability disclosure, specifically, annual sustainability reporting. The purpose of this study is to investigate the value relevance of sustainability reporting evidenced from investors' reaction to the newly released sustainability information. Our sample consists of 731 observations of sustainability reporting release between 2009 and 2018, corresponding to 122 public listed firms incorporated in Sweden, Finland, Norway and Denmark. Based on the single-sample T-test on the aggregated abnormal return and the multivariant regression analysis, we find that stock market does react to the release of sustainability reports, and the magnitude of such reaction is positively associated with the reporting firm's sustainability performance, supporting the value-enhancing theory of sustainability. We also find that i) the positive association between stock market reaction and sustainability performance is stronger for firms in a weaker information environment; and ii) issuing sustainability reports in the stand-alone form will lead to stronger positive association between stock market reaction and sustainability performance, only when the reporting firm has superior sustainability performance. Our findings provide empirical evidence on Nordic stock market's reaction to sustainability reporting, help corporate internal parties in their decision making about sustainability reporting, and offer public sector players reference for the cause of sustainability.

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1 Introduction

During the last two decades, the issue of sustainability has drawn attention both from the business press and from substantial body of academic literature (Malik, 2014). With dramatic increases in sustainability investments and endorsement from the administrations, sustainability has gradually become the center of focus both of business development and of investors' attention span[1]. As such, there is an increasing demand from public on firms' disclosure on their sustainability engagement. More and more guidance and regulations have been formulated and enacted to enhance sustainability disclosure. According to the latest KPMG sustainability survey (KPMG, 2017), regulation, stock exchanges and investor pressure are the three main drivers that help to increase the national sustainability reporting rates. EU countries such as Finland, Ireland, Greece and the Czech Republic have recorded increases of 8% between 2015 and 2017. Increasing numbers of firms are involving themselves in sustainability reporting and sustainability activities. From 2006 to 2018, the number of investment companies that committed to incorporating sustainability into their investment decision has grown from 63 to 1,715 (Harvard Business Review, 2019). This corresponds to the fact that investors are advocating for sustainability and claiming that they will incorporate sustainability in their trading philosophies.

Under such trend, a large portion of attention has been allocated to the discussion and verification of whether the reporting companies are "walking their talk"[2] (for example, see Lyon & Maxwell, 2011; Morimoto et al., 2005). Comparably, there are much fewer discussions about the walking and talking from the side of investors. Whether, and how does market react to sustainability information hence become an interesting topic to pursue.

Companies conduct sustainability disclosure via multiple channels such as advertising or websites disclosure, of which the major and most comprehensive channel is the annual

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[1] According to the *2018 Global Climate Change and Sustainability Services investor survey* (Ernst & Young, 2017), only 3% of respondents said they conduct little or no review of non-financial disclosures, and for those who conducted either informal (65%) or a structured, methodical evaluation (32%), very few ignore ESG factors.
[2] The definition of "Walk" and "Talk" from the side of companies is extracted from the most recent investigation into this issue in Sweden by Mistra Center for Sustainable Markets (Misum) at the Stockholm School of Economics, who has released in September 2019 the third edition of *Walking the Talk* report in three consecutive years. They refer what companies say they will do as "Talk", and what companies say they have done as "Walk".

sustainability report (Dhaliwal et al., 2011; Du et al., 2017). Sustainability reports are referred to under different names, including "sustainability reports", "CSR reports", "environmental reports", "GRI reports" and "Citizenship Reports" (Mahoney et al., 2013). Regardless of the title, it is viewed as the key vehicle through which the sustainability performance of a firm is communicated to external stakeholders, providing far greater depth and breadth for the most updated sustainability information (Du et al., 2017). Combining the critical role that annual sustainability reporting plays in sustainability disclosure together with investors' seemingly enchantment of sustainability performance gives rise to our research question:

How does sustainability reporting matter?

The question could be divided into two main sections. First, we would like to explore whether and how the stock market reacts to the release of sustainability reporting. Secondly, we are interested in whether and how the stock market's reaction interacts with sustainability performance communicated through sustainability reporting, the form of sustainability reporting, as well as the information environment of the reporting firm.

While the market's reaction to financial information has been examined in depth over the years, its reaction to sustainability information is full of ambivalence. Traditional shareholder theory suggests that a corporation's responsibility is to maximize shareholder return, where sustainability is regarded as an extra cost (Friedman, 1970). On the other hand, the amount of research about the value-enhancing capabilities of sustainability has increased significantly over the past two decades (Malik, 2014). High sustainability performance and high firm value seem to go hand in hand (Klassen & McLaughlin, 1996; Luo & Bhattacharya, 2009). Meanwhile, there is also concern stemming from the cost side about whether it is worthwhile to prepare sustainability reports (van Wensen et al., 2011). With all these conflicting factors present, the effect and function of sustainability reporting become quite unclear. Therefore, the impact of non-financial information such as sustainability disclosure on investor's behavior merits research.

The contributions of this paper fall in three aspects. Firstly, we contribute to the literature of sustainability value relevance and sustainability communication by conducting a research on sustainability reporting in the Nordic context. To our knowledge, there hasn't been any

previous study that specifically looks at the market reaction to sustainability reports using a Nordic sample. Our research therefore helps to provide empirical evidence on the value-enhancing capabilities of sustainability reporting in the Nordics.

Secondly, we include reporting form as a variable and conduct a more detailed classification on sustainability disclosure. Previous event studies use only the release of stand-alone sustainability reports as sample and purposely exclude separately issued sustainability reports that were released at the same date with annual reports from their sample[3]. With this elimination, the possibility of comparing certain effects of stand-alone reporting and integrated reporting is limited. By documenting and comparing both the release date of annual report and (if applicable) the release date of separate sustainability report, we avoid such limitation. In the same vein, our research not only examines the reporting form of sustainability, but also the timing differentiation of sustainability information release in relation to non-sustainability information release, such as earnings. Our grouping method for sustainability reporting form shows the timing difference, where we distribute the samples according to the release date of information as well, not only according to form.

Thirdly, we examine the role played by the information environment in the interaction between market reaction and sustainability performance. The information environment is regarded as a critical factor in research about market efficiency and market reaction (Lang et al., 2002). By incorporating the information environment into the research of sustainability disclosure, we find that the effect of sustainability reporting is subject to the information environment that the firm is in, which would help management to make more informed decisions about the choice different forms of sustainability reporting with regards to the size of the firm.

This paper consists of six main sections. Section 2 introduces the efficient market hypothesis, theories on different views about the effects of sustainability, and summarizes prior research on the market reaction to sustainability information. Section 3 develops our research into five hypotheses. Section 4 outlines our overall research design and methodology, specifies our models, variables and describe the data collection process. Section 5 is a presentation of the descriptive statistics, hypothesis testing results as well as the robustness tests. Finally, in

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[3] For example, Yu et al. (2013) selected Fortune 500 companies as their sample but eliminated observations if there is annual report release at the same date or if the company issues integrated annual reports.

section 6 we summarize our findings, present concluding remarks and limitations of this paper.

2 Literature Review

The studies of value relevance of accounting information are mainly conducted from one of the two major perspectives: the signaling perspective and the measurement perspective. The signaling perspective looks at whether there is a market reaction to the publication of the accounting information in question, while the measurement perspective measures the explicit relationship between company value and accounting measures (Hellström, 2006).

By studying the market reaction to the release of sustainability report, our paper takes the signaling perspective. In the following section of the literature review, we first introduce the underlying theoretical assumption of the signaling perspective, i.e. the efficient market theory. Secondly, we discuss the two major streams of sustainability accounting research, the agency theory and the stakeholder theory. In the end, we summarize relevant prior research that looks at the market reaction to sustainability information.

2.1 Efficient market and value relevance of accounting information

The efficient market theory or hypothesis (EMH) has long been extant as one of the most fundamental assumptions on the functionality of the stock market. In general, the ideal is a market in which prices accurately signal the allocation of resources. It is a financial economics theory that deems the market efficient by stating the asset prices in the market reflect all the relevant and available information. Fama (1970) concludes that based on empirical evidence, for a strong level, all relevant information is reflected in the stock price, for a semi-strong level all publicly available information is reflected in the stock price, for a weak level, the history of the prices is reflected in the current price of the stocks. This implies that the attempt to "beat the market" is outright pointless. Once the new information is disseminated, the market would capture it and incorporate it into the stock prices without delay.

The EMH is the underlying assumption of studies that look at stock market price to examine the value relevance of a certain kind of information or events. According to the EMH when the market is at least semi-strong efficient, public information is absorbed by the market instantly by investors making revisions on their expectations. Therefore, by looking at the stock price changes (usually represented by cumulative abnormal returns) resulted from the release of some certain information or the occurrence of some certain events within a short window,

researchers can measure the economic influence brought by the information or event, i.e., the value relevance of the information or event (Mackinlay, 1997).

2.2 Value relevance of sustainability information

The primary purpose of accounting is to "provide information that is useful for making business and economic decisions" (Financial Accounting Standards Board 1978, p. 15). While the original focus is on financial information, as early as in the 1980s, researchers began to identify the role of corporate social responsibility information in investors' evaluations of investment desirability (see Patten, 1990). In the 21st century, the emergence of sustainable development as the complex notion through which social and environmental issues must be addressed has had a growing influence in the accounting literature (Gray, 2010).

The value relevance of accounting information discussion naturally extends to the value relevance of sustainability information. Generally, there are two competing streams of theory explaining what sustainability means to a company, i.e. the shareholder and stakeholder theory. Before we start to elaborate on these two streams of theory, first we discuss the overview of sustainability information per se.

2.2.1 Overview of sustainability information

The evolution of the corporate sustainability concept has taken place over the last several decades. In the 1930s, a Harvard Law Review article argued in support of the responsibilities of managers to society in the 1930s (Dodd, 1932). This could be viewed as the beginning of the discussion about sustainability issue (Taneja et al., 2011; Malik, 2014). Organizations began to speak about "accounts of sustainability" more than 30 years ago (Gray, 2010). Around the year 2000, the emphasis of corporate sustainability and corporate social responsibility (CSR) could be seen in the accounting literature. The focus has primarily been on firms' sustainability as well as sustainability disclosure, and the association of those two factors with various accounting and financial variables (Malik, 2014).

Even after decades of research and practice on sustainability information, ambiguity in the concept and scope of corporate sustainability remains. Literature has used many definitions of the term corporate sustainability, and meanwhile terms of corporate citizenship, corporate social investment, the triple bottom line, socially responsible investment, and corporate

governance have been added to the sustainability literature from time to time (Taneja et al., 2011). The most used three terminologies that usually interchangeably refer to corporate sustainability issues are: Sustainability, CSR, and ESG (Environmental, Social and Governance). Distinguishing among these terms is both not clear in the academic literature and out of the scope of this paper. We use sustainability as the inclusive terminology for consistency to incorporate sustainability, CSR and ESG.

Sustainability information is disclosed in different forms. We are particularly interested in the form of sustainability reporting. According to the Global Reporting Initiative, sustainability reporting is the practice of corporations of measuring, disclosing and being accountable to internal and external stakeholders for organized performance towards the goal of sustainable development in terms of the economic, environmental and social impacts caused by its everyday activities. Put in academic context, sustainability reporting can be conceptualized as documents that represent management's communication with its stakeholders on issues that go beyond financial profits (Gary et al., 1995). It promotes corporate social transparency by providing additional information about the generation of profits as a supplement to traditional financial statements (Williams et al., 1999; Williams, 1999). In this respect, the term sustainability reporting takes a broad and diverse scope and includes, but not limited to, the disclosures of community involvement, employee well-being, supplier and customer interactions, product responsibility and so on (Williams, 1999).

Annual sustainability reporting is critical compared with other forms of sustainability disclosure in that it provides far greater depth and breadth in conveying a firm's overall sustainability performance than alternative methods of sustainability communication (Du et al., 2017). According to Du et al. (2017), from a public policy angle, a comprehensive, in-depth, and well-structured sustainability report, as compared to numerous scattered and disintegrated filings, would streamline the process of monitoring and information acquisition by key stakeholders.

2.2.2 Agency Theory

The role and nature of sustainability in business has long been a substantial debate in the academic community. Generally, there are two major theory streams providing contradictory explanations to the stock market's reaction to corporate sustainability disclosures. Based on

these two streams, we could form our hypothesis about whether sustainability is perceived as a positive aspect of the company or not.

Friedman (1970) takes the shareholder value maximization view and states that the goal of the management is set by shareholders and should be to maximize the return on shareholder's investment. Sustainability efforts are in turn viewed as the cost incurred in the process of doing business, compromising the profits which otherwise the businesses could have generated. Since improving sustainability is not always cost-efficient (especially in the short run), in most instances managers' socially responsible acts will go against the wishes of shareholders as managers are contractually bound to increase profits and not to undertake socially responsible activities. Rappaport (1986) and Jensen (2001) share Friedman's opinion that sustainability is an additional and unnecessary cost. Tirole (2001) on the other hand takes the angle of performance measurement and states that including sustainability as an explicit part of management's terms of employment would make enforceable managerial contracts unrealistic. In contrast, profit maximization and share price increase are easily observable and could be used as criteria of performance metrics to make managerial contracts enforceable.

Empirical literature supporting the agency theory is also plenty. For example, Cheng et al. (2012) find that spending on sustainability is due partially to agency problems. Krüger (2015) finds that investors respond negatively to positive events concerned with a firm's sustainability issues, which is more likely to result from agency problems based on the shareholder theory.

2.2.3 Stakeholder Theory

The stakeholder theory was first introduced by Freeman (1984) to challenge the shareholder perspective. It advocates that companies are responsible not only for its shareholders, but also for a broader group of stakeholders, namely everyone who is substantially under the effect of or potentially affected by the welfare of the company. As an extension to Freeman's view, Donaldson & Preston (1995) in their analysis of the stakeholder theory state that there is an intrinsic value in the different stakeholder relationships of the firm. Therefore, by undertaking sustainability activities managers can enhance the value of stakeholder relationships without disadvantaging shareholders, and eventually increase the value of the company. In other words, the stakeholder theory suggests that socially responsible firms can and often do adhere to value-maximizing corporate governance practices.

This value-enhancing capability of sustainability has been tested from multiple angles (Malik, 2014), and empirical research supporting the existence of benefits brought by sustainability has been done on various facets of firm performance, including enhanced operating efficiency, product market gains, M&A value enhancement, and capital market benefits. For example, using US data, Deng et al. (2013) find that in mergers, high CSR acquirers realize higher announcement returns and larger increases in post-merger long-term operating performance; Richardson & Welker (2001) and Dhaliwal et al. (2011) find strong negative association between corporate sustainability performance and the cost of equity capital.

The empirical literature testing these two competing streams of theory is mixed and thus has left the issues raised in the question "to whom are corporations accountable for" largely unresolved (Ferrell et al., 2014). By testing the market reaction to the sustainability reports, we participate in this intense discussion and examine which theory is more evidenced with Nordic data. Our paper could therefore for one thing help to clarify the ambiguity in the relationship between sustainability and firm value, and for another, provide empirical evidence to aid the corporation decision making when it comes to sustainability disclosure.

2.3 Prior research on market reaction and sustainability
Literature on the value relevance of sustainability information is abundant, taking two perspectives of the issue. The first one is the measurement perspective and the second the signaling perspective. These two perspectives are both developed through signaling theory. Grounded on the EMH and asymmetric information, signaling theory is used to describe behavior when two parties have access to different information. Typically, one party, the sender, must choose whether and how to communicate (or signal) that information, and the other party, the receiver, must choose how to interpret the signal (Connelly et al., 2010). In our discussion, the two parties would be the company and the market (external shareholders), and the information to be signaled is sustainability information, where sustainability reporting is the primary channel for the signaling.

The measurement perspective measures the explicit relationship between market indicators of the value of the company and accounting measures. It is usually conducted with a regression model, using linear regression and constructed indicators to account for the value of the

company. In contrast, signaling perspective emphasizes the time when the sustainability information is released and its influence on the firm value, conducted through assessing the market's reaction. The advantage of adopting the lens of signaling perspective is that it is possible to narrow the scope of the independent variables and control for other events or environment changes that otherwise would be hard to rule out. Below are some important prior studies on sustainability information and market reaction based on signaling perspective.

Clacher & Hagendorff (2012) apply an event study methodology to examine the stock market reaction to the announcement of firm inclusion in the social index (FTSE4Good Index). They find no strong evidence in favor of a positive market reaction in the UK. Wang et al. (2011) make comparisons with different groups of investors' behaviors as well as the difference before and after a CSR scandal (melamine contamination incident) was revealed to the public in China. They find that while neither the individual investors' nor the institutional investors' behaviors are influenced by firms' CSR performance before the incident, institutional investors' behaviors are significantly influenced by firms' CSR performance that exceeds a certain threshold in the post-event period. Flammer (2013) conducts an event study around the announcement of corporate news related to environment for all US publicly traded companies from 1980 to 2009 and finds that companies reported to behave responsibly toward the environment experience a significant stock price increase, whereas firms that behave irresponsibly face a significant decrease. In contrast, using news events about corporate sustainability events generated from the KLD database in the time period of 2001 to 2007, Krüger (2015) finds that investors react strongly negatively to negative news about CSR, and weakly negatively to positive events.

Du et al. (2017) also choose the event study as the methodology to identify short-term stock market reaction to the release of stand-alone sustainability reports of Fortune 500 companies in the period 2005 to 2011. They find that abnormal stock returns around the release of such reports are positively related to firm sustainability performance, and this positive link is smaller for firms in a strong information environment.

Prior research on market reaction to sustainability information based on signaling perspective has been conducted with data from different countries, and event study is the most popular choice of methodology. The advantage of event study is that the precise knowledge of the

timing as well as the information contained in an event allows discarding alternative explanations for changes in shareholder value (Krüger, 2015).

Scholars have looked at different manifestation of sustainability information, such as companies' involvement to sustainability index or the release of positive or negative sustainability news. Comparably, there has been much less research directly examines the market reactions to the release of sustainability reporting except the one by Du et al. (2017). A summary of relevant literature can be found on the next page in Table 1. Our research therefore contributes to the sustainability value relevance literature by providing empirical evidence on the value-enhancing capabilities of sustainability in the Nordic context.

Table 1. List of relevant articles

Author	Sample	Method	Event in concern	Result
Wang et al. (2011)	Firms listed in China's stock markets with sales over 1.5 billion USD in 2017	Event Study with regression	CSR scandal (melamine contamination incident in China)	Institutional investors' behaviors are significantly influenced by firms' CSR performance that exceeds a certain threshold in the post-event period
Clacher & Hagendorff (2012)	UK firms who are included in the FTSE4Good index from 2001 to 2008	Event Study with T-test and regression	Firm's inclusion in social index	No strong positive market reaction found
Flammer (2013)	Environmental press coverage from 1980 to 2009 on Wall Street Journal	Event Study with T-test and regression	Corporate environmental news	Significant stock price increase for companies reported to be sustainable
Krüger (2015)	Publicly listed large U.S. firms with KLD database	Event Study with T-test and regression	Corporate sustainability news	Investors react strongly negatively to negative news, and weakly negatively to positive events
Du et al. (2017)	Fortune 500 companies who issued stand-alone CSR reports during 2005-2011	Event study with regression	Release of stand-alone sustainability reports	a) Abnormal returns were found on the release of SR b) Abnormal returns were positively related to sustainability performance
LaGore & Thorne (2015)	U.S companies who issued stand-alone sustainability reports in 2006	OLS regression on cumulative returns over 12 & 24 months after issuance	Release of stand-alone sustainability reports	Firms with a stronger CSR track records are issuing stand-alone CSR reports to reap higher stock market

3 Hypothesis Development

In this paper, we measure the value relevance of sustainability reporting by looking at the market reaction to the newly released sustainability reports. We are interested in the interaction between market reaction and sustainability performance, the moderating effect of reporting form, as well as that of information environment. We divide our research question into five hypotheses, where hypothesis 1 and 2 look at the jointed market reaction, while hypothesis 3 to 5 look at how market reaction interacts with sustainability performance, reporting form and information environment.

3.1 Market reacts to sustainability reporting

Based on the hyped scene of sustainability development, we presume investors do incorporate sustainability information into their decision making. According to Du et al. (2017), annual sustainability reporting could be viewed as the most comprehensive and in-depth communication channel through which the most updated sustainability information is conveyed to its investors. Combing these two theoretical assumptions, market should react to the release of sustainability reporting. In other words, the company share will yield a return different from the time when the information contained in sustainability reports are not available.

Further, we need to distinguish the difference between stand-alone and integrated sustainability reports. Previous studies on the market reaction to sustainability reporting mainly limit their sample with the stand-alone sustainability reports. The advantage of doing so is that one can safely assume that the corresponding market reaction comes from sustainability information alone since in stand-alone sustainability reports no other new information such as financial performance is released. However, the major disadvantage of taking this angle is that the sample size will be very limited. We hence also include the sustainability reports released along with annual reports into our sample (the classification between stand-alone and integrated sustainability reporting is discussed more in detail in methodology section). In the case of integrated reporting, the market reaction comes from the mixture of sustainability information and non-

sustainability information, where the non-sustainability information includes assured accounting information that is vital to the market judgment and evaluation of companies' performance for that fiscal year.

We use levels of financial performance as a rough classification criterion to distinguish the market reaction to the non-sustainability information from the market reaction to sustainability information. We want to examine, for integrated reporting firms with the same level of financial performance, whether the market reaction to their annual reports will differ if they have different levels of sustainability performance.

Following stakeholder theory, sustainability engagement should be value enhancing. This means that market should react positively if the sustainability report indicates that the company performs well in sustainability and react negatively if otherwise. Meanwhile, according to the EMH and financial information value relevance theory, ceteris paribus, market should react positively to firms with higher level of financial performance and negatively otherwise. In this vein, if a firm performs well only in sustainability or only in financial metrics, the reaction with opposite directions will cancel out each other assuming their effects could lead to market return at approximately the same level but in different directions, and the aggregated market reaction should turn out close to 0.

We therefore develop hypotheses 1 and 2 as follow:

H1: The stock market has a significant reaction to the release of stand-alone sustainability report, where

H1(a): The reaction will be positive if the reporting firm has high sustainability performance;
H1(b): The reaction will be negative if the reporting firm has low sustainability performance.

H2: The stock market has a significant reaction to the release of integrated sustainability report, where

H2 (a): The reaction will be positive if the reporting firm has high sustainability performance and high financial performance;

H2 (b): The reaction will be negative if the reporting firm has low sustainability performance and low financial performance;

H2 (c): The aggerated reaction will not differ from 0 if the reporting firm has high sustainability performance but low financial performance, or if the reporting firm has low sustainability performance but high financial performance

3.2 Sustainability performance, reporting form, firm size and market reaction

As mentioned in 3.1, market could have opposite reaction depending on the sustainability performance communicated in sustainability reporting. For firms performing better in sustainability, sustainability reports will more likely convey good news; for firms performing relatively poor in sustainability[4], sustainability reports will more likely convey bad news (Dhaliwal et al. 2011; Du et al. 2017). As a result of the release of the sustainability report, more investors will pay attention to and comprehend more about the firm's superior or inferior sustainability performance, and consequentially leading to positive or negative abnormal returns, respectively. However, to explore more in depth, we investigate the magnitude of the market reaction. This means we deem the scale of market reaction in relation to sustainability performance is of interest, not only the direction of the market reaction in face of sustainability reporting.

Worth noticing is that such prediction is based on the credibility of sustainability report. This premise states that all information conveyed in sustainability reporting is generally sufficiently grounded and supported with high confidence level. Prior research has supported such assumption. For example, Healy & Palepu (2001) summarize in their literature review about asymmetry information that voluntary disclosure, such as sustainability reports, is generally credible. We hence pose the following hypothesis.

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[4] We define when a firm achieves better ESG scores than the industry median, they perform "relatively good" and when a firm achieves lower ESG scores than the industry median, they perform "relatively poor". More details of this classification can be found in the methodology session of this thesis.

H3: The market reaction magnitude around the release of sustainability report will be positively associated with the reporting firm's sustainability performance.

Research on information disclosure also indicates that the value relevance of the information of interest is subject to the salience of the reporting item (Holthausen & Verrecchia, 1988). According to Du et al. (2017), the form of reporting affects the salience of the reporting item, where they find that firms with stand-alone sustainability reporting enjoy a higher level of value relevance compared to those who do not produce stand-alone reports. Moreover, the voluntary disclosure theory states that firms issue stand-alone sustainability reports to ensure that stakeholders are aware of the appropriateness of the actions taken by the firms on social and environmental issues (Clarkson et al., 2011; Gray et al., 1995). Thus, stand-alone reporting would presumably carry more magnitude regarding value relevance. In the same vein, we pose hypothesis 4.

H4: The positive association between the market reaction around the release of sustainability report and the reporting firm's sustainability performance is stronger for firms that issue stand-alone sustainability reports, compared to those issue integrated sustainability report.

The impact of firm sizes on the new information release's value relevance links with the fact that information environment plays a critical role which influences the amount of information available from firms' reporting activities. For financial information, the financial disclosure literature shows that information cross-sectional differences affect the extent to which market reacts to earnings announcements, which is partly due to the variation in information environment and the different processes in dissemination of news (Atiase, 1985; El-Gazzar, 1998). Extending the notion to sustainability reporting, the effect of previously unavailable sustainability information which will be first revealed by sustainability reporting on market reaction, could also be subject to the similar effect that specific information environment has.

Branco & Rodrigues (2008) conduct a study on information environment and suggest that firms in a strong information environment, such as larger firms who expose themselves to a wider range of investors, are more likely to communicate sustainability information publicly to institutional investors. This argumentation corresponds with the EMH, which indicates that the larger the firm is, the more likely that its investors have already incorporated public information on sustainability subject through press releases or corporate official website prior to systematical sustainability reporting. Thus, the amount or portion of new information released in sustainability reporting would be lower. In contrast, for smaller firms in a weaker information environment, sustainability information is not as accessible as those of larger firms, raising the possibility that sustainability reporting might in fact have higher portion of new information compared with larger firms. The scale of market reaction under different levels of information environment could also interfere with value relevance of sustainability performance. Thus, we have hypothesis 5, where

H5: Around the event release, the association between the CAR and firm's sustainability performance is stronger for smaller firms compared to larger firms.

4 Methodology and Data

To answer our research question, we employ the event study methodology to examine the market reaction to the release of sustainability information and use a linear regression model to analyze if the magnitude of the market reaction is influenced by the reporting form of sustainability information. Accordingly, we divide the empirical design into two parts: i) the event study methodology, ii) additional regression based on the result of the event study.

4.1 Event study

According to the EMH, when the market is at least semi-strong efficient, public information concerning firm value will be constantly absorbed by the market and consequently be shown from the variability of stock prices. Therefore, by measuring the abnormal movement of stock prices within a relatively short period surrounding the occurrence of the event in question, we will be able to verify whether the information released from the event has influence on firm value (Mackinlay, 1997).

To catch the market reaction over the event, two measures are of interest. The first and most important one is the cumulative abnormal return (CAR). In addition to the CAR, another informative measure is the trading volume (Campbell & Wasley, 1996). The underlying mechanism is that if the newly released information is value relevant, investors will make transactions based on it, resulting in a higher trading volume within the short period around the event. Our event study mainly looks at the CAR measure and uses trading volume as a supplementary description in order to draw overall inference from the event of interest.

4.1.1 Event of Interest and Event Window Specification

The event of interest is the release of annual sustainability reporting, which takes place on the release day of the annual sustainability report. Event window is the period over which the stock prices of the firms effected by the event will be examined. According to Mackinlay (1997), it is a customary call to define the event window to be longer than

the specific period of interest. Inclusion of the periods prior to the event could be of interest because this allows for the examination of the possibility that the market may acquire information prior to the release, while inclusion of the periods post to the event captures the lag effects of the release. A longer window helps to capture the entire event of interest while a shorter window lowers the risks of including other impactful events in the window (Mackinlay, 1997). Also, setting the event window longer will result to a smaller sample set because the chance that the trading days within the event window are fewer than our requirement will be higher.

Accordingly, we initially test an event window of (-10, 10)[5]. Based on the graph of the average CAR for event window (-10, 10), we consider an event window of (-1, 5) to be appropriate[6]. It is adequately long that allows enough time for the market, even in a relatively weaker efficient state, to digest and react to the effect. Meanwhile seven days in total is also reasonably short to less the chance of including other impactful events into the window. It allows for consideration about pre-emptive market movement related to the estimation of information in future release.

4.1.2 Measurement of CAR

The CAR is the aggregation of abnormal returns for an individual security (Mackinlay, 1997). The average CAR is the defined measurement of the overall event impact showcased on the stock market. The CAR is calculated as the sum of abnormal returns both across securities and through time, while abnormal return is the difference between daily actual stock return and the daily "normal" stock returns estimated based on the assumption that the event never occurs.

Measurement of normal returns

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[5] The event day is deemed 0. (-10, 10) means the period of the 10 days prior to the event to the 10 days post to the event.
[6] We test a shorter window of (-1, 1) following similar studies on the U.S. sample (Du et al., 2017; Yu et al., 2013). In our case, in order to clear the bias which neglects the following reaction in the market of the trading week, we employ an event window of (-1, 5). This event window not only captures the pre-emptive reaction by the market, but also a more comprehensive reaction starting from the event date and lasting for a trading week.

The normal return is defined as the expected return without conditioning on the event taking place (Mackinlay, 1997). It is estimated using a normal return model, such as the constant mean return model, the market model and the economic models. We use the market model in our research following MacKinlay (1997), who states in his article that market model is arguably more sophisticated than the constant mean return model. Meanwhile, sustainability reporting is in most cases released in March, April or May every year in our sample. In such cases, where event dates are to some extent clustered with respect to calendar time, market model is the suggested model according to Peterson (1989). There are also more advanced models such as multi-factor model, but their results are qualitatively similar to the market model.

Same as the event window, there is also a trade-off concerning the length of the estimation window. A shorter window is beneficial in that the economic conditions are better reflected in the normal return, while the additional sampling error variance to the variance of the abnormal return could be assumed as 0 with a long enough estimation window. We define our estimation window to be (-100, -20) in relation to the event day in reference to both MacKinlay (1997) and Du et al. (2017), where the latter has similar research setting with us and conduct event study on the release of sustainability reports. According to them, (-100, -20) is a period that can balance the trade-off of having a long or short estimation window. We require at least 70 daily returns available in the estimation period and eliminate those observations that don't qualify.

Estimation of Normal Returns

The market model for any security, *i*, can be specified as follow:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$$
$$\mathrm{E}(\varepsilon_{it} = 0), var(\varepsilon_{it}) = \sigma^2_{\varepsilon_{it}}$$

where R_{it} is the return of security *i* in period *t*, R_{mt} is the return of market portfolio in period t, and ε_{it} is the zero-mean error term. α_i, β_i and $\sigma^2_{\varepsilon_{it}}$ are the parameters of market portfolio (MacKinlay, 1997). Ordinary least square (OLS) is used to estimate the market model parameters for the ith firm in event time. To specify the suitable market

portfolio for the pricing of a given stock, in this paper we use the market returns downloaded from Wharton Research Data Service. In their International Event Study section, market returns are gathered automatically from Compustat Global[7] after specifying the country of the security of interest.

Calculating the Abnormal Returns

Abnormal returns are calculated by subtracting the estimated normal returns from the actual returns of the security. The calculation can be specified as follow (MacKinlay, 1997):

$$AR_{it} = R_{it} - \widehat{\alpha_i} - \widehat{\beta_i} R_{mt}$$

where $\widehat{\alpha_i}$ and $\widehat{\beta_i}$ are the estimated intercept and slope from the OLS market model for security i. R_{it} is the actual return on security i in period t, while R_{mt} is the market returns gathered from Compustat Global. The notion behind this action is that abnormal return is the walk from the estimated return based on market return in the according period. Abnormal return represents the impact any additional information or unexpected market momentum has on the value of the stock, thus can be used as a metric to indicate value relevance of events of interest. Abnormal returns are essentially the excess returns that cannot be explained by market returns. According to our assumption of the EMH, new information plays a key role in the formulation of abnormal returns, which attributes to sustainability reporting.

Aggregation of Abnormal Returns

Following MacKinlay (1997), as a next step for the test of influence by events of interest, abnormal returns need to be aggregated along two dimensions so that the overall inferences for the event of interest could become viable. The two dimensions of the aggregation are through time and across securities. The aggregation result of the abnormal returns is CAR. $CAR_i(t_1, t_2)$ is defined as the sample cumulative abnormal returns for security i from time t_1 to t_2. The formula is as follow:

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[7] Data provided by International Event Study (Compustat Global), Wharton Research Data Services.

$$CAR_i(t_1, t_2) = \sum_{t=t_1}^{t_2} AR_{it}$$

After the aggregation through time and across securities, we arrive at the average CAR for any interval in the event window given N events as

$$\overline{CAR}_{(t_1,t_2)} = \frac{1}{N} \sum_{t=t_1}^{t_2} CAR_i(t_1, t_2)$$

where $\overline{CAR}_{(t_1,t_2)}$ is the average CAR over the event window, $t_1 = -1$ and $t_2 = 5$. We then conduct a single-sample T-test on the average CAR over the event window for N events to see if CAR significantly differs from 0. The test statistic is given by

$$t_{CAR} = \frac{\overline{CAR}_{(t_1,t_2)}}{S[CAR(t_1, t_2)]}$$

where $S[CAR(t_1, t_2)]$ is the standard deviation of $CAR(t_1, t_2)$. If the absolute value of t_{CAR} is above the critical t-value (1.96 at the 5% significance level), we can reject the null hypothesis and say the average CAR is significantly different from 0, which is an indicator of two-tailed T-test. As for one-tailed T-test, we can change our focus to p value, which measure the probability of obtaining test results at least as extreme as the results observed during the test, assuming that the null hypothesis is correct. If p value is lower than the significance level, then we can reject the null hypothesis. If p value is generated from a default two-tailed test, we can adjust this p value to a one-tailed p value by simply dividing it in half. Following that, we can compare p value to 1%, 5% or 10% significance level to decide whether to reject the null hypothesis.

4.1.3 Classification of the Event Study Sub-groups

We divide our event sample into six sub-groups based on reporting form, sustainability performance and financial performance. The rationale of each classification criterion is detailed as follow.

Reporting Form and Financial Performance

We deem one sustainability report as stand-alone if both criteria are met: i) the sustainability report is issued on a different day from the annual report released day; ii) the sustainability report contains information that is distinct from the information

disclosed in the annual report. If one of the criteria isn't met, we deem the sustainability report as integrated.

This classification is important in that when we conduct event study on stand-alone sustainability reports, on the event day (i.e. the day when the stand-alone sustainability report releases) only sustainability information is disclosed to the market. This allows us to see the effect caused by sustainability information per se, without other disturbance information such as financial restatement in the annual report. This doesn't hold when the sustainability information is integrated within annual report.

It is challenging to isolate the effect of sustainability information when it is disclosed along with the whole annual report. We decide to use financial performance represented by earnings per share (EPS) as a rough approximation. Research about the informativeness of annual report is focused primarily on accounting earnings, i.e. financial information (Kwon & Wild, 1994), meaning that financial earnings is the most influential information released by annual report. Therefore, financial performance should be the first and most important criterion to be choose when classifying annual reports. Follow the same vein as the rationale between dividing sustainability reports into high ESG (good news) group and low ESG (bad news) group (Du et al., 2017), annual reports issued by firms that have superior financial performance will more likely convey good news, while the annual reports issued by firms with inferior performance will more likely convey bad news. For each event, i.e. for each release of an integrated sustainability report, if the corresponding annual EPS is above the median EPS by industry, we classify this event into the "high EPS" group, otherwise the "low EPS" group. In this manner, we can verify whether market reaction differs on the interplay of levels of sustainability performance and levels of financial performance.

Sustainability Performance

To acquire the distinction desired between better performing firms and worse performing firms in terms of sustainability, there are several different methods of measurement advocated in prior studies.

Martinelli & Psychogyios (2014) employ content analysis on the sustainability reports

they collect in their master thesis, based on the metrics and indicators from environment, social and governance perspectives according to the Global Reporting Initiative's (GRI) G4 sustainability reporting guidelines (Global Reporting Initiative, 2016a). They assess the content of the sustainability reports and assign scores subjective to their own judgements according to the criteria they referred to. The GRI provides a set of different and comprehensive metrics to include every aspect when rating a company's sustainability performance. However, the disadvantage of this method is that the judgement on whether certain perspectives in the sustainability reports meet the criteria might be biased and it is subject to personal perception of the content of sustainability reports.

Yu et al. (2013) take another perspective, utilizing the already extant database on the evaluation of the sustainability performance of KLD ratings. KLD ratings have been used extensively in corporate social responsibility related literatures (e.g., Dhaliwal et al., 2011; Godfrey et al., 2009; Servaes & Tamayo, 2013; Waddock & Graves, 1997) and are considered as "the de facto (CSR) research standard" (Waddock, 2003). The rationales behind the usage of KLD ratings are that first, the KLD database comprehensively covers multiple social and environmental domains, including environment, community, diversity, employee relations, product, and human rights, and corporate governance. Second, KLD ratings are especially resourceful when the researches target sample companies from the US, which KLD database is based on.

In addition, Malik (2014) points out that archival researchers can also collect large-scale, cross-sectional data for global firms from other databases including Asset 4 Thomson Reuters database, the Bloomberg database, the CRD Analytics and the Dow-Jones Sustainability database. One shortcoming of KLD dataset is that it covers only the US companies, leaving a void among the international studies and researchers who are interested in other geographic settings.

Under this circumstance, the Asset 4 Thomson Reuters database is employed in our value relevance research conducted for companies in the Nordics for three reasons. First, it has comprehensive coverage on the Nordic companies targeted in this research and quick access is guaranteed by resources available. Second, Asset 4 Thomson

Reuters database are designed to transparently and objectively measure a company's relative sustainability performance across ten themes, which include Emissions, environmental product innovation, human rights and shareholders, etc. (Thomson Reuters ESG scores manual, 2017). Third, Asset 4 Thomson Reuters database explicitly states that they base their evaluation of companies' sustainability performances with the company reported data, which is in alignment with our research. The events we are interested in are the releases of sustainability reports, which is the official summary and declaration of the sustainability performance of corporations. Thus, the database reflects directly the level of sustainability performance essentially indicated by the quality of sustainability reporting, but not sustainability news or other possible events that might not be a part of sustainability reporting. We deem the method using Asset 4 Thomson Reuters database appropriate and effective for our investigation.

For the first part of our analysis, according to the ESG scores provided by Asset 4 Thomson Reuters database, a good sustainability performance and a bad sustainability performance are distinguished by the relative position of the ESG scores to the median ESG scores of the industry the firms reside in. This is in line with prior research of Dhaliwal et al. (2011), who also cluster sustainability reporting quality by the relative position to the average of peer firms in the industry. To cluster the industries, we refer to the Standard Industry Classification system, which is the most prevalent industry sectoring method in researches[8]. To avoid the interference of extreme scores in the dataset and arrange same number of events in both groups, the median ESG score is preferred to the average score.

To summarize, we divide the events into six sub-groups, see table 2.

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[8] The Standard Industry Classification system was established in the U.S. in 1937. The SIC codes can be grouped into progressively broader industry classifications: industry group, major group and division. In order to have a more reasonable grouping for each of our company and observation, we used the first two digits of each company which indicates the major group they are in. Detailed industry clusters can be found in the data description session and the appendix.

Table 2. Classification Matrix

Stand-alone Report Low ESG score	Stand-alone Report High ESG score	Integrated Report Low ESG score, High EPS	Integrated Report High ESG score, High EPS
		Integrated Report Low ESG score, Low EPS	Integrated Report High ESG score, Low EPS

4.2 Regression Analysis and Variable Definition

4.2.1 Model Specification

Conducting a single-sample T-test on the average CAR over the event window is a widely accepted method to study the market reaction to an event (Mackinlay, 1997; Peterson, 1989). However, since it is tested on the aggregated level of all event observations in the sample, its significance of result could be shadowed by the different direction of market reaction for each event observation. We try to use the level of sustainability performance and the level of financial performance as the classification criteria to accommodate this problem, but no classification is perfect. Also, the aggregated test doesn't allow us to further our research question into a more in-depth and more sophisticated level. In order to accommodate this problem and meanwhile to see the interaction between market reaction and detailed factors such as reporting form and firm size, we conduct the regression analysis using the CAR of each event as our dependent variable. Using the unaggregated event by event data, one will be able to control for firm specific characteristic factors such as size, profitability and leverage, and therefore could lead to a clearer depiction of the interaction between market reaction and the variable of interest. When analyzing the market reaction to a certain event, regression analysis based on the CAR around the event window is usually the method used (see for example Du et al., 2017; Clacher & Hagendorff, 2012; Wang et al., 2011; Margolis & Walsh, 2003; Godfrey et al., 2009).

In order to test H3, where we predict that the market reaction around the release of sustainability report will be positively associated with the firm's sustainability

performance, we specify our model in reference to Du et al. (2017). The model is as follows:

$$CAR(t_1, t_2)_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 SASR_{it} + \beta_3 PAGES_{it} + \beta_4 PB_{it} + \beta_5 EPS_{it} +$$
$$\beta_6 SIZE\_R_{it} + \beta_7 Leverage_{it} + \varepsilon_{it} \qquad (1)$$

where $t_1 = -1$ and $t_2 = 5$. The subscript i, t refers to firm i in year t. CAR refers to the unaggregated cumulative abnormal return within the event window (-1, 5) generated from the prior-step event study. ESG is the measure of sustainability performance. $SASR$ is a dummy variable of the reporting form. $PAGES$ is the measure of readability. Price-to-book ratio (PB), EPS, $Leverage$ and $SIZE\_R$ in this model are viewed as the control variables to control for firm-specific characteristics. A detailed description of each variable is presented after the introduction of each model.

To test for H3, the coefficient β_1 of ESG is of interest. If the market reaction around the release of sustainability report is positively associated with the firm's sustainability performance as we predict, β_1 will be positive.

As a further step based on H3, in H4 we are interested in how the positive association between market reaction and sustainability performance is influenced by the reporting form. We therefore generate an interaction variable, $ESG * SASR$, to capture such moderation effect. The model is specified as follow:

$$CAR(t_1, t_2)_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 ESG_{it} * SASR_{it} + \beta_3 SASR_{it} + \beta_4 PAGES_{it} +$$
$$\beta_5 PB_{it} + \beta_6 EPS_{it} + \beta_7 SIZE\_R_{it} + \beta_8 Leverage_{it} + \varepsilon_{it} \qquad (2)$$

The difference between model (2) and model (1) is the newly added interaction variable. $SASR = 1$ when the company issues stand-alone sustainability report. Therefore, the association between CAR and sustainability performance in the case of stand-alone reporting is the sum of the coefficients of the variable ESG and the interaction variable $ESG * SASR$, i.e., $\beta_1 + \beta_2$. When the company issues integrated sustainability report, the interaction variable will become 0 and the association between

CAR and sustainability performance is captured by β_1. To summarize, our hypothesis specified in H4 will be verified when β_2 is positive and significant, implying that the positive association between market reaction and sustainability performance will be stronger under stand-alone reporting.

In addition to the interaction effect coming from the reporting form, we are also interested in the interaction effect coming from the information environment. In H5, we predict that the association between CAR during the event window and the firm's sustainability performance is stronger for firms in a weaker information environment, where we assume that the information environment is weaker for smaller firms. We therefore specify model (3) as follow:

$$CAR(t_1, t_2)_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 SASR_{it} + \beta_3 PAGES_{it} + \beta_4 PB_{it} + \beta_5 EPS_{it} + \beta_6 SIZE\_R_{it} * ESG_{it} + \beta_7 SIZE\_R_{it} + \beta_8 Leverage_{it} + \varepsilon_{it} \qquad (3)$$

The interaction variable $SIZE * ESG$ captures the difference in the association between market reaction and sustainability performance resulted from information environment. In order to verify H5, the coefficient, β_6, of the interaction variable needs to be negative and significant.

4.2.2 Variable Specification

The variable ESG refers to the scores that we extracted from the Asset 4 Thomson Reuters database. It serves as the metric in our research to proxy the performance of sustainability information embedded in sustainability reporting. ESG approximates the objective assessment of the sustainability performance and serves as a basis for the overall evaluation of sustainability reporting by the investors. In our research, ESG essentially functions as the most important variable of interest, as the value relevance appears in the form of the interaction of different levels of ESG and different levels of the CAR.

$SASR$ refers to the reporting format that is of interest in this research. In order to distinguish potentially different mechanisms under which sustainability information

links to market reaction, we group all events into sub-groups using the distinction between the ways in which sustainability information is revealed to the public. As mentioned in the previous session of measurements of sustainability form, stand-alone reporting and integrated reporting are the two different reporting styles in reporting format. We set *SASR* as a dummy variable (0 or 1) to represent the differentiation between stand-alone reporting and integrated reporting by assigning the value of *SASR* as 1 to observations when sustainability information is released in stand-alone reporting, and value of *SASR* as 0 among observations when sustainability information is released in integrated reporting. We intend to see whether there are certain correlations between reporting formats and the value relevance to market reaction by distinguishing reporting formats using this dummy variable.

PAGES represents the number of pages of sustainability contents in both sustainability reporting and integrated reporting. We measure the pages by manually looking up the indexes in stand-alone sustainability reports and integrated reports, documenting them and matching them with the companies and the years they were released. *PAGES* essentially controls for the influence factor that stems from the readability of reports. Li (2008) studies readability of annual reports to understand its relationship with positive earnings. Also, extensive literature focuses on the obfuscation hypothesis that argues that managers have incentives to obfuscate information when firm performance is poor because the market may react with a delayed incorporation of the information contained in complicated disclosures (Bloomfield, 2002). One motivation is that the information that is more costly to process is perhaps less completely reflected in market prices (Grossman & Stiglitz, 1980). We introduce this hypothesis as a premise to our study and include readability as a control variable, trying to only evaluate the value relevance of material sustainability information that is firstly aggregately released to the public, in this way controlling for the influences readability has on the reactions market makes.

From prior literature, we infer that metrics other than the effects by sustainability reporting influence on investors' reaction and thus influence on the abnormal return if investors decide to react specifically to the releasing event during the event window (Du et al., 2017). Following Du et al. (2017), we apply the same philosophy in the

setting of the control variables.

SIZE_R measures the information environment that may affect the market's effort to access and reasonably understand the publicized information about a certain company. Collins et al. (2003) and Du et al. (2017) both employ a normalizing method to rank the sizes of the companies of interest. Du et al. mainly conduct this ranking mechanism for *Fortune 500* companies, which are all incorporated in the US. From a scale of 0 to 9, the total sample of companies are ranked according to the scales of their total asset into 10 groups. Then the ranks are divided by 10 and normalized to a scale of 0 to 1. We follow this method and rank our companies of interest on a scale of 0 to 1, accommodating this method to the Nordic context. Du et al. (2017) find out that the size of sample companies has a correlation with the effect that the quality of sustainability reporting has on CAR, which is non-linear. We are particularly interested in this non-linear effect and curious about whether this effect takes place in the Nordic setting. This is to allow for a more comprehensive understanding of the regression results and a more thorough investigation into the secondary value-relevance of sustainability reporting as well.

For fundamentals in the financial performance of the company, we use *EPS*, *Leverage* and *PB* to grasp the inherent characteristics that might impact market reaction to said financial information.[9] In the OLS, the notion is that control variables need to be maintained to prevent distortions that variables other than those we are concerned about trigger on the pursued correlation. For stand-alone reporting, the already disclosed annual reports or year-end reports would impact on CAR in event window given the fundamental analysis perspective, and for integrated reporting, these critical financial performance measure and results are disclosed at the same time to the market as sustainability information, thus would also count for some influence on CARs in event

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[9] Most event studies of market reaction control for financial performance and risk consideration in their model as an effort to isolate these factors inherent fundamentally in the valuation and thus the daily return of a company. *EPS* is used as a profitability measure in fundamental analysis and is one of the most important parameters investors refer to when evaluating a stock. Du et al. (2017), Flammer (2013) and LaGore & Thorne (2015) are examples which control for profitability measures. Due to the uniqueness of our method when measuring the CAR, we decide to use Earnings per Share as our parameter for profitability, because we deem Earnings per Share closer, more intuitive to stock prices, and more convenient for investors to use in valuation.

window. *EPS* stands for the consolidated basic earnings per share excluding extraordinary items for each company in each year subtracted from the annual reports and aligned under a common standard. *EPS* is included in the regression using ordinary least squares (OLS) mentioned above to control for the financial performance for companies in selected years. *EPS* measures the net income divided by the weighted total number of shares, indicating the returns companies yield per share. In order to have a concise and inclusive metric to represent the financial performance of sample companies and to separate out potential impact financial performance has on market that may disturb our research, we assign EPS data obtained from Compustat Capital IQ provided by Wharton Research Data Services (WRDS) to respective CAR calculated using Event study function provided by WRDS. *Leverage* is a common measure that analysts use to evaluate the financial risks firms take on when they are expanding their operations. By including *Leverage* in the OLS, we establish another control variable that might impact the market's reaction and attempt to separate out the influence that the status of perceived risk mirrored by the financial leverage has on the CAR. In addition, we select *PB* as a metric representing the expectation of the market about the stock per se. *PB* is the Price-to-Book ratio, which is calculated by dividing the market capitalization with the book value of equity. It is believed to be a growth indicator and has explanatory power to mean stock returns (Penman, 1996; Chan et al., 1991).

4.3 Sample and Data Collection

Our sample consists of listed companies headquartered in Sweden, Norway, Denmark and Finland with identifiable releases dates of stand-alone sustainability reports or integrated sustainability reports in the period 2009 to 2018. According to Asset 4 Thomson Reuters, there are in total 1,390 companies incorporated in Sweden, Finland, Denmark or Norway during year 2009 and year 2018, including year 2009 and year 2018. Among these 1,390 companies, only 190 of them have at least one available annual ESG scores in the period of 2009 to 2018. In total we obtain 1,259 annual ESG scores where one score corresponds to one company and one year, or in other words, one release of sustainability report (one event). We then start the report release dates collection based on these 1,259 observations. 468 observations are further eliminated because of a lack of identifiable release dates or available reports. We finally arrive to

an unbalanced panel dataset with 791 observations corresponding to 122 companies, where some companies have less than 10 yearly observations.

In order to collect the release dates, important definitions and assumptions need to be declared. We first check on the company's website to see if it reports sustainability information separately or together with the annual report. If the company issues stand-alone sustainability report, we hand collect the release date of the stand-alone sustainability report from press release. If there is no separate sustainability report from the annual report, we collect the release date of the integrated annual report. If the company issued both sustainability reports and annual reports, but the release dates of the sustainability reports are unavailable, we assume the release date of both reports are the same and treat this observation as integrated report. Pages of sustainability information are also collected in the process. For integrated reports, we collect the sum of pages about sustainability within the annual report.

We obtain daily stock returns, market benchmark returns, trading volumes, market capitalization, total equity value, total assets, earnings per share and leverage from Compustat Capital IQ Global database provided by Wharton Research Data Service. For the event study, we further eliminate 103 event observations because of inadequate trading days within the estimation and/or event window. The total event observation number for event study is 791. In the regression section, another 60 observations are excluded because of the missing values in the variables, and in the end the event sample for regression analysis consists of 731 observations.

5 Descriptive Statistics and Results

5.1 Descriptive Statistics

5.1.1 Sample descriptive, all variables

This overview rests upon the calculation of the respective CAR for each event, summarized in table 3. The overview of number of observation sheds light on the relative position of sustainability reporting of companies in incorporated countries and industries. Across the Nordics, manufacturing industry has the most significant sustainability reporting presence in terms of number of qualifiable observations, which represents 52% of observations in four countries. This is reasonable because manufacturing companies interact the most with resources and they are more inclined to show the contribution and achievements in sustainability progress. To investigate in the national difference in number of observations available, Sweden leads the competition. It is also predictable because among the Nordic countries, Sweden has the most established industry system and economic activities, achieving a leading nominal GDP position in the Nordics (International Monetary Fund, 2016).

Table 3. Number of observations, CAR

Industry/country of incorporation	Denmark	Finland	Norway	Sweden	Total
Mining	-	-	27	9	36
Construction	1	8	3	23	35
Manufacturing	86	77	48	171	382
Transportation, Communications, Electric, Gas and Sanitary service	18	18	-	29	65
Wholesale Trade	1	9	2	4	16
Retail trade	-	-	-	20	20
Finance, Insurance and Real Estate	31	9	10	101	151
Services	2	1	1	13	16
Nonclassifiable	-	-	9	-	9
Total	139	122	100	370	731

Table 4 summarizes the data description of the variable ESG scores. ESG scores range from 15.09 to 90.93 with a total standard deviation of 14.75. The average ESG score is 60.74 and the median ESG score is 61.52, this means the distribution of ESG scores is close to symmetric.

Table 4. ESG scores

ESG score	Integrated	Stand-alone	Total
Min	15.09	27.69	15.09
Average	59.50	70.11	60.74
Median	59.72	69.06	61.52
Max	90.79	90.93	90.93
St.Dev.	14.53	12.95	14.75

We also generate the Pearson correlation table to see how the variables correlate with each other. Table 5 summarizes the correlation matrix. One of the highest positive correlation is seen between *ESG* and *PAGES*, indicating firms with superior sustainability performance tend to issue longer reports. This goes in line with the salience theory about the rationale of issuing stand-alone sustainability report (Holthausen & Verrecchia, 1988). Reporting separately or reporting with more pages enhances the salience of the reported information and could be chosen by superior sustainability performers with the hope to increase the visibility of their good performance. Overall, we do not witness any surprise among these correlations.

Table 5. Pairwise correlations

Variables	CAR	ESG	SASR	PAGES	PB	EPS	SIZE_R	Leverage
CAR	1							
ESG	0.095*	1						
SASR	0.014	0.231*	1					
PAGES	0.049	0.419*	0.394*	1				
PB	0.032	-0.062	-0.057	-0.091*	1			
EPS	-0.036	-0.005	0.031	0.074*	-0.012	1		
SIZE_R	-0.005	0.326*	0.073*	0.308*	-0.117*	0.108*	1	
Leverage	0.039	0.166*	0.037	0.029	-0.153*	-0.051	0.241*	1

Notes: This table provides pairwise correlations result for the variables of our model. Reported significance (two tailed) at the 10%, 5% and 1% levels are indicated by *, **, and ***, respectively.

Follow Yu et al. (2013), we also examine the differences between firms that issue stand-alone sustainability reports and firms that issue integrated reports using a Probit model:

$$SASR_{it} = \alpha + \beta_1 ESG_{it} + \beta_2 PAGES_{it} + \beta_3 PB_{it} + \beta_4 EPS_{it} + \beta_5 SIZE_{it}$$
$$+ \beta_6 Leverage_{it} + \varepsilon_{it}$$

Table 6 summarizes the Probit regression result. The result indicates that firms with better sustainability performance and smaller size are more likely to issue stand-alone sustainability reports. The positive coefficient of sustainability performance goes in line with Dhaliwal (2011)'s finding that firms that are superior in sustainability have more incentives to conduct better reporting. Comparably, with sample from the U.S., Yu et al. (2013) find that larger firms are more likely to issue stand-alone sustainability reports. The difference might be because we use the dates of issuance to classify the form of reporting and as a result for a firm issues a separate sustainability report in addition to annual report, it is still deemed as integrated if the two reports are issued on the same day. In such cases, smaller firms are more likely to issue their sustainability reports in a later time because of lack of resources.

Table 6 . Probit regression

SASR	Coef.	St.Err.	T-stat	p-value	Sig
ESG	0.038	0.006	6.610	0.000	***
PB	-0.003	0.003	-0.960	0.339	
EPS	0.000	0.000	1.580	0.115	
SIZE	-0.130	0.039	-3.350	0.001	***
Leverage	0.287	0.382	0.750	0.453	
Constant	-2.507	0.430	-5.840	0.000	***
Mean dependent var	0.116		SD dependent var		0.321
Pseudo r-squared	0.108		Number of obs		731
Chi-square	56.978		Prob > chi2		0
Akaike crit. (AIC)	480.531		Bayesian crit. (BIC)		508.098

Notes: This table provides multivariate Probit regression results with SASR as the dependent dummy variable. Reported significance (two tailed) at the 10%, 5% and 1% levels are indicated by *, **, and ***, respectively.

5.1.2 Average Daily Trading Volume within the Event Window

As the CAR only captures the materiality of the change in abnormal return, the scale of the market response that is triggered by one event can be expressed by the trading volume around the event day. Thus, apart from abnormal return, trading volume is also one area of interest when testing the short-term reaction of the market (Cready & David,

2002; Bushee et al., 2011). By including trading volume in descriptive analysis, we are able to present a more holistic picture on the response investors make. Volume data is extracted from WRDS database to depict the change in trading volume during the event window of (-1, 5) as we specify. We average the trading volume for every event to locate them at the same day as the event window suggests. That is to say, the volume data on event day 0 shows the average trading volume made on the event day, no matter which calendar date when the specific event happened. As shown in figure 1, there is an obvious spike on event day for integrated reporting, but not so visible for stand-alone reporting. Because trading volume data documents the total transactions made on that specific day, there are no concerns about the aggregated effect where the positive and negative directions could cancel out each other and together yield an insignificant result. The non-reaction for stand-alone reporting does not say the market does not react, but the reaction is not reflected in the trading volume.

Figure 1. Average Trading Volume within the Event Window
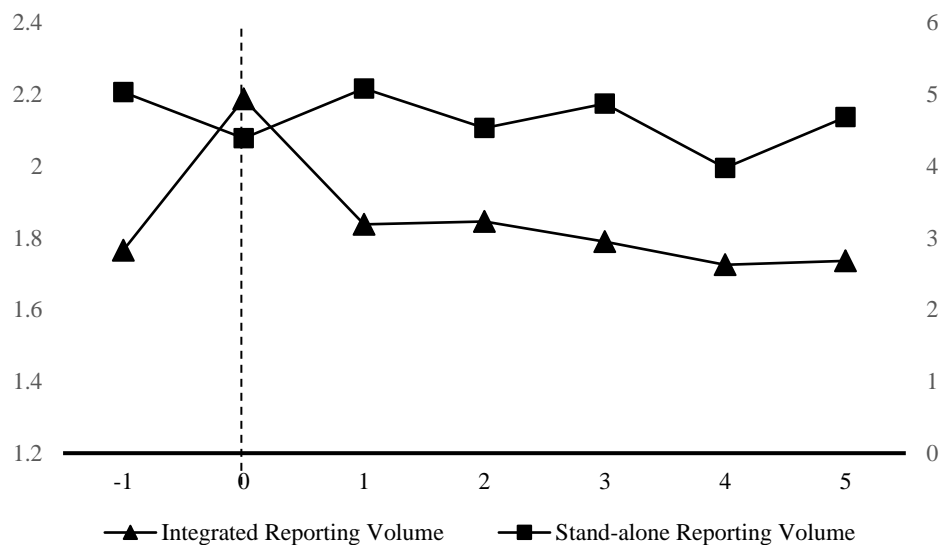
5.2 Hypothesis Testing Results

5.2.1 Aggerated Market Reaction

To test H1 and H2, we conduct an event study using (-1, 5) as event window for each sub-group based on the reporting form, sustainability performance and financial performance. The result supports H1 (a), where the mean of CAR is tested positive at

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95% confidence level (coeff. = 0.0107, one-tailed p < 0.05). This implies that market does react to stand-alone sustainability reporting, and the reaction is positive for firms with good sustainability performance. For firms perform relatively poor in sustainability, the CAR around their releases of stand-alone sustainability reports is negative as we predict in H1 (b) but insignificant. The insignificance may partly be due to the small size of this sub-group (N=23).

Table 7. Aggregated Abnormal Return for Stand-alone Reporting

CAR (-1, 5)	H1 (a) SASR High ESG score	H1 (b) SASR Low ESG score	Notes: This table provides the single-sample T-test result for stand-alone reporting firms with (a) high sustainability performance and (b) low sustainability performance. Reported significance levels are based on a one tailed significance level. Significance at the 10%, 5% and 1% levels are indicated by *, **, and ***, respectively.
Coef.	0.0107	-0.0112	
Predicted Sign	+	-	
Robust St. Err.	0.00564	0.0118	
T-stat	1.897	-0.947	
p-value	0.0626	0.354	
One tailed Sig	**		
Observations	*62*	*23*	

Figure 2. Average CAR on Stand-alone Reporting
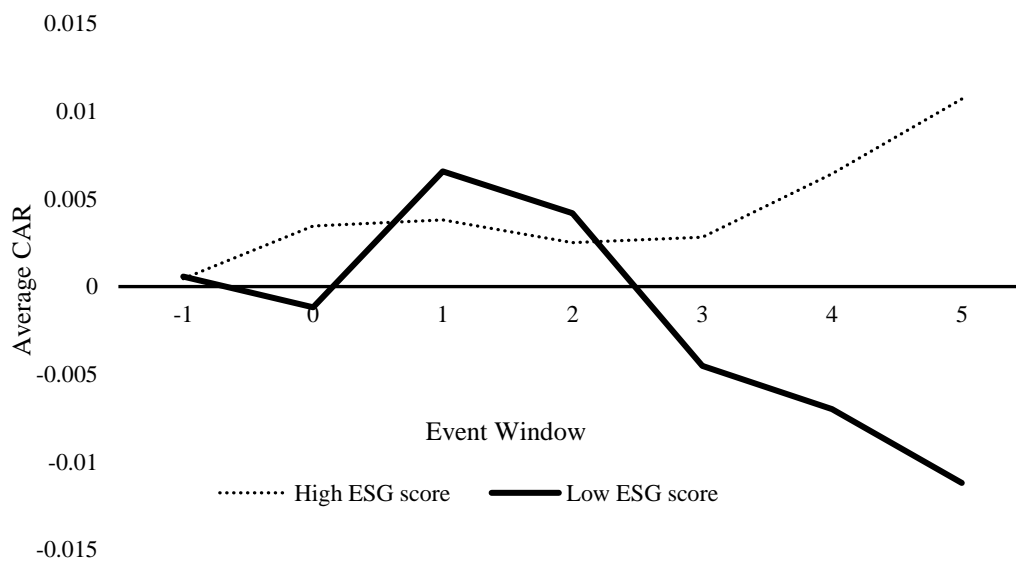
Table 8 shows the test results for integrated reports (Hypothesis 2). Here, high performers refer to the companies who do well both in sustainability and in financial performance and low performers refer to the companies who do not do as well neither in sustainability nor in financial performance. We incorporate financial performances here to reflect the fact that these sustainability contents are integrated with annual reports, which means at the event date, they both reveal sustainability performance and financial performance. The sign of the aggregated CAR is positive for high performers and negative for low performers, which goes in line with our hypothesis H2 (a) and H2 (b). But they are both insignificant. The insignificance could be due to the imperfect classification of the sub-groups. If market in some cases reacts positively to the low performers or reacts negatively to the high performers (since the static levels of ESG scores and EPS might not be able to completely explain the direction of market's reaction), the joint-test result will come out insignificant. We hence further our research by conducting a regression analysis using the yield CAR of each event observation as the dependent variable to catch such nuance. In H2 (c) we predict the test result for mixed performers (firms with high ESG score but low EPS, and firms with low ESG score but high EPS) to be insignificant under the same rationale: the positive and negative market reaction will cancel out each other in the joint test. The insignificant result supports H2 (c).

Table 8. Aggregated Abnormal Return for Integrated Reporting

CAR (-1, 5)	H2 (a) Integrated High ESG score & High EPS (High Performers)	H2 (b) Integrated Low ESG score & Low EPS (Low Performers)	H2 (c) Integrated High ESG score & Low EPS; or Low ESG score & High EPS (Mixed Performers)
Coef.	0.00378	-0.0029	0.00384
Predicted Sign	+	-	+/-
Robust St. Err.	0.00317	0.00394	0.00255
T-stat	1.191	-0.738	1.506
p-value	0.235	0.462	0.133
Sig			
Observations	*161*	*156*	*389*

Notes: This table provides the single-sample T-test result for integrated reporting firms with (a) high sustainability performance & high financial performance; (b) low sustainability performance & low financial performance; and (c) high sustainability performance & low financial performance, or low sustainability performance & high financial performance. For (a) and (b) the reported significance levels are based on a one tailed significance level. For (c) the reported significance level is based on a two tailed significance level. Significance at the 10%, 5% and 1% levels are indicated by *, **, and ***, respectively.

Figure 3. Average CAR on Integrated Reporting[10]

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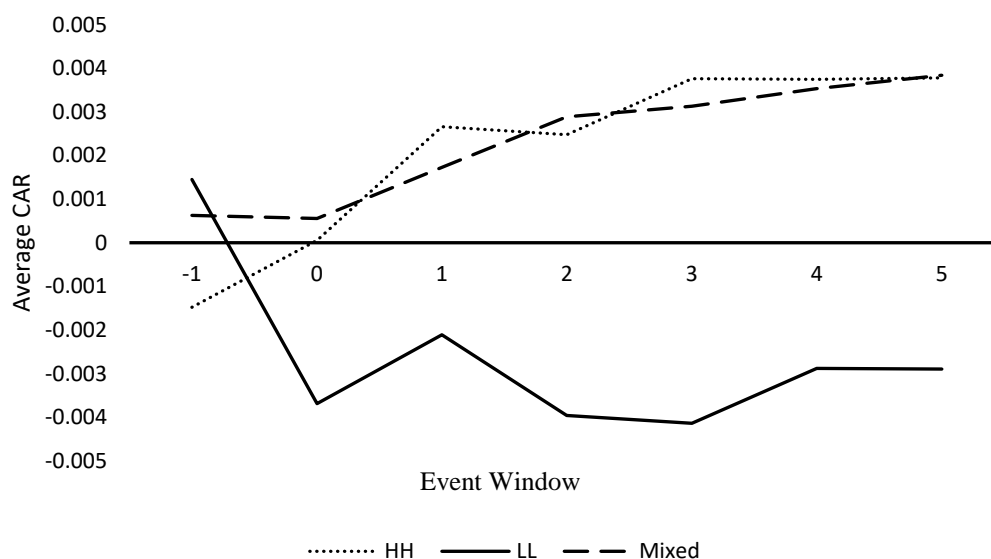
[10] "HH" stands for firms who achieve higher than median sustainability and financial performance; "LL" stands for firms who have lower than median sustainability and financial performance; "Mixed" stands for firms with high/low sustainability performance and low/high financial performance.

5.2.2 Regression Analysis

5.2.2.1 Market Reaction and Sustainability Performance

In H3, we predict that the magnitude of market's reaction to the release of sustainability reports is positively associated with firm sustainability performance. The coefficient for ESG in Table 9 is positive and significant at 95% confidence level (coeff. = 0.312, one-tailed $p < 0.05$), supporting H3. This indicates that other things equal, the cumulative abnormal returns around the release of sustainability reporting are more positive for firms with better sustainability performance. Based on this, we can further verify if this positive effect is influenced by the form of reporting and the information environment.

Table 9. Regression Result for Model 1 (H3)

CAR (-1, 5)	Predicted Sign	Coef.	St.Err.	T-stat	p-value	Two tailed Sig	**One tailed Sig**
ESG	+	**0.312**	**0.138**	**2.26**	**0.024**		**
SASR		-2.397	6.065	-0.4	0.693		
PAGES		0.044	0.057	0.77	0.441		
PB		0.102	0.096	1.07	0.286		
EPS		-0.031	0.038	-0.81	0.419		
SIZE_R		-8.218	7.281	-1.13	0.259		
Leverage		9.784	9.748	1	0.316		
Constant		-19.084	8.916	-2.14	0.033	**	
Mean dependent var		2.886	SD dependent var		48.11		
R-squared		0.015	Number of obs		730		
F-test		1.539	Prob > F		0.151		

Notes: This Table provides multivariate OLS regression results for model (1), Hypothesis 3. The dependent variable is CAR with an event window of (-1, 5). We multiply CAR with 1000 to make coefficients more evident. Reported significance levels for our variable of interest (In this case, ESG) are based on a one tailed significance level. Reported significance levels for other control variables are based on a two tailed significance level. Significance at the 10%, 5% and 1% levels are indicated by *, **, and ***, respectively.

5.2.2.2 Market Reaction and the Form of Reporting

In H4, we predict that the positive association between the CAR around the release of sustainability report and the firm's sustainability performance will be stronger for firms that issue stand-alone sustainability reports, compared to those issue integrated sustainability report. Table 10 summarizes the test result. The coefficient for *ESG* is positive and significant at 95% confidence level (coeff. = 0.251, one-tailed $p < 0.05$).

In addition, the coefficient for the interaction variable $ESG * SASR$ is positive and significant (coeff. = 0.671, one-tailed p < 0.1). This indicates that the form of reporting also has a significant influence on the association between market reaction and sustainability reporting.

As for the direct relationship between the reporting form and the CAR during event window, we find that the coefficient for SASR is negative and significant at 90% confidence level as well (coeff. = -48.599, one-tailed p < 0.1). This means on average, there is a negative influence from the form of stand-alone reporting to the market reaction represented by CAR.

We can see the aggregated influence of stand-alone reporting on CAR can be expressed as $(\beta_1 + \beta_2)ESG_i + \beta_3$. Using the OLS results, we can show a linear relationship between the different effect of reporting format have on the portion of CAR that they can explain. From Figure 4, it showcases that when a firm's sustainability performance exceeds a certain threshold, stand-alone reporting is associated with higher positive market reaction. This indicates that our hypothesis (the positive association between CAR and sustainability performance is stronger for stand-alone reporting) only holds when the firm achieves a relatively good sustainability performance. When the firm performs relatively poor in sustainability, integrated reporting could bring stronger positive reaction. This goes in line with the theory that reporting separately could enhance the salience of the reported information, and as a result enlarge the positive or negative effect.

Table 10. Regression Result for Model 2 (H4)

CAR (-1, 5)	Predicted Sign	Coef.	St.Err.	T-stat	p-value	Two tailed Sig	One tailed Sig
ESG	+	**0.251**	**0.143**	**1.75**	**0.08**		**
ESG*SASR	+	**0.671**	**0.425**	**1.58**	**0.115**		*
SASR	-	**-48.599**	**29.919**	**-1.62**	**0.105**		*
PAGES		0.04	0.057	0.69	0.488		
PB		0.105	0.096	1.09	0.274		
EPS		-0.029	0.038	-0.75	0.456		
SIZE_R		-7.859	7.277	-1.08	0.28		
Leverage		9.832	9.738	1.01	0.313		
Constant		-15.541	9.186	-1.69	0.091	*	

Mean dependent var	2.886	SD dependent var	48.11
R-squared	0.018	Number of obs	730
F-test	1.66	Prob > F	0.105

Notes: This Table provides multivariate OLS regression results for model (2), Hypothesis 4. The dependent variable is CAR with an event window of (-1, 5). We multiply CAR with 1000 to make coefficients more evident. Reported significance levels for our variable of interest (In this case, ESG, SASR and ESG*SASR) are based on a one tailed significance level. Reported significance levels for other control variables are based on a two tailed significance level. Significance at the 10%, 5% and 1% levels are indicated by *, **, and ***, respectively. β_1 is the coefficient of ESG, β_2 is the coefficient of $ESG * SASR$, β_3 is the coefficient of $SASR$. An illustration of the changes in the moderating effect of the reporting form is shown in Figure 4.

Figure 4. Reporting Form and Market Reaction
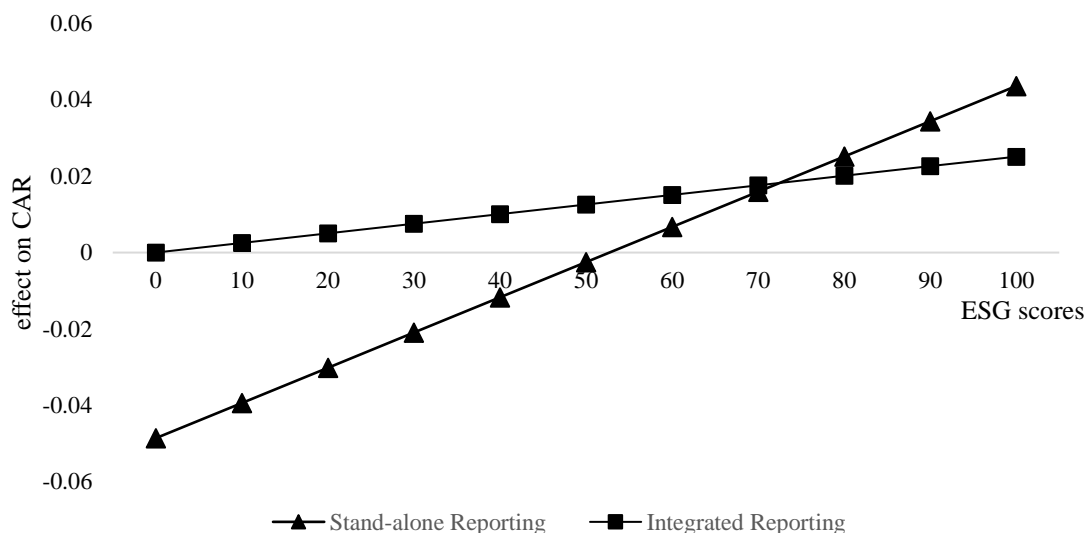
5.2.2.3 Market Reaction and Information Environment

In H5 we predict that the positive association between sustainability performance and market reaction as represented by cumulative abnormal return will be stronger for firms in a weaker information environment (indicated by firm size). The coefficient of the interaction variable $SIZE\_R * ESG$ in table 11 is negative and significant at 95% confidence level (coeff. = -0.747, one-tailed $p < 0.05$), and the coefficient of ESG is positive and significant at 99% confidence level (coeff. = 0.712, one-tailed $p < 0.01$). The result supports our hypothesis in H5, indicating that the moderating effect of information environment does exist. Intriguingly, the size ranking's direct correlation with CAR is positive, meaning that the larger the firm size is, the higher CAR would show during the event window. This creates another counter-effect on the secondary relationship that size of firm has on market reaction, moderating the correlation between sustainability reporting and the scale of market reaction during event window.

Table 11. Regression Result for Model 3 (H5)

CAR (-1, 5)	Predicted Sign	Coef.	St.Err.	T-stat	p-value	Two tailed Sig	One tailed Sig
ESG	+	**0.712**	**0.271**	**2.63**	**0.009**		***
SASR		-3.047	6.069	-0.5	0.616		
PAGES		0.061	0.058	1.04	0.297		
PB		0.104	0.096	1.09	0.276		
EPS		-0.034	0.038	-0.88	0.38		
SIZE_R*ESG	-	**-0.747**	**0.435**	**-1.72**	**0.087**		**
SIZE_R		36.019	26.788	1.34	0.179		
Leverage		9.452	9.737	0.97	0.332		
Constant		-42.166	16.133	-2.61	0.009	***	
Mean dependent var		2.886	SD dependent var		48.11		
R-squared		0.019	Number of obs		730		
F-test		1.718	Prob > F		0.091		

Notes: This Table provides multivariate OLS regression results for model (3), Hypothesis 5. The dependent variable is CAR with an event window of (-1, 5). We multiply CAR with 1000 to make coefficients more evident. Reported significance levels for our variable of interest (In this case, ESG and SIZE_R*ESG) are based on a one tailed significance level. Reported significance levels for other control variables are based on a two tailed significance level. Significance at the 10%, 5% and 1% levels are indicated by *, **, and ***, respectively.

5.3 Robustness Tests for Regression

In this section, we check for the robustness of our OLS to see if the conclusion we

obtained from the statistics analysis is reliable[11]. We have country specific, industry specific and year specific variables for each observation, which could lead to time-series and cross-sectional correlation among observations. In order to check if our results are robust across industry, country and year, we conduct fixed-effect regression on model 1-3. Table 12-14 summary the robustness test results. Fixed effect regression allows us to control for time-invariant variables and time-series variables to alleviate the undesirable and distorting factors stemming from these variables.

In the robustness test for model 1, we obtain results same to what is concluded as our empirical results. Table 12 shows the robustness regression adding in different control variables stepwise. As the default reporting mechanism only conduct significance test a two-tailed T-test, the results with asterisks are not consistent if checking the p value in the chart. To access the ideal statistics for judgement, we need to adjust our statistical approach, altering the p value to what is suitable for a one-tailed T-test. After adjustment, we can infer that across the 4 tests, the correlation between sustainability performance and market reaction still holds.

In robustness test for model 2 and model 3, we adopt the same methodology when testing robustness of the two interaction variables. The correlation between $ESG * SASR$ variable and market reaction still holds at a confidence level of 90%. To further test the moderating effect of the reporting form of sustainability reporting, we also check the p value for one-tail T-test for control variable $SASR$, which turned out to be still significant at a confidence level of 90%. This means the moderating effect of reporting form of sustainability reporting is still valid. Same as the moderating effect of reporting form, the moderating effect of size of firms also stands proven through robustness test. Complications of direct effect of size on market reaction does not hold when we control for all 3 fixed effect variables. Thus, we eliminate this complication and acknowledge that it is not significant enough for us to accept in our discussion and conclusion.

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[11] There are different ways to check the robustness of a regression model. We are primarily concerned about the fixed effects brought in by country, industry and year. Because of this, we conduct robustness tests by applying fixed-effect model to an expanded group of variables to find out whether the conclusion we draw is robust.

Table 12. Robustness Test for Model 1 (H3)

Variables	Predicted sign	Statistics	Industry	Country, Year	Industry, Country	Industry, Country, Year
ESG	+	**coeff.**	**0.315****	**0.354*****	**0.392*****	**0.364*****
		St. Err.	**-0.143**	**-0.146**	**-0.149**	**-0.151**
		p-value	**0.0277**	**0.0153**	**0.00894**	**0.0166**
SASR		coeff.	-2.332	-2.039	-2.092	-2.304
		St. Err.	-6.121	-6.104	-6.136	-6.154
		p-value	0.703	0.738	0.733	0.708
PAGES		coeff.	0.0595	0.0267	0.0429	0.0393
		St. Err.	-0.061	-0.0629	-0.0659	-0.0661
		p-value	0.33	0.671	0.515	0.552
PB		coeff.	0.12	0.0867	0.105	0.11
		St. Err.	-0.0973	-0.0969	-0.0983	-0.0987
		p-value	0.218	0.371	0.286	0.263
EPS		coeff.	-0.0346	-0.039	-0.0449	-0.0428
		St. Err.	-0.0395	-0.039	-0.0399	-0.04
		p-value	0.381	0.318	0.262	0.285
SIZE_R		coeff.	-8.078	-7.137	-6.789	-5.87
		St. Err.	-8.207	-7.386	-8.27	-8.331
		p-value	0.325	0.334	0.412	0.481
Leverage		coeff.	10.79	8.73	7.587	7.835
		St. Err.	-10.61	-9.892	-10.7	-10.76
		p-value	0.309	0.378	0.479	0.467
Constant		coeff.	-20.58**	-20.85**	-23.34**	-22.14**
		St. Err.	-9.286	-9.14	-9.432	-9.45
		p-value	0.027	0.0228	0.0136	0.0194
Industry Fixed Effect			Yes	No	Yes	Yes
Year Fixed Effect			No	Yes	No	Yes
Country Fixed Effect			No	Yes	Yes	Yes
Observations			729	730	729	729
R-squared			0.021	0.037	0.027	0.044

Notes: This table provides robustness test results for model (1), Hypothesis 3. Reported significance levels for our variable of interest (In this case, ESG) are based on a one tailed significance level. Reported significance levels for other control variables are based on a two tailed significance level. Significance at the 10%, 5% and 1% levels are indicated by *, **, and ***, respectively.

Table 13. Robustness Test for Model 2 (H4)

Variables	Predicted sign	Statistics	Industry	Country, Year	Industry, Country	Industry, Country, Year
ESG	+	**coeff.**	**0.254****	**0.293****	**0.335****	**0.307****
		St. Err.	**-0.148**	**-0.15**	**-0.154**	**-0.157**
		p-value	**0.087**	**0.052**	**0.031**	**0.051**
ESG*SASR	+	**coeff.**	**0.66***	**0.684***	**0.625***	**0.608***
		St. Err.	**-0.432**	**-0.428**	**-0.434**	**-0.435**
		p-value	**0.127**	**0.11**	**0.15**	**0.163**
SASR	-	**coeff.**	**-47.73***	**-49.02***	**-45.04***	**-43.98***
		St. Err.	**-30.32**	**-30.02**	**-30.42**	**-30.46**
		p-value	**0.116**	**0.103**	**0.139**	**0.149**
PAGES		coeff.	0.0542	0.0216	0.0384	0.0347
		St. Err.	-0.0611	-0.0629	-0.0659	-0.0661
		p-value	0.375	0.732	0.56	0.599
PB		coeff.	0.122	0.0884	0.105	0.111
		St. Err.	-0.0972	-0.0968	-0.0983	-0.0986
		p-value	0.211	0.362	0.285	0.262
EPS		coeff.	-0.0322	-0.0366	-0.0427	-0.0406
		St. Err.	-0.0395	-0.039	-0.0399	-0.04
		p-value	0.415	0.349	0.285	0.31
SIZE_R		coeff.	-7.795	-6.756	-6.673	-5.694
		St. Err.	-8.201	-7.381	-8.264	-8.326
		p-value	0.342	0.36	0.42	0.494
Leverage		coeff.	11.14	8.978	8.025	8.319
		St. Err.	-10.6	-9.882	-10.7	-10.76
		p-value	0.294	0.364	0.453	0.44
Constant		coeff.	-17.16*	-17.44*	-20.14**	-19.00*
		St. Err.	-9.543	-9.376	-9.682	-9.708
		p-value	0.0726	0.0632	0.0378	0.0508
Industry Fixed Effect			**Yes**	**No**	**Yes**	**Yes**
Year Fixed Effect			**No**	**Yes**	**No**	**Yes**
Country Fixed Effect			**No**	**Yes**	**Yes**	**Yes**
Observations			729	730	729	729
R-squared			0.024	0.04	0.03	0.047

Notes: This table provides robustness test results for model (2), Hypothesis 4. Reported significance levels for our variable of interest (In this case, ESG, ESG*SASR and SASR) are based on a one tailed significance level. Reported significance levels for other control variables are based on a two tailed significance level. Significance at the 10%, 5% and 1% levels are indicated by *, **, and ***, respectively.

Table 14. Robustness Test for Model 3 (H5)

Variables	Predicted sign	Statistics	Industry	Country, Year	Industry, Country	Industry, Country, Year
ESG	+	**coeff.**	**0.714*****	**0.728*****	**0.728*****	**0.692****
		St. Err.	**-0.278**	**-0.274**	**-0.28**	**-0.281**
		p-value	**0.010**	**0.008**	**0.010**	**0.014**
SASR		coeff.	-3.005	-2.533	-2.623	-2.78
		St. Err.	-6.126	-6.104	-6.143	-6.16
		p-value	0.624	0.678	0.67	0.652
PAGES		coeff.	0.0711	0.0462	0.0574	0.0532
		St. Err.	-0.0614	-0.064	-0.0666	-0.0668
		p-value	0.247	0.47	0.389	0.426
PB		coeff.	0.122	0.0888	0.107	0.112
		St. Err.	-0.0972	-0.0968	-0.0983	-0.0986
		p-value	0.209	0.359	0.279	0.255
EPS		coeff.	-0.0362	-0.0408	-0.0461	-0.0438
		St. Err.	-0.0394	-0.039	-0.0399	-0.04
		p-value	0.359	0.296	0.248	0.274
SIZE_R*ESG	-	**coeff.**	**-0.745****	**-0.711***	**-0.64***	**-0.628***
		St. Err.	**-0.446**	**-0.442**	**-0.452**	**-0.453**
		p-value	**0.0948**	**0.108**	**0.157**	**0.166**
SIZE_R		coeff.	36.73	34.89	31.42	31.73
		St. Err.	-28.01	-27.12	-28.24	-28.36
		p-value	0.19	0.199	0.266	0.263
Leverage		coeff.	11.28	8.774	8.228	8.574
		St. Err.	-10.6	-9.881	-10.7	-10.77
		p-value	0.287	0.375	0.442	0.426
Constant		coeff.	-44.27***	-42.77***	-43.43**	-41.88**
		St. Err.	-16.93	-16.39	-17.04	-17.08
		p-value	0.00912	0.00925	0.011	0.0144
Industry Fixed Effect			**Yes**	**No**	**Yes**	**Yes**
Year Fixed Effect			**No**	**Yes**	**No**	**Yes**
Country Fixed Effect			**No**	**Yes**	**Yes**	**Yes**
Observations			729	730	729	729
R-squared			0.025	0.04	0.03	0.047

Notes: This table provides robustness test results for model (3), Hypothesis 5. Reported significance levels for our variable of interest (In this case, ESG and SIZE_R*ESG) are based on a one-sided significance level. Reported significance levels for other control variables are based on a two tailed significance level. Significance at the 10%, 5% and 1% levels are indicated by *, **, and ***, respectively.

6 Discussion

6.1 Summary of findings and conclusions

How does sustainability report matter? In our research, we first look at the aggregated market reaction to the release of sustainability reporting by dividing the overall sample into five categories: a) high ESG performers with stand-alone reports, b) low ESG performers with stand-alone reports, c) high ESG and high financial performers with integrated reports, d) low ESG and low financial performers with integrated reports, and e) mixed performers with integrated reports. We find that i) the direction of market's reaction for all groups goes in line with our prediction; but ii) the reaction is only significant for high ESG performers with stand-alone reports. Overall, the first part of our research suggests that market does react to sustainability reports, and stand-alone reports issued by high sustainability performers are rewarded by market with positive reaction. This goes in line with the value enhancing theory of sustainability.

The insignificant results of the sub-groups in the first part of our research indicate that a more in-depth research looking at the market reaction on an unaggregated level is necessary. As suggested by other researches (LaGore & Thorne, 2015; Du et al., 2017), we conduct OLS on the event study. We first find out that there is a significant positive association between market reaction and sustainability performance. This finding is consistent with the findings of Flammer (2013), who claim that sustainability performance has positive relationship with market reaction. It also further supports the stakeholder view and the value-enhancing ability of sustainability therein. Secondly, we find that this positive association is influenced both by the reporting form and by the information environment. Specifically, we find that stand-alone reporting will enlarge the positive market reaction with better sustainability performance, but for those who performed relatively poor in sustainability, integrated reporting should be the desired form of reporting in the sense of minimizing market's negative reaction to their sustainability performance. This goes in line with the theory that stand-alone reporting could increase the salience of the reported information, and as a result enlarges both the positive and negative market reaction to the reported information (Du et al, 2017). As of the information environment theory (Branco & Rodrigues, 2008) and

its application in our research, our findings confirm the positive correlation between sustainability performance's value relevance and information environment status in the Nordic setting. Firms will enjoy a stronger positive market reaction if they are in a weaker information environment, indicating that sustainability reporting as the communication channel is more important for smaller firms (weaker information environment).

6.2 Conclusions

This thesis investigates the value relevance of sustainability reporting in the Nordics. We adhere to two core theories, the stakeholder theory (Freeman, 1984) and the signaling theory (Hellström, 2006) to develop our hypotheses. Stakeholder theory essentially views sustainability efforts and good sustainability performance as a positive attribute of companies, which implicates that highlighting and rewarding these investments and endeavors in sustainability is justifiable on the theory level. Signaling theory comes hand in hand with the Efficient Market Hypothesis, which assumes the market function in different levels of information processing efficiency. Overall, it suggests that the market receives information, process it and then reflect the responses to the information in the form of prices. These two fundamental theories construct the research path we follow in this thesis.

To analyze and evaluate the value relevance of sustainability reporting, we define the market reaction as the abnormal return in the predetermined event window in excess of normal return that can be predicted with market return, following the approach proposed by MacKinlay (1997). Thereafter, we adhere to the signaling theory and deem sustainability reporting as the way in which sustainability information of companies is communicated to the market. Next, we define the release date of sustainability reporting as the time near when market receives sustainability information from sustainability reporting and define a scale of sustainability performance communicated by sustainability reporting using metrics developed by Asset 4 Thomson Reuters database. This way, we have developed all the parameters to capture the correlation between sustainability reporting and market reaction, thus the value relevance of interest. We organized the sample data collected manually and from Asset 4 Thomson Reuters database to make it suitable for statistical analysis. The results suggest the following:

Value relevance of sustainability reporting holds materially. The market reacts to sustainability reporting positively with the sustainability performance level indicated by sustainability reporting. However, there are other factors that could add to the value relevance of sustainability reporting. sustainability Reporting form has a moderating effect in the positive correlation between sustainability performance and market reaction. Stand-alone reporting proves to trigger higher level of value relevance as it enlarges the effect that sustainability performance has on market reaction when sustainability performances cross a certain threshold. This links to the notion that the size of firms proves to suppress the level of value relevance. As the size of the company increases, the value relevance on average will be at a lower level comparing with those companies who are of smaller size. These findings echo with some of the prior researches concerning the value relevance of sustainability reporting, providing comparable evidence in the Nordics.

6.3 Contributions and implications

These findings contribute to the extant literature and research in at least 3 aspects. First, previous sustainability value relevance studies focus primarily in the US market, Chinese market and the UK market (Flammer, 2013; Wang et al. 2011; Clacher & Hagendorff, 2012). These researches have been looking into geography-specific value relevance, which potentially raises selection bias. We step in this realm with new empirical data and findings about the Nordics, which few researchers have touched upon before. We validate with limited database that the value relevance and specifications inherent in value relevance of sustainability hold across industries and countries in the Nordics. This contributes to advancement in understanding the sustainability progress landscape in the Nordic market, which has a long tradition of advancing sustainable development. Nordic companies, embedded in a Scandinavian Stakeholder Societal Model, are globally admired and have especially embraced the notion of "companies as a force for good" (Strand & Freeman, 2013). In addition, according to *From global goals to local action* (Deloitte, 2018), Nordic countries have been actively engaged in the formulation of a new set of sustainable development goals (SDGs). By analyzing the value relevance of sustainability reporting, the results can better reveal a more comprehensive and in-depth understanding in the market

momentum specified for the Nordics and fuel the cooperation of public sector and private sector to adhere to its sustainability notion and hopefully advance towards the said SDGs.

Second, we differentiate reporting forms to explore if they are evaluated differently by the market. Previous researches, to our best knowledge, have not so often combined the two reporting forms in the data sample and conducted analysis. What's more, we discover a threshold between where the enlarging effect of stand-alone reporting on value relevance differs. As Du et al. (2017) suggest, stand-alone reporting is a default setting for their research. We contribute to the researches on stand-alone reporting's secondary effect on market reaction. Our findings suggest that unless a firm's sustainability performance reaches a certain high enough level, then it is more beneficial for them to integrate their sustainability information into annual reports. This raises the question that for companies, if it is possible for them to cover their lower sustainability performance with integrated reporting and avoid the loss which would otherwise incur on their stocks, what path they would take. Is covering the non-ideal sustainability performance the right option to take to protect shareholder value or is putting into more efforts in bettering sustainability performance the correct direction to go by utilizing the enlarged value relevance to market reaction to enhance shareholder value. This question traces back to the long-standing debate between stakeholder theory and shareholder theory, in which we provide a different angle of looking at agency theory, the ethical dilemma researches have been debating about (Malik, 2014) and the pragmatic value-enhancing role of sustainability such as increasing capital market benefits (Godfrey, 2005; Dhaliwal et al., 2011)

Third, we prove that the information environment theory, which holds using the sample of Fortune 500 companies, still holds in the Nordics. The size of companies does matter when looking into value relevance. Despite the understandable awareness and perceived emphasis on sustainable development, the society may need to think of other ways to reward smaller size companies for their sustainability efforts and achievements, especially when Small-to-Medium Enterprises (SMEs) have an important role to play

in achieving the SDGs[12] (OECD, 2017).

Implications for the study of sustainability go in two dimensions. First, for external parties, by revealing the stock return irregularity linked with sustainability information communication, we investigate into the real-time relationship between sustainability performance and financial performance. We uncover the positive relationship between real-time stock market movement and sustainability performance and use event study to single out only sustainability reporting and information by fixating an event window and control for other variables. This helps advance the understanding in prediction of stock prices with new sustainability information emerging, where good sustainability performance would enhance financial performance. This could serve as an extended topic and an idea for the advocate and campaign to involve an increasing number of companies into the investment in sustainability. When policy makers or regulators set out to incentivize firms to take part in sustainability investment, this study enhances the notion that efforts in sustainability progress will be rewarded by the market.

Second, for internal parties within the firms, this study provides them with evidence that SMEs will capitalize on sustainability reporting. Due to limited funding, weaker liquidity and less effective organizational structure compared to larger firms, it is a difficult decision for the management of SMEs to join in sustainability investment. This research is a vital support argument for management who are hesitant about the participation of shaping sustainability performance to take that step. According to our research, by releasing sustainability reports, the investors would honor the behavior and the market would yield abnormal returns. However, discretion should apply when thinking about sustainability reporting form for these SMEs, because it might not achieve the desired goal to directly opt to stand-alone reporting.

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[12] According to *Meeting of the OECD Council at Ministerial Level* (Paris, 2017), by promoting inclusive and sustainable economic growth, providing employment and decent work for all, promoting sustainable industrialization and fostering innovation, etc., SMEs would serve as a cornerstone in sustainable development.

6.4 Limitations and future research

This thesis is subject to several limitations which might influence the explanatory power of this study. First, in sample collection, we only look at companies who have documented ESG scores in Asset 4 Thomson Reuters database. This may lead to selection bias and over-generalization, misusing one limited sample to represent the total landscape for the value-relevance of sustainability reporting in the Nordics. Second, we aim to use event study to eliminate influences from other factors that might affect the correlation, but the methodology is not perfect enough to erase all other effects and control for all variables during event windows. There could possibly be cases where we failed to capture other events that took place around the same time while assuming we covered all possible impact on market reaction in said event window.

Following this thread, several directions of further research are suggested based on our findings and discussions. First, it could be of value to expand the sample size and increase the number of variables to obtain as many observations as possible. In this way, the sample data would be ample to conduct a stronger research and have more indications from a broader perspective. For example, in addition to the Nordic countries, include Baltic countries into the sample target and study possible diverges of effect because of a more remote culture and geographical setting. In addition to financial control variables, include more qualitative measures as variables such as geopolitical settings, investor confidence or average ethical levels to produce more insightful findings. Second, it would be interesting if content analysis is provided on this same study to replace ESG scores from Asset 4 Thomson database. It is possible that specific grading standards that cater to the Nordic context be applied and the same statistic tests be conducted to see if the result and reasoning are still valid. This can also shed lights on the scoring mechanism of Asset 4, which we can use to investigate for valuable inferences. Third, there is a trend in complying for sustainability reporting standards and seeking for limited assurance for sustainability reports. It would be intriguing to see if different sustainability reporting standards would have different level of value relevance, or if assurance plays a significant part in market reaction linked with sustainability reporting.

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Appendix

Appendix 1: Average Abnormal Return and CAR for Stand-alone Sustainability Report

Day to Event	SASR High ESG		SASR Low ESG	
	AR	CAR	AR	CAR
-1	0.045	0.045	0.057	0.057
0	0.300	0.345	-0.176	-0.119
1	0.035	0.380	0.777	0.657
2	-0.130	0.250	-0.239	0.418
3	0.031	0.282	-0.870	-0.452
4	0.361	0.643	-0.247	-0.698
5	0.427	1.070	-0.417	-1.116

Appendix 2: Average Abnormal Return and CAR for Integrated Sustainability Report

Day to Event	ISAR High Performers		ISAR Low Performers		ISAR Mixed	
	AR	CAR	AR	CAR	AR	CAR
-1	-0.15	-0.15	0.14	0.14	0.06	0.06
0	0.15	0.01	-0.51	-0.37	-0.01	0.06
1	0.26	0.27	0.16	-0.21	0.12	0.17
2	-0.02	0.25	-0.18	-0.40	0.12	0.29
3	0.13	0.38	-0.02	-0.41	0.02	0.31
4	0.00	0.38	0.13	-0.29	0.04	0.35
5	0.00	0.38	0.00	-0.29	0.03	0.38

Appendix 3: list of sample companies and observations

ID	Company Name	ISIN	Number of Obs.	Country of Incorporation	Industry
1	Santa Fe Group A/S	DK0010006329	9	Denmark	Manufacturing
2	Genmab A/S	DK0010272202	5	Denmark	Manufacturing
3	Simcorp A/S	DK0060495240	2	Denmark	Services
4	Ambu A/S	DK0060946788	2	Denmark	Manufacturing
5	Bang & Olufsen A/S	DK0010218429	7	Denmark	Manufacturing
6	Solar A/S	DK0010274844	1	Denmark	Wholesale Trade
7	Demant A/S	DK0060738599	10	Denmark	Manufacturing
8	Coloplast A/S	DK0060448595	10	Denmark	Manufacturing
9	Per Aarsleff Holding A/S	DK0060700516	1	Denmark	Construction
10	Royal Unibrew A/S	DK0060634707	1	Denmark	Manufacturing
11	Dampskibsselskabet Norden A/S	DK0060083210	9	Denmark	Transportation, Communications, Electric, Gas and Sanitary service
12	Chr Hansen Holding A/S	DK0060227585	2	Denmark	Manufacturing
13	NKT A/S	DK0010287663	1	Denmark	Manufacturing
14	Rockwool International A/S	DK0010219153	2	Denmark	Manufacturing
15	H Lundbeck A/S	DK0010287234	5	Denmark	Manufacturing
16	Flsmidth & Co A/S	DK0010234467	9	Denmark	Manufacturing
17	DSV Panalpina A/S	DK0060079531	9	Denmark	Manufacturing
18	Topdanmark A/S	DK0060477503	9	Denmark	Finance, Insurance and Real Estate
19	Novo Nordisk A/S	DK0060534915	5	Denmark	Manufacturing
20	Carlsberg A/S	DK0010181759	9	Denmark	Manufacturing
21	Sydbank A/S	DK0010311471	4	Denmark	Finance, Insurance and Real Estate
22	Jyske Bank A/S	DK0010307958	9	Denmark	Finance, Insurance and Real Estate
23	AP Moeller - Maersk A/S	DK0010244508	9	Denmark	Transportation, Communications, Electric, Gas and Sanitary service
24	Danske Bank A/S	DK0010274414	9	Denmark	Finance, Insurance and Real Estate
25	Uponor Oyj	FI0009002158	9	Finland	Manufacturing

ID	Company Name	ISIN	Number of Obs.	Country of Incorporation	Industry
26	Tieto Oyj	FI0009000277	1	Finland	Services
27	Outotec Oyj	FI0009014575	8	Finland	Manufacturing
28	Nokian Tyres plc	FI0009005318	9	Finland	Manufacturing
29	Yit Oyj	FI0009800643	8	Finland	Construction
30	Elisa Oyj	FI0009007884	9	Finland	Transportation, Communications, Electric, Gas and Sanitary service
31	Kemira Oyj	FI0009004824	9	Finland	Manufacturing
32	Metsa Board Oyj	FI0009000665	1	Finland	Manufacturing
33	Huhtamaki Oyj	FI0009000459	5	Finland	Manufacturing
34	Cargotec Oyj	FI0009013429	8	Finland	Manufacturing
35	Metso Oyj	FI0009007835	4	Finland	Manufacturing
36	Kesko Oyj	FI0009000202	9	Finland	Wholesale Trade
37	Outokumpu Oyj	FI0009002422	7	Finland	Manufacturing
38	Kone Oyj	FI0009013403	1	Finland	Manufacturing
39	Stora Enso Oyj	FI0009005961	9	Finland	Manufacturing
40	Nokia Oyj	FI0009000681	7	Finland	Manufacturing
41	Fortum Oyj	FI0009007132	9	Finland	Transportation, Communications, Electric, Gas and Sanitary service
42	Sampo Oyj	FI0009003305	9	Finland	Finance, Insurance and Real Estate
43	REC Silicon ASA	NO0010112675	9	Norway	Manufacturing
44	Tomra Systems ASA	NO0005668905	7	Norway	Manufacturing
45	DNO ASA	NO0003921009	9	Norway	Mining
46	Akastor ASA	NO0010215684	4	Norway	Mining
47	TGS NOPEC Geophysical Company ASA	NO0003078800	9	Norway	Mining
48	SalMar ASA	NO0010310956	1	Norway	Public Administration
49	Schibsted ASA	NO0003028904	9	Norway	Manufacturing
50	Veidekke ASA	NO0005806802	3	Norway	Construction

ID	Company Name	ISIN	Number of Obs.	Country of Incorporation	Industry
51	Aker Solutions ASA	NO0010716582	2	Norway	Wholesale Trade
52	PGS ASA	NO0010199151	3	Norway	Mining
53	Mowi ASA	NO0003054108	7	Norway	Manufacturing
54	Orkla ASA	NO0003733800	9	Norway	Nonclassifiable
55	Aker ASA	NO0010234552	1	Norway	Mining
56	Aker BP ASA	NO0010345853	1	Norway	Mining
57	Yara International ASA	NO0010208051	7	Norway	Manufacturing
58	Storebrand ASA	NO0003053605	1	Norway	Finance, Insurance and Real Estate
59	Equinor ASA	NO0010096985	9	Norway	Manufacturing
60	DNB ASA	NO0010031479	9	Norway	Finance, Insurance and Real Estate
61	CTT Systems AB	SE0000418923	2	Sweden	Manufacturing
62	Svedbergs i Dalstorp AB	SE0000407991	2	Sweden	Manufacturing
63	Sectra AB	SE0012853661	2	Sweden	Manufacturing
64	Fingerprint Cards AB	SE0008374250	3	Sweden	Manufacturing
65	Nederman Holding AB	SE0011204510	3	Sweden	Manufacturing
66	Bergman & Beving AB	SE0000101362	2	Sweden	Wholesale Trade
67	Clas Ohlson AB	SE0000584948	3	Sweden	Retail trade
68	Nolato AB	SE0000109811	3	Sweden	Manufacturing
69	Dustin Group AB	SE0006625471	1	Sweden	Retail trade
70	Gunnebo AB	SE0000195570	3	Sweden	Services
71	Beijer Ref AB (publ)	SE0011116508	2	Sweden	Wholesale Trade
72	Nobia AB	SE0000949331	7	Sweden	Manufacturing
73	Lindab International AB	SE0001852419	2	Sweden	Manufacturing
74	Axfood AB	SE0006993770	9	Sweden	Retail trade
75	Swedish Orphan Biovitrum AB (publ)	SE0000872095	3	Sweden	Manufacturing

ID	Company Name	ISIN	Number of Obs.	Country of Incorporation	Industry
76	Hexpol AB	SE0007074281	4	Sweden	Manufacturing
77	BillerudKorsnas AB (publ)	SE0000862997	8	Sweden	Manufacturing
78	JM AB	SE0000806994	9	Sweden	Construction
79	Mekonomen AB	SE0002110064	1	Sweden	Retail trade
80	Modern Times Group MTG AB	SE0000412371	9	Sweden	Transportation, Communications, Electric, Gas and Sanitary service
81	Swedish Match AB	SE0000310336	9	Sweden	Manufacturing
82	Indutrade AB	SE0001515552	1	Sweden	Manufacturing
83	Nibe Industrier AB	SE0008321293	3	Sweden	Manufacturing
84	Wihlborgs Fastigheter AB	SE0011205194	7	Sweden	Finance, Insurance and Real Estate
85	Kungsleden AB	SE0000549412	9	Sweden	Finance, Insurance and Real Estate
86	Lundin Petroleum AB	SE0000825820	9	Sweden	Mining
87	Ratos AB	SE0000111940	9	Sweden	Finance, Insurance and Real Estate
88	NCC AB	SE0000117970	5	Sweden	Construction
89	Hufvudstaden AB	SE0000170375	5	Sweden	Finance, Insurance and Real Estate
90	Trelleborg AB	SE0000114837	9	Sweden	Manufacturing
91	Alfa Laval AB	SE0000695876	9	Sweden	Manufacturing
92	Fabege AB	SE0011166974	9	Sweden	Finance, Insurance and Real Estate
93	SAS AB	SE0003366871	9	Sweden	Transportation, Communications, Electric, Gas and Sanitary service
94	Castellum AB	SE0000379190	9	Sweden	Finance, Insurance and Real Estate
95	Securitas AB	SE0000163594	9	Sweden	Services
96	Holmen AB	SE0011090018	9	Sweden	Manufacturing
97	Getinge AB	SE0000202624	8	Sweden	Manufacturing
98	Boliden AB	SE0012455673	9	Sweden	Manufacturing
99	Husqvarna AB	SE0001662230	1	Sweden	Manufacturing

ID	Company Name	ISIN	Number of Obs.	Country of Incorporation	Industry
100	Saab AB	SE0000112385	3	Sweden	Manufacturing
101	Assa Abloy AB	SE0007100581	8	Sweden	Manufacturing
102	Tele2 AB	SE0005190238	2	Sweden	Transportation, Communications, Electric, Gas and Sanitary service
103	AB SKF	SE0000108227	9	Sweden	Manufacturing
104	Hexagon AB	SE0000103699	8	Sweden	Manufacturing
105	Svenska Cellulosa SCA AB	SE0000112724	9	Sweden	Manufacturing
106	Industrivarden AB	SE0000190126	9	Sweden	Finance, Insurance and Real Estate
107	H & M Hennes & Mauritz AB	SE0000106270	6	Sweden	Retail trade
108	Intrum AB	SE0000936478	1	Sweden	Services
109	Atlas Copco AB	SE0011166610	9	Sweden	Manufacturing
110	ICA Gruppen AB	SE0000652216	5	Sweden	Finance, Insurance and Real Estate
111	Electrolux AB	SE0000103814	6	Sweden	Manufacturing
112	Skanska AB	SE0000113250	9	Sweden	Construction
113	Fastighets AB Balder	SE0000455057	3	Sweden	Finance, Insurance and Real Estate
114	Sandvik AB	SE0000667891	5	Sweden	Manufacturing
115	L E Lundbergforetagen AB (publ)	SE0000108847	1	Sweden	Finance, Insurance and Real Estate
116	Investor AB	SE0000107419	8	Sweden	Finance, Insurance and Real Estate
117	Telia Company AB	SE0000667925	9	Sweden	Transportation, Communications, Electric, Gas and Sanitary service
118	Telefonaktiebolaget LM Ericsson	SE0000108656	8	Sweden	Manufacturing
119	Volvo AB	SE0000115446	9	Sweden	Manufacturing
120	Swedbank AB	SE0000242455	9	Sweden	Finance, Insurance and Real Estate
121	Svenska Handelsbanken AB	SE0007100599	9	Sweden	Finance, Insurance and Real Estate
122	Skandinaviska Enskilda Banken AB	SE0000148884	9	Sweden	Finance, Insurance and Real Estate