![UiA University of Agder logo]

Stock market reaction to ESG news in Norway

An event study of stock price reactions to corporate ESG related news in the energy sector on the Oslo Stock Exchange.

EVEN F. LARSEN, KJELL S. LARSEN

SUPERVISOR

Steen Koekebakker

Obligatorisk gruppeerklæring

Den enkelte student er selv ansvarlig for å sette seg inn i hva som er lovlige hjelpemidler, retningslinjer for bruk av disse og regler om kildebruk. Erklæringen skal bevisstgjøre studentene på deres ansvar og hvilke konsekvenser fusk kan medføre. Manglende erklæring fritar ikke studentene fra sitt ansvar.

1.	Vi erklærer herved at vår besvarelse er vårt eget arbeid, og at vi ikke har brukt andre kilder eller har mottatt annen hjelp enn det som er nevnt i besvarelsen.	Ja
2.	**Vi erklærer videre at denne besvarelsen:** • Ikke har vært brukt til annen eksamen ved annen avdeling/universitet/høgskole innenlands eller utenlands. • Ikke refererer til andres arbeid uten at det er oppgitt. • Ikke refererer til eget tidligere arbeid uten at det er oppgitt. • Har alle referansene oppgitt i litteraturlisten. • Ikke er en kopi, duplikat eller avskrift av andres arbeid eller besvarelse.	Ja
3.	Vi er kjent med at brudd på ovennevnte er å betrakte som fusk og kan medføre annullering av eksamen og utestengelse fra universiteter og høgskoler i Norge, jf. Universitets- og høgskoleloven §§4-7 og 4-8 og Forskrift om eksamen §§ 31.	Ja
4.	Vi er kjent med at alle innleverte oppgaver kan bli plagiatkontrollert.	Ja
5.	Vi er kjent med at Universitetet i Agder vil behandle alle saker hvor det forligger mistanke om fusk etter høgskolens retningslinjer for behandling av saker om fusk.	Ja
6.	Vi har satt oss inn i regler og retningslinjer i bruk av kilder og referanser på biblioteket sine nettsider.	Ja
7.	Vi har i flertall blitt enige om at innsatsen innad i gruppen er merkbart forskjellig og ønsker dermed å vurderes individuelt. Ordinært vurderes alle deltakere i prosjektet samlet.	Nei

Publiseringsavtale

Fullmakt til elektronisk publisering av oppgaven Forfatter(ne) har opphavsrett til oppgaven. Det betyr blant annet enerett til å gjøre verket tilgjengelig for allmennheten (Åndsverkloven. §2).
Oppgaver som er unntatt offentlighet eller taushetsbelagt/konfidensiell vil ikke bli publisert.

Vi gir herved Universitetet i Agder en vederlagsfri rett til å gjøre oppgaven tilgjengelig for elektronisk publisering:	Ja
Er oppgaven båndlagt (konfidensiell)?	Nei
Er oppgaven unntatt offentlighet?	Nei

Acknowledgements

This thesis marks the end of our Masters of Science (MSc) programme in Business Administration at the University of Agder.

It has been exciting and rewarding for us to put the knowledge we have accumulated through the years into use and investigate the topic of this thesis.

We want to express appreciation towards our knowledgeable professors who through the programme have inspired and shaped us into the students we are today. Most of all we would like to thank our supervisor, professor Steen Koekebakker for his help and feedback, his vast expertise on existing literature has been especially helpful. We would also like to thank the university for making the necessary software available to us.

Abstract

News on environmental, social, and governance (ESG) subjects are becoming increasingly prevalent in the largest economic newspapers in Norway. These news are followed by analysts, the public, and other stakeholders. This thesis investigates the extent of the stock market reaction following news related to ESG subjects. We assemble a dataset of news articles by performing a structured search in atekst's newspaper database Retriever. The articles concerns companies in the energy sector noted on the Oslo Stock Exchange, sampled in the period 2010-2021. We employ a natural language processing model to categorize the articles as either positive or negative. We conduct an event study around the announcement of the articles collected. We find that the market participants are responsive to the news releases. Our results suggest a positive market reaction to corporate ESG news with a positive sentiment and a negative reaction towards negative ESG news. We argue that shareholders assign utility and value to ESG initiatives in energy companies and punish unsustainable behaviour.

Contents

List of Figures

List of Tables

Chapter 1

Introduction

News related to environmental, social, and governance (ESG) topics is becoming increasingly prevalent in the largest economic newspapers in Norway. In today's corporate landscape, ESG news has become an important part of the media's news announcements and is followed by analysts, the public, and other stakeholders. How do these news announcements affect the energy companies of the Oslo Stock Exchange? We have created a unique dataset that differentiates the articles based on the evaluated sentiment in the corpus of each individual article. We use this dataset to measure the stock price reaction around the ESG-related news announcements. It is an important phenomenon to research as more and more investors integrate ESG information in their valuation of stocks, and news related to ESG can have an actual impact on companies.

Global Sustainable Investment Alliance (2020) (GSIA) reported that in 2020, the global sustainable investment market reached 35.3 trillion dollars. This was an increase of 15% since 2018. Canada and America lead the charge with 48% and 42% growth, respectively. Japan and Australasia followed; however, Europe saw a slight decline in the period (2018-2020). As a result, Canada and Europe are the markets with the highest proportion of sustainable investment (Global Sustainable Investment Alliance, 2020). GSIA also documented that the most common strategies of ethical and sustainable investment in the period 2018-2020 were ESG integration, followed by negative screening, corporate engagement, shareholder action, norms-based screening, and sustainability themed investment.

Existing literature has investigated the stock market reactions to ESG news releases. Borelli-Kjaer et al. (2021), Capelle-Blancard and Petit (2019), Griffin and Sun (2013), Krüger (2015), and Serafeim and Yoon (2022) found significant stock market reaction to ESG news releases. Serafeim and Yoon (2022) found that there was a significant positive stock market reaction associated with positive ESG news that was material to a business, as well as significant negative results associated with negative ESG news. However, Capelle-Blancard and Petit (2019), Griffin and Sun (2013), and Krüger (2015) found that negatively ESG-associated news gave a strong negative stock market reaction and positive ESG news gave a weak negative or positive reaction. In this research, we add to the existing literature by detailing how both positive and negative ESG-associated news on Norwegian energy companies affect investors and the stock price of these companies.

We examine how investors who invest in energy companies of the Oslo stock exchange react to different news articles chosen by specific search terms related to environmental, social, and governance issues. We created a unique data sample of the Norwegian stock market with 141 positive and negative news articles on 21 companies from 2010 to 2021 extracted from atekst's newspaper database Retriever. Then, we performed a sentiment analysis by employing a Norwegian language model created by the national library of Norway trained on 109 gigabytes of Norwegian literature to independently classify our 141 news articles as having either a positive or negative sentiment. This gives us the ability to study if there is a correlation between a positive stock market reaction and positive news releases and a negative stock market reaction to negative news releases. The news articles originate from Norway's most prominent online financial newspaper, E24.

Our research design is primarily an event study based on the market model by Sharpe (1963) with an added factor accounting for industry fluctuations specific to the oil industry. The sentiment analysis determines whether the news event gives a positive or negative sentiment, and that gives us an indicator variable for a positive or negative market reaction to the event. We then measure if there was an abnormal market reaction in the period surrounding the news release date. The market model defines an expected normal return and what is an abnormal return for a given period. There are two periods measured, one estimation window that gives a benchmark for what is regarded as normal returns and an event window that measures the abnormal return associated with the event that we seek to investigate.

Our analysis of the event windows related to the news events shows significant stock market reactions. Our news events indicated as positive give significant positive stock market reactions. The news events indicated as negative give mostly significant negative reactions. However, the reactions to the negative news were more spread out in the days following the event. The average abnormal return on the event day for news classified as positive was 2.18%, and -0,81% for negatively classified news.

Our result gives a significant stock price reaction of the 21 energy companies in the Oslo stock exchange included in this research. The reaction was significant, both related to negative and positive news. Both parametric and non-parametric tests give significant results. Our result supports the view that shareholders react to ESG news and react in accordance with the sentiment of the news article by buying or selling stocks. We believe that our findings are interesting because it is in line with the research performed by Serafeim and Yoon (2022), who found that positive ESG news gave positive stock price reactions and negative ESG news gave negative stock price reactions. We also found, like Serafeim and Yoon (2022) that positive news gives a much stronger stock price reaction than negative news. This is different from Capelle-Blancard and Petit (2019), Griffin and Sun (2013), and Krüger (2015), who found weak negative or positive reactions associated with positive news and strong negative reactions to negative news. As stated by Serafeim and Yoon (2022), this could be caused by our news selection coming from a period where ESG news has become more prevalent.

1.1 Environmental Social Governance

Global warming resulting from greenhouse gas emissions after 100s of years of significant economic and technological development is taking a toll on the earth's planetary boundaries. In the last 10 000 years, the earth has been in an unusually stable period referred to by geologists as the Holocene. This era might be coming to an end as humans have become the primary driver of global climate change (Rockström et al., 2009). Global warming will introduce significant risks to household wealth, capital markets, and firm profits. Global warming introduces risks associated with rising sea levels, the potential price of carbon emissions, and problems related to agricultural productivity (Hong et al., 2020). In order to reduce net greenhouse gas emissions to zero within 2050, the European Commission expects that energy and infrastructure investments have to increase from 2% of GDP annually to 2,8% annually (Euractiv, 2018). The damage inflicted to the US economy as a consequence of climate change could be as high as 10% at the end of the century (The New York Times, 2018).

As environmental social governance has become an essential part of modern business. Corporate social responsibility is often used together with ESG as an umbrella term for sustainability in business and investing. However, ESG has become the acronym term for incorporating sustainability in corporate management and investor portfolio management decisions (Liang & Renneboog, 2020). The term ESG is divided into three pillars or dimensions, environmental (E), social (S), and governance (G). The environmental dimension of ESG considerations is created to measure a corporation's impact on the natural ecosystem. The environmental pillar involves greenhouse emissions or other damaging emissions, how efficient the corporation's use of natural resources is, the amount of pollution the corporation generates, and the amount of research and effort used to increase its environmental effort (Liang & Renneboog, 2020).

The social pillar relates to a company's relations with its stakeholders, customers, and workforce. This dimension includes health and safety training and development, efforts to create satisfied customers, efforts to create loyal workers, producing safe products for customers, and being a "good citizen" within the communities in which the corporation operates (Liang & Renneboog, 2020).

The governance pillar involves making decisions in the best interest of the corporation's long-term shareholders and not getting involved in illegal activities and fraudulent behavior. Governance also covers the responsibility of the corporation to include a diversity of minorities. The governance dimension is described as a "somewhat ambiguous term in the context of ESG. Meaning that the governance dimension is not as easy to define as the E and S dimensions. (Liang & Renneboog, 2020)

As a consequence of ESG becoming a more important part of modern business, sustainable, responsible, impact investing (SRI) is becoming more prominent in investors' decision-making. SRI is the concept behind investors "screening" the investments they will put into their portfolios. This ensures that the investments in a portfolio follow the SRI "goals" that a portfolio has. The most basic type of screening is removing companies that produce goods

or services that are considered damaging to humans. Such as Tobacco, alcohol, and weapon producers, also referred to as "sin stocks" (Hong & Kacperczyk, 2009). A stricter screening process removes companies from their portfolios that cannot meet above-average standards, protecting human rights, the environment, or sustainability. Even stricter screening processes might only consider the best-in-class companies strictly following ESG operations in their everyday business. (Liang & Renneboog, 2020)

Friedman (1970) wrote a piece on corporate social responsibility (CSR) in business. In the early 70s, the idea that businesses had more responsibility than just creating economic value was gaining momentum. The view emerged that businesses should also strive to create value within environmental and social arenas. Friedman was opposed to this and famously wrote that businesses could not have "social responsibilities". Instead, the only responsibility of businesses was to *"make as much money as possible while conforming to the basic rules of society, both those embodied in law and those embodied ethical custom"* (Friedman, 1970).

The shareholder view proposed by Friedman (1970) convey that a corporation has no other duty than to maximize its profits for its shareholders. This neoclassical paradigm usually considers ESG activities as an unnecessary part of value creation and not in line with profit maximization. Friedman (1970) was a proponent of the "invisible hand of the market" theory which was first used by Smith (1937), the father of modern finance. The invisible hand of the market was defined by Smith (1937) as a metaphor for the invisible forces that move and control the free market economy based on the self-interest of its participants. Smith (1937) believed in an open and unregulated market where the self-interest of individuals would accumulate wealth would serve others in the process. However, this view could be considered naive. Is it possible that everyone would serve society sustainably by only accumulating wealth for themselves? Stakeholder theory tries to evolve on the earlier shareholder view in order to create guidelines on how to generate sustainable value that is in the interest of everyone in society.

The stakeholder term was initially made famous by Freeman in 1984 but had first appeared in an internal memorandum from Stanford Research Institute already in 1963 (Parmar et al., 2010). A stakeholder is a person or group of people that are touched by the operations of a firm or someone who can affect it in any way (Freeman, 1984). It might be people living in the local ecological environment or the societal. It might consider a worker or someone in the worker's family, a supplier, or a business relation. A stakeholder is a person affected by the decisions and responsibilities that a firm chooses to act on. Stakeholder theory extends the business role in society as serving a more significant amount of people than just their shareholders. Stakeholder theory serves to understand how to manage value creation in modern society in a sustainable way. Stakeholder theory seeks to balance financial value creation against ethics, moral responsibilities, and sustainability within the constraints of the modern capitalistic system.

Alex Edmans is another influential benefactor in building an understanding of creating long-term value for stakeholders. Through his book written on the topic pie-economics, he presents the idea of "growing the pie." The traditional view followed by managers and investors is often what he calls the pie-splitting mentality. The pie represents the total value output

created by the firm in a pie chart. Under the pie-splitting mentality, a re-distribution of the value given to the recipients would benefit one group at the detriment of another. This entails that the pie is fixed in its size. The size of the pie and, therefore, the pieces for all shareholders cannot be increased. To increase a piece of the pie, the stakeholder has to take from one or more of the other stakeholders. Growing the pie mentality views the pie as an expandable pie. This mentality aspires to increase the total created value and, in that way, expand all pieces of the pie for all stakeholders. Profits alone are no longer the end goal of the business, but it will be a result of the mentality, among others. Everyone is on the same team. This is similar to ESG and is an important part of modern business. Economic profit will follow by focusing on creating value through societal and environmental doings. It creates a far greater long-term value for investors than the more traditional and easier pie-splitting mentality. (Edmans, 2021)

When investors and managers is considering financial reporting, materiality is commonly thought of as items that are prone to influence investors' decision-making using an organization's financial statement. In sustainability reporting, the materiality principle is used to determine what information is relevant for a company to disclose publicly. When speaking of sustainability reporting, the principle covers topics and items that may have an impact on the organization's environmental and social footprint. Providers of sustainability accounting standards employ various approaches to determine what ESG issues are important to disclose. For instance, the Global Reporting Initiative (GRI) framework provides a stakeholder approach where topics are regarded as material if there is a positive or negative impact on the economy, the environment, and the society caused by the organization (Global Reporting Initiative, 2016). The literature offer arguments that investors may react to ESG news whether they are financial material or not. Investors may react on account of their own reputation or other non-financial reasons (Baker et al., 2018). In this case, the reaction is expected to be significant regardless of the news' financial materiality for the firm (Serafeim & Yoon, 2022).

Investors may have different viewpoints towards how the market should react to ESG news announcements. The first viewpoint as expressed by Friedman (1970), is that a firm's ESG efforts will be associated with increased agency costs because managers prioritize their own reputation at the cost of shareholders. The second viewpoint suggest that there is no reaction to ESG news because investors might not update their ESG beliefs because the information is already known from other channels Griffin and Sun (2013). The third viewpoint is that ESG news announcements may be connected with shareholder value because it might lead to better resource use, marketing success, better reputation for the firm, better and higher quality employees and decrease the risk of a stock price crash (Cochran & Wood, 1984; Mozkowitz, 1972). By extrapolating the third view we expect to see positive ESG news generate positive stock market results as it will contribute to future value creation. We would also expect to see an adverse reaction from negative ESG news as the opposite is true.

1.2 Efficient Market Hypothesis

The event study methodology is often associated with the efficient market hypothesis (EMH), because event studies are an efficient way to measure event effects under the assumptions of EMH. An early iteration of EMH was the original motivation for Ball and Brown (1968) to develop the event study method. EMH is an integral part of modern financial theory. The central concept behind the EMH is the theory that all stock markets are efficient and that all investors strive to make a profit, and any valuable and available piece of data will be reflected in the stock market and the stock market price will be a "fair" value for the asset. When the market is spoken of as efficient, it is often considered that market prices of assets is regulated by supply and demand. Economists assume that investors and traders act rationally in a competitive market and these rational traders assimilate all relevant information into the asset price quickly. (Cuthbertson & Nitzsche, 2004)

Under the EMH the stock price is always fair and all information that is relevant to the price of a stock is incorporated. The only reason for stock price changes over time is the arrival of news or unanticipated events. The EMH expects the average forecast errors to be zero and be uncorrelated with any information that was available at the time when the forecast was made. The forecast error being equal to zero is often called the *rational expectations* of the EMH. This means that on average the expected price should equal the actual price of an asset. The EMH is often applied to the returns of stock purchases and implies that it is impossible to earn abnormal profits by selling and buying stocks. (Cuthbertson & Nitzsche, 2004)

Under the EMH, a risk adverse investor should adopt the buy and hold strategy. He should spread the risk and hold a market portfolio, such as an index fund based on the S&P 500. Under the EMH it is impossible for active investment managers to pick winners based on available information (Cuthbertson & Nitzsche, 2004). Paradoxically investment managers will even help the market become efficient by acting on available information, even though they will not be able to consistently benefit from it (Grossman & Stiglitz, 1980). However, if information is always reflected in the prices of an asset, investors could just avoid gathering information in the first place. An investor not interested in collecting news would at least beat the performance of other investors by not having to pay costs related to collecting available information (Cuthbertson & Nitzsche, 2004). Grossman and Stiglitz (1980) pointed out that if information is costly, asset prices cannot accurately reflect all information available.

Under the EMH we would expect to observe results where there is an immediate reaction in the market to the new information represented by the ESG news. The new information should assimilate quickly and be reflected in the stock price of the firm.

1.3 Research Question

In light of the research presented by Borelli-Kjaer et al. (2021), Capelle-Blancard and Petit (2019), Flammer (2013), Griffin and Sun (2013), Krüger (2015), and Serafeim and Yoon (2022) we became interested in researching how such a study would apply to the Norwegian stock market. Taking into account the theory presented above we hope to answer the

following research question:

- *How does firm-related ESG news announcements affect company stock price in energy companies of the Oslo stock exchange?*

The goal of this research question is to discover how the Norwegian stock market relates to the stock markets discussed in the previous literature and if we can uncover similar effects. If we are able to find stock price reactions related to ESG news announcements we would also like to discuss how the stock market reaction compares to what is expected under the theory of efficient markets.

Chapter 2

Literature Review

Dimson et al. (2015) discovered through their research on firms from 1999 to 2009 that positive ESG interactions with companies had a general positive return. However, in situations where the result of the ESG interaction by investors where negative, the returns were negative. This indicates that ESG implementation in business and a focus on such issues correlated with companies' positive long-term profits.

This finding was further supported by the work of Flammer (2013), who found that as time passed, the stock market reaction caused by ESG-related incidents increased. Negative news causes ever-increasing negative returns, and positive news results in more significant positive returns. This study mostly relates to the E dimension of ESG. Flammer (2013) argued that robust ESG implementation in businesses behaved like insurance against negative returns from a negative system of business-related events. When a business is considered well implemented in CSR/ESG manners, Flammer (2013) argue that negative events would affect the business less negatively than a less well-implemented business. Flammer (2013) also argue that it would be less affected by a positive event as well. This supports the view that when ESG matters are properly implemented in a business, it creates more stability in its expected return.

Ioannou and Serafeim (2015) performed an extensive study over 15 years and documented the ratings done by sell-side analysts on firms' future financial performance. Ioannou and Serafeim (2015) put forward that during the early 90s high CSR and ESG focus was viewed as an agency cost and therefore contributed to more pessimistic views of future performance. However, this has changed over the 15 years that was observed. As time passed, a focus on CSR and ESG values in companies was progressively assessed more positively. The research showed that analysts of high status were the first to improve the ratings of ESG and CSR-focused firms.

Hartzmark and Sussman (2019) put forward evidence suggesting that sustainability in companies is regarded as a positive predictor when evaluating future performance. However, they do not find that high sustainability funds outperform low sustainability funds. This evidence was found to be consistent with the positive effect sustainability has when influencing the expectations of a fund's performance and how nonpecuniary motives can influence investment decisions. This suggests that investors value sustainability and find utility in

both financial and social returns.

Renneboog et al. (2011) researched the money flow surrounding SRI funds. They found that SRI fund performance was less related to past returns. SRI funds are more concerned with ethical and social issues than fund performance when making investment decisions. Picking stocks based on SRI targets increase the money flow into the fund. However, these funds do neither outperform nor underperform compared to their conventional benchmarks. These results give evidence that nonfinancial attributes are valued by the investors and clientele of SRI funds.

Gantchev et al. (2019) argued that companies that experienced highly volatile returns due to a lack of focus on CSR and ESG matters want to upgrade their focus and position on the area. Experiencing volatile returns is negative in the shareholder's view and the business view, as it is an expression of increased risk. Gantchev et al. (2019) also discovered in their research that investors played a significant role in implementing ESG/CSR matters into daily operations. It supports the idea that a strong position on ESG/CSR matters affects shareholder value and is an essential consideration to investors.

Naughton et al. (2019) also found a link between an investors valuation of businesses based on sustainability considerations. They discovered that businesses produce larger positive abnormal returns when they consider ESG matters as an important part of their daily business strategy. They also suggested that companies needing investors duly upgrade their ESG focus. This supports the idea that ESG matters are important for investors and have become a large part of modern business investor sentiment and value creation.

Hoepner et al. (2018) also supported this sentiment through his research. Hoepner et al. (2018) demonstrated that ESG activities reduced the firm's exposure to downside risk, which again serves shareholders and increases value. Hoepner et al. (2018) measured the risk reduction associated with ESG engagements on the investor's side against a firm. The main takeaway from this research is that successful ESG-related engagements significantly reduced downside risk. However, unsuccessful engagements did not increase or decrease risk significantly.

Khan et al. (2016) developed a dataset that collect materiality classifications on sustainability topics and create firm-specific sustainability ratings. How material a sustainability issue is, depends on how important the issue is to the daily operations of a business. A more material issue will significantly affect a firm's economic, reputational, and legal aspects (Khan et al., 2016). The main finding from this work is that companies with good ratings on material sustainability considerably outperform poorly rated companies. Khan et al. (2016) argue that the materiality of sustainability issues must be considered to predict the risk and economic outcome of such issues effectively. This has an important effect on investors and managers that incorporate sustainability goals in their valuation and capital allocation assessments.

Coqueret (2022) performed an extensive literature study on socially responsible investing. It covers 900 academic sources grouped in 6 themed chapters. The literature examined for review suggests a dichotomy between profitability and sustainability in investing. Researchers claim that there is possible to both do good and do well simultaneously. On the aggregate

level, such conclusions are not clear-cut, which is the conclusions of most meta studies. If SRI was not costly to implement and is socially beneficial for investors, it could be considered an ethically free lunch. However, it is not evident that ESG investing has had a significant global impact. The literature supports the idea that ESG investing has become an essential part of investor sentiment globally. The literature also suggested that there should be investment done in brown companies as it is needed to help bend them into a more sustainable operation. Research also found evidence that investors prefer green companies because they are less vulnerable to risks that are hard to evaluate. This is also the sentiment put forward in the article written by Flammer (2013). By functioning as insurance and creating stability, sustainability in companies might help them be considered less risky by investors.

Engle et al. (2020) created a procedure to dynamically hedge climate risk. They used a textual analysis based on articles from news outlets on ESG news to decide on a hedging target. The hedging was disciplined using ESG scores from a third party. In particular the E-scores or news from the E pillar of ESG was used as a hedging target. The procedure created parsimonious and industry balanced portfolios that performed well in hedging innovations in climate news. This method outperformed earlier methods of hedging against climate risk, such as using industry tilts.

Hong and Kacperczyk (2009) discovered that the price of certain stocks was affected by social norms held by some investors. They hypothesized that there existed a societal norm against investing in companies that create vice, and that some institutions subject to norms incur an opportunity cost by abstaining from investing in such companies. Such stocks represent the opposite values of ESG aligned stocks and is often referred to as "sin-stocks". These stocks included categories as tobacco, alcohol and gaming stock. They found that these stocks was less held by norm constrained investors such as pension plans, compared to mutual or hedge funds that try to take advantage of inefficiencies in the market. It was also discovered that such stocks receive less coverage than stocks of otherwise comparable statistics. Sin-stocks had a higher expected return than their otherwise comparable stocks which is consistent with these stocks being neglected by norm constrained investors.

The literature supports the idea of investors valuing ESG and CSR focus in companies. Focus on these issues might help to increase firm value. This view has evolved since the 90s and has become an increasingly larger part in investor valuation of companies today. It is also evident that both companies and investors have incentives to implement a focus on these issues to attract investment or to increase company value in the modern market. Today, focusing on ESG and CSR issues is important to evaluate companies properly. Performance within these areas will only be more important in securing future financial performance and decreasing downside risk. However, investors who are not concerned with ESG related risks might be able to exploit inefficiencies in the market surrounding sin-stock.

2.1 Related Event Studies

Griffin and Sun (2013) performed an event study on the market reaction to CSR news releases in the American market. The event study contained a sample size of 172 observations from

2000 to 2010. They find that a firm's disclosure of greenhouse gas emissions creates a positive reaction in the market. This might seem counter-intuitive. Should not news containing information about emissions devaluate the stock pertaining to the information collected from the earlier literature? However, disclosure of emissions shows a firm's commitment to ESG and its willingness to disclose negative news and positive. As the awareness associated with climate change increases, investors and individuals demand increased information about their "environmental friendliness." From this research, there is evidence of market gratitude towards such actions.

The research by Griffin and Sun (2013) also shows that the effect is negatively correlated with the size of the firm. A smaller firm produces a greater positive market reaction when disclosing the release of harmful emissions. This might be due to the smaller firms often having less publicly available information than larger companies.

Krüger (2015) is also an example of an event study performed to evaluate the market reaction to CSR news releases. The study contained 2116 observations in the American market and was performed from 2001 through 2007. The main findings from this work were that negative CSR news created a strong negative reaction in the market, and positive news brought with it weak negative reactions. This is interesting because this result might not be as expected. One might expect that positive news brings positive market results and vice versa.

Krüger (2015) further suggest that investors do value "offsetting CSR," which means that investors value firms with poor stakeholder relations getting positive CSR news. Krüger (2015) also suggested that investors respond negatively to positive CSR news that is a result of agency problems. CSR news with solid legal or economic information also generates more pronounced investor reactions.

Capelle-Blancard and Petit (2019) performed an event study on 100 listed firms from the Dow Jones index. This event study contained 33000 observations on both positive and negative ESG news. It was performed between 2002 and 2010. The research finds that there is, on average, a 0.1% drop in company market value when they are subject to negative ESG news releases. Conversely, with positive news releases Capelle-Blancard and Petit (2019) find that there is no discernible market value gain. The paper also finds no reaction to a firm's own press releases, but the market is responsive to the media. Further, the paper suggests that the reputation of a sector will mitigate the potential loss of news releases. Finally, the different lexical contents and cultural proximities of disclosures impact the magnitude of value fluctuations.

Serafeim and Yoon (2022) used a language model similar to the one used in this paper that classified firm level ESG-related news as positive or negative in order to examine the stock price reactions to the news releases. The study was conducted on 111,020 firm day observations on 3,126 companies. The study found that the companies' stock prices only reacted to issues identified as material to the company or the industry it operates within. The reaction is also different for news that is positive or receives more attention. The study concludes that the changes in stock price are affected by news considering the companies' fundamentals. Therefore, the moves in stock price are motivated by financial reasons instead

of nonpecuniary motives. (Serafeim & Yoon, 2022)

Borelli-Kjaer et al. (2021) also performed an event study on social news in the form of how sexual harassment impacts company value. This study relates to the social "S" pillar of ESG. The event study contains 199 observations across a 13-year time span from 2005 to 2018. The main finding of this research is that the average effect of a sexual harassment scandal in a firm is a negative AR of 1.25%. This is observed on the initial event day and the following trading day. Borelli-Kjaer et al. (2021) also suggest that CEO involvement and high levels of news coverage greatly amplify the effect. However, company disclosure of sexual misconduct mitigates the effect. Findings also indicate that the #MeeToo movement has brought a four-time increase in the risk of being involved in a scandal.

Chapter 3

Event Study Methodology

Event studies have been used to examine various market reactions to corporate events. This thesis will study the stock price reaction following the event[1]. The approach provides an effective tool for determining the information content of events as perceived by the shareholders (Kliger & Gurevich, 2014). The methodology was first introduced in a seminal paper by Ball and Brown (1968), who heralded the view of the importance of companies' financial statements in the capital markets. Prior to the works of Ball and Brown, there was no empirical evidence that accounting numbers conveyed information about a firm's financial performance (Kothari, 2001). The motivation of Ball and Brown's (1968) paper was the then recent development in capital theory. The body of theory suggested that the market is efficient and will adjust rapidly to information that is useful in forming capital asset prices. The theory has later been established as the efficient market hypothesis.

The premise of the event study method is that the period before the event consists of normal returns. This returns period is fitted using an appropriate model (eg. the market model, CAPM, or Fama French factor models). The (abnormal) returns during the event window are then compared to the expected returns given by the estimated model.

The execution and evaluation of the event study in this thesis follow MacKinlay's (1997) description of a general event study procedure. As summarized in table 3.1, the procedure follows eight steps. Firstly the events that are of interest are defined. The event window must then be defined to capture the relevant period of effect. After identifying the event, firms are chosen based on given criteria. These criteria may be based on listings on stock exchanges or memberships in industries (MacKinlay, 1997). Subsequently, an appropriate estimation window must be defined. The estimation window is the basis of estimating the normal performance model, which is assumed to be unaffected by the event. Once the normal returns model is established, abnormal returns can be calculated, and hypotheses testing is conducted on variants of the abnormal returns.

---

[1]Other types of event studies include studies that examine return variances, trading volume and operating performance among others (Kothari & Warner, 2007)

Table 3.1: General flow of an event study (MacKinlay, 1997)

Step	Subject
1	Define event of interest
2	Identify event window
3	Determine selection criteria for included firms
4	Define estimation window
5	Select a normal performance model
6	Calculate abnormal returns
7	Define hypotheses
8	Presentation of empirical findings

3.1 Event and Estimation Window

When deciding to employ the event study method with the research question in mind, we have to start with tracking the performance of an asset over a period that potentially will reflect behavior related to the event. In event studies involving news articles, the common practice is to set the event date as the date of release of the article (Flammer, 2013). A problem with this is that the event the news article concerns might not be the actual date the event occurred, which might have been on the previous day during stock market opening hours. As such, it is customary to include a period before and after the event itself in the event window (MacKinlay, 1997). The extension in time of the event window both before and after an event allows the study to detect if the market reacts prematurely in cases of information leakage prior to the announcement, if the event occurred before the article release, or whether the market is inefficient. In order to properly evaluate if the event manifested itself in an abnormal return, these abnormal returns are given by the excess of the expected returns, further elaborated in section 3.3.

Figure 3.1: Event study timeline
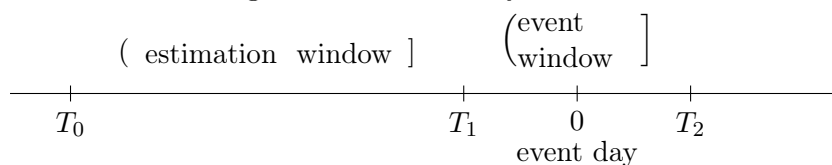
Figure 3.1 shows the typical setup of a timeline in an event study. The estimation window ends one observation before the first observation T_1 in the event window.

The normal return is estimated in the estimation window preceding the event window which is assumed to be representative of a return process unaffected by the event. The estimation window acts as a benchmark containing normal returns, in which the normal performance model is estimated. The estimation window must be of sufficient length for the model parameters to be adequately estimated. The length of the estimation window typically lies within the range of 60 to 250 trading days in the literature, with common choices being 60, 120 and 200 trading days (see eg. Capelle-Blancard and Petit (2019), Carberry et al. (2018) Krüger (2015) and Flammer (2013)). An estimation window of length 120 trading days is selected for this thesis, given by the interval [-123,-3] relative to the event date. The period ends 3 days prior to the event date because we do not expect the event to have any effect

preceding the two days before the event, on the basis that we find no evidence of the event having an effect on day -2.

3.2 Technical Issues in Event Studies

Confounding events

An essential assumption of the event study methodology is that the event window studied is unaffected by a confounding effect of another event. Confounding events can include the declaration of dividends, announcement of unexpected earnings, and a change in key executives (McWilliams & Siegel, 1997). Specifically, events that might impact the share price during the event window. By employing short event windows, the risk of this effect is reduced and easier to control. With the content of isolating the effect of the studied events, we seek to remove observations where financial statements were released in the event window. Steps have also been taken to filter out event windows containing other confounding effects, but there is still a risk of unobserved confounding events in the data.

Confounding events may also cause problems in the estimation window. Various methods have been proposed in the literature to deal with confounding events in the estimation window. These include choosing estimation windows on a case-by-case basis free of contaminating events (Aktas et al., 2007). Another possibility is to find dates of events believed to have an impact and remove these from the estimation window series of returns. However, these solutions are tedious and unreasonable for our sample, and we have opted not to apply them in this thesis. The market index and oil price regressors used in the adjusted market model will dilute some of the effects of market-wide events occurring during the estimation windows.

Event clustering

Event clustering refers to cases when event windows overlap. Clustering affects the independence assumption for the analysis. The independence assumption assumes that the sample consists of independent events. In the case where event windows overlap and thus their respective abnormal returns overlap, it is likely that some of the securities are correlated (Kliger & Gurevich, 2014) and the independence assumption may be violated. Kolari and Pynnönen (2010) finds that even with low cross-correlation in the sample data, event clustering may cause a severe understatement of the standard deviation. This can result in an overestimated t-statistic which leads to over-rejecting the null hypothesis, potentially causing type 1 errors.

Event induced variance

As certain events occur, the variance of abnormal returns have been found to increase significantly for a period surrounding the event (Boehmer et al., 1991). If the variance estimator is based on the estimation window, the variance in the event window may be underestimated, possibly leading to type 1 errors. One solution has been to ignore the estimation window variance, and solely use a cross-sectional approach. This approach in turn does not account for other statistical issues which will be further discussed in section 3.4.

3.3 Normal and Abnormal Returns

We apply a modified market model to calculate the normal (expected) return (NR). The basic market model is a single factor model devised by Sharpe (1963). The model assumes a linear relationship between the market index and a stock's contemporaneous returns. In a critical analysis of the event study methodology, McWilliams et al. (1999) emphasizes that one should control for industry effects when conducting the normal return regression. Because the sample of securities used in this thesis exclusively encompasses firms in the energy sector, a factor for log change in the oil price is added to the regression. The modified market model is thus given as follows:

$$R_{i,t} = \alpha_i + \beta_{i1}R_{m,t} + \beta_{i2}R_{oil,t} + \varepsilon_{i,t} \tag{3.1}$$

Where $R_{i,t}$ and $R_{m,t}$ is the returns of stock i and market m at period t accordingly. α_i and β_i are the market model parameters. The Beta β_{i1} is interpreted as stock i's systemic risk, it describes how the stock moves in accordance with the market. β_{i2} describes firm i's correlation with the movement of the oil price. The stock's Alpha α_i can be interpreted as the stock's performance in the case when the market return is zero. $\varepsilon_{i,t}$ is the model's error term with the expected value of zero, the term can be thought of as the abnormal return (AR) since it is the difference between the predicted return and the observed return. The model parameters are estimated by an ordinary least squares (OLS) regression for stock i based on the estimation window of the given event. The underlying assumptions of an OLS regression is further expanded upon in Appendix A. Given that the error term from equation 3.1 is expected to equal zero, the expected normal returns can be expressed as

$$\text{NR}_{i,t} = \hat{\alpha}_i + \hat{\beta}_{i1}R_{m,t} + \hat{\beta}_{i2}R_{oil,t} \tag{3.2}$$

Where $\text{NR}_{i,t}$ is the estimated normal return, for stock i at time t, $\hat{\alpha}_i$ and $\hat{\beta}_i$ are the model parameters estimated during the sample period. Being that the error term of equation 3.1 is regarded as the abnormal return denoted $AR_{i,t}$, we get the following equation for the abnormal returns

$$AR_{i,t} = R_{i,t} - \text{NR}_{i,t} = R_{i,t} - (\hat{\alpha}_i + \hat{\beta}_{i1}R_{m,t} + \hat{\beta}_{i2}R_{oil,t}) \tag{3.3}$$

The aggregated abnormal return (AAR) is then calculated as the sum of abnormal returns on day t.

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_t^i \tag{3.4}$$

The cumulative abnormal return CAR's purpose is to capture the full effect of the event by including several days in the event window. CAR is the sum of abnormal returns for event i in a given interval (τ_1, τ_2).

$$CAR(\tau_1, \tau_2)^i = \sum_{\tau=\tau_1}^{\tau_2} AR_\tau^i \tag{3.5}$$

Furthermore, the cumulative average abnormal return CAAR can either be calculated by summing up CARs, or by finding the cumulative average of AARs. The method used is dependent on what is necessary for the given test statistic.

$$CAAR_{s,t} = \frac{1}{n} \sum_{i=1}^{n} AAR_{s,t}^{i} \tag{3.6}$$

3.4 Statistical Tests for Abnormal Returns

It is customary in the event study literature to include both parametric and non-parametric statistical tests. This section presents three parametric tests and one non-parametric test, which will be used in an attempt to answer the following two hypotheses:

- Hypothesis 1. Shareholders react positively to the announcement of positive ESG-related news.

- Hypothesis 2. Shareholders react negatively to the announcement of negative ESG-related news.

The null hypothesis states that there is no market reaction in terms of abnormal returns to either positive or negative news. The tests given the most emphasis are the adjusted BMP test and generalized rank t-test. In addition, however, it is beneficial to include the traditional- and cross-sectional tests to identify possible issues in the data.

3.4.1 The Traditional Test

The method of Brown and Warner (1980) is commonly regarded as the traditional method to perform test statistics in event studies. It will be referred to as the traditional test henceforth. With the variance for AAR expressed as

$$\sigma_{AAR}^2 = \text{var}(AAR_\tau) = \frac{1}{N^2} \sum_{i=1}^{N} \sigma_{\varepsilon_i}^2 \tag{3.7}$$

The traditional test method uses the estimation window to predict an appropriate estimator for $\sigma_{\varepsilon_i}^2$. To account for a multi-day event window, the variance is aggregated by

$$var(CAAR(\tau_1, \tau_2)) = (\tau_2 - \tau_1 + 1)\sigma_{AAR}^2 \tag{3.8}$$

With τ_1 being the day of the start of the event window and τ_2 the end, relative to event day 0. The covariance terms are set to zero and as such, the test assumes that the security residuals are uncorrelated. Because the variances are based on returns in the estimation window, the model assumes that event-induced variance is insignificant (Boehmer et al., 1991). The test statistic for testing the null-hypothesis that the abnormal returns are zero can then be calculated by equation (3.9) for both cumulative aggregated abnormal returns and single-day aggregated abnormal returns (MacKinlay, 1997).

$$t = \frac{CAAR(\tau_1, \tau_2)}{var(CAAR(\tau_1, \tau_2)^{\frac{1}{2}}} \sim N(0, 1) \tag{3.9}$$

3.4.2 Cross-Sectional Test

The cross-sectional test of MacKinlay (1997) offers a more robust test in terms of event-induced variance compared to the traditional test. As mentioned in section 3.2, event-induced variance may understate the variance in the event window which may result in type 1 errors. The cross-sectional test does not rely on the estimation period abnormal returns for the variance estimator. Using the cross-section to form an estimator for the variance gives (MacKinlay, 1997)

$$var(CAAR(\tau_1, \tau_2)) = \frac{1}{N^2} \sum_{i=1}^{N} (CAR_i(\tau_1, \tau_2)) - CAAR_i(\tau_1, \tau_2))^2 \tag{3.10}$$

An assumption for this estimator to be consistent is that the abnormal returns are uncorrelated in the cross-section, this assumption is sustained when there is no clustering of events (MacKinlay, 1997).

3.4.3 Adjusted BMP Test

The final parametric test that will be applied in this thesis is the adjusted BMP test. The original BMP test stems from Boehmer, Musumeci and Poulsen's (BMP) standardized cross-sectional test (Boehmer et al., 1991). The original BMP test contributed to the literature by offering a model that is robust against highly volatile stocks dominating the test. This is done by using standardized abnormal returns (SAR) which is found by dividing the abnormal returns by the standard deviation estimated from the regression prediction errors in the abnormal returns during the estimation window.

$$SAR = \frac{AR_{it}}{S_{AR_i}} \tag{3.11}$$

This ensures that stocks which are highly volatile in the estimation window and possibly have large absolute levels of abnormal returns are weighted less in the test (Harrington & Shrider, 2007). The test statistic is given by

$$t_{BMP} = \frac{SAAR\sqrt{N}}{s} \tag{3.12}$$

Where $SAAR$ is the standardized aggregated abnormal during the chosen event window, and s is the cross-sectional standard deviation of the standardized abnormal returns given by the square root of the sample variance (Boehmer et al., 1991):

$$s^2 = \frac{1}{1-N} \sum_{i=1}^{N} (SAR_i - SAAR)^2 \tag{3.13}$$

However, there is still the issue of cross-correlation in the original BMP method because the test assumes that abnormal returns are cross-sectionally uncorrelated. Kolari and Pynnönen (2010) shows that the estimator for the sample variance as given by equation 3.13 is a biased estimator of the variance when contemporaneous return-correlations are nonzero. Which may be the case in instances where event clustering is present. Kolari and Pynnönen (2010)

further suggests a feasible solution to the issue by correcting the sample variance with variable $\bar{r}$ which is the average of the sample cross-correlations of estimation window residuals. The adjusted variance estimator is thus found by:

$$s^2_{SAR} = \frac{s^2}{1 - \bar{r}} \tag{3.14}$$

The new method of estimating the variance of standardized aggregated abnormal returns is given by

$$s^2_{SAAR} = \frac{s^2_A}{N}(1 + (N-1)\bar{r}) \tag{3.15}$$

Using these estimators, the adjusted BMP (ADJ-BMP) test statistic which accounts for both event-induced volatility and cross-correlation can be calculated (Kolari & Pynnönen, 2010).

$$t_{ADJ-BMP} = \frac{SAAR}{s_{SAAR}} = \frac{SAAR\sqrt{N}}{s_{SAR}\sqrt{1 + (N-1)\bar{r}}} \tag{3.16}$$

The method remains the same for finding the test-statistic for the standardized cumulative abnormal returns (SCAR). This is done by replacing the SARs (SAAR) with SCAR (SCAAR) and estimating the cross-sectional variance using SCARs. This concludes the third and final parametric test we will employ when testing the abnormal returns.

3.4.4 The GRANK T-test

A problem with the parametric tests that are disclosed above is that they assume that the stock returns follow a normal distribution. Evidence generally suggests that daily stock returns are fat-tailed compared to a normal distribution (Brown and Warner, 1985;Fama, 1976). As a result of this non-normality, nonparametric tests are argued to be superior to parametric methods in event studies (Corrado, 1989;Cowan, 1992). The rank test of Corrado (1989) works by transforming every event's time series of abnormal returns into their respective ranks. The ranks are based off the length of the series (T), such that the highest recorded abnormal return is attributed rank T, and the lowest is given a rank of 1. By this construction, the average rank is half the number of observed returns. By transforming the returns to ranks, the rank test asserts that the results are not overly influenced by a few extreme abnormal returns (Cowan, 1992). One issue with the original rank test is that it is impractical when applied to CARs. A common approach to apply it to multiple day event windows has been to divide the estimation window into multi-day returns. Given a five-day CAR and a 120-day estimation window for instance, the estimation period observations would be reduced to 24 (a fifth). This reduction weakens the precision of the estimation and thus renders the test less reliable (Kolari & Pynnonen, 2011).

Kolari and Pynnonen (2011) have developed a generalized rank (GRANK) test which is applicable to both single-day and cumulative abnormal returns, which they find to outperform previous rank tests while being robust against serial correlation and event-induced variance. They further state that their proposed GRANK procedure outperforms common parametric tests in terms of empirical power. The GRANK-T procedure regards the CAR period as one observation at point $t = 0$ referred to as the *cumulative event day.* This allows for the use

of the entire estimation window of daily returns. As with the adjusted BMP test, abnormal returns in the estimation windows are standardized in accordance with equation 3.11. The SCAR is found similarly, by standardizing the CAR with prediction errors in the cumulative abnormal returns from the estimation period. The SCAR is additionally re-standardized with the cross-sectional variance to account for event-induced variance.

$$SCAR^*_{i\tau} = \frac{SCAR_{i\tau}}{S_{SCAR,\tau}} \tag{3.17}$$

Where $S_{SCAR,\tau}$ is the cross-sectional standard deviation of $SCAR_{i\tau}$. Given the null hypothesis of no event effect, $SAR_{i\tau}$ and $SCAR^*_{i\tau}$ are random variables distributed with a zero mean and unit variance (Kolari & Pynnonen, 2011). The series which is being transformed into ranks is denoted by GSAR (generalized standardized abnormal return), it consists of SARs for days outside the event window, and $SCAR^*_{i\tau}$ for the cumulative event day at $t = 0$.

$$GSAR_{i,t} = \begin{cases} SCAR^*_{i\tau} \text{ for t in event window,} \\ SAR_{i,t} \text{ for t in estimation window} \end{cases} \tag{3.18}$$

The standardized rank of the GSAR are given by

$$U_{it} = \frac{Rank(GSAR_{it})}{T+1} - \frac{1}{2}, \tag{3.19}$$

where T is the total number of observations, from the timeline presented in 3.1 this gives $T = T_1 - T_0 + 1$, the latter term representing the cumulative event day observation. Now the GRANK test statistic is defined as

$$t_{grank} = Z \Big(\frac{T-2}{T-1-Z^2} \Big)^{\frac{1}{2}} \tag{3.20}$$

where

$$Z = \frac{\bar{U}_0}{S_{\bar{U}}}. \tag{3.21}$$

With

$$S_{\bar{U}} = \sqrt{\frac{1}{T} \sum_{t \in T} \frac{n_t}{n} \bar{U}_t^2} \quad \text{and} \quad \bar{U}_t = \frac{1}{n_t} \sum_{i=1}^{n_t} U_{it}, \tag{3.22}$$

n_t is the number of valid $GSAR_{it}$ at time t, for $t \in T = T_0 + 1, ..., T_1, 0$. T is the number of observations in the combined estimation and event window. $\bar{U}_0$ is the mean $\bar{U}_t$ at the cumulative event day either consisting of a single day, or multi-day event window.

Chapter 4

Data

4.1 News Articles

The events applied in this study consist of news articles which have been collected through a structured news search in Retriever's 'atekst' database. Smaller western countries typically have only a few business newspapers (Larsen & Thorsrud, 2019), as such we have limited the news search to only include web articles from Norway's biggest online business newspaper 'E24'. Other business newspapers have not been included due to big overlaps in articles where the distributors reported on the same company event. Choosing to include online news articles proves beneficiary when extracting and preparing the corpus for analysis. It also provides the timestamp when the article was released, necessary for determining the event-day. Retriever features an advanced search tool in their atekst database allowing the creation of a search profile based on several chosen key words which must be included in the text of the article. To assure the relevance of an article to a company, the search profile was adjusted such that the name of the company must occur in either the title or the ingress of the article.

The list of ESG keywords[1] used in the search profile aims at capturing key issues related to each of the ESG pillars presented in section 1.1. To reduce the effect of confounding events caused by the release of financial statements, the search profile was altered such that articles containing the words 'quartile' and 'annual report' were excluded. Articles that corresponded to the search profile were manually processed, in which further filtering was necessary. Articles marked as reader posts, debate posts and journalistic comments, as well as articles stemming from exhibitions were disregarded because there generally is no new information being released to the public in these articles. Articles which only mentions the given company, without containing any relevant news related to the company have also been disregarded. The sample period was set to January 1, 2010 to December 31, 2021. This period was selected due to the amount of ESG-relevant news articles available. The final sample consists of 141 news articles whereof the majority come from the latter three years as

---

[1]The exact search string applied is the following: intros:(COMPANY NAME) AND (klima OR bærekraft* OR forurens* OR naturkatastrofe OR fornybar OR grønnvask* OR likestilling OR trakasser* OR barnearbeid OR minoritet OR arbeidsforhold OR samfunnsansvar OR korrup* OR nullutslipp OR søksmål OR hvitvask*) AND-NOT(kvartil* OR årsrapport). Words are stemmed with * at the end to capture various word endings and spellings

illustrated in figure 4.1. As of 01.01.22 there were 47 companies listed on Oslo Børs within the 'Oil, Gas and Coal', 'Alternative Energy' and 'Electricity' sectors. Relevant news articles was found for 21 of the companies, where the majority concern Equinor ASA as seen in table B.1. We do not find event clustering in the sample data to be problematic, however some dates do incur clustering. In total there are 7 occurrences of event window overlapping, and 2 equal event dates in the sample. An overview is provided in appendix table C.1.

Figure 4.1: Articles per year
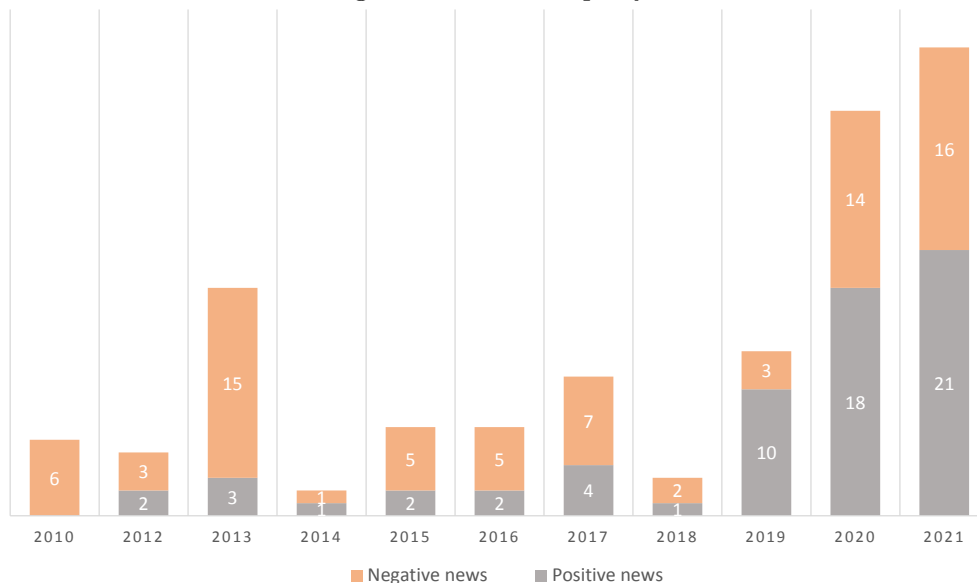
4.2 Sentiment Classification

With news articles being subjective in nature, measures have been taken to prevent further subjectivity. This thesis relies on a natural language processing (NLP) model to systematically determine the sentiment of each news article. Using a NLP model avoids potential quality and selection bias introduced when relying on a human analyst to subjectively classify the articles (Serafeim & Yoon, 2022). Serafeim and Yoon (2022) use event-data from TruValue Labs (TVL) in their event-study. TVL uses artificial intelligence to find ESG-relevant news articles and NLP to analyse the semantic content. Because this thesis gathers the sample events manually, the sample size is substantially smaller than that of Serafeim and Yoon (2022). Among studies that manually collect data using structured news searches, our sample of 141 articles resembles a common sample size (see e.g. Flammer, 2013; Borelli-Kjaer et al., 2021; Griffin and Sun, 2013).

NLPs require massive amounts of collections of text to perform well. The Norwegian Language Bank provides some corpus to the public, however due to copyright restrictions it mainly consists of online newspapers and Wikipedia pages (Kummervold et al., 2021). Kummervold et al. (2021) works through the national library of Norway (NLN) and thus have access to corpus beyond what is publicly available. With this they built a 'colosssal' Norwegian corpus consisting of 109 GB of text (18,438M words)[2]. A Norwegian bidirectional encoder

---

[2]The publicly available corpus provided by the Norwegian Language Bank contain 5 GB of text (818M words) (Kummervold et al., 2021)

Table 4.1: Example of articles

Ticker	Event Date	Positive	Negative	Headline
EQNR	24.10.2012	0	1	Statoil stevnes for retten i Iran
EQNR	07.12.2016	1	0	Statoil satser på energilagring
DNO	28.11.2017	0	1	Refser DNO for brudd på arbeidsrettigheter i Jemen
NEL	14.12.2018	1	0	Nel og Yara inngår samarbeid skal utvikle grønt gjødsel
EQNR	26.01.2021	0	1	Miljødirektoratet fant nytt avvik på Equinor-anlegg på Mongstad
AKSO	09.02.2021	1	0	Aker solutions sikter mot havvind-jobb

representations from transformers (BERT) model was then built using the new corpus, the model was found to outperform existing alternatives. Their trained model 'NB-BERT-base' is released online (National Library of Norway AI Lab, 2021). The NB-BERT-base model has been applied in the sentiment classification of the sample articles. It intuitively works by providing two mutually exclusive categories (positive and negative) in which the model predicts which category the text corpus belong to.

From section 4.1, a table of tickers and article URLs is created. Using the programming language Python, the URLs are transformed into text corpora using the package 'newspaper3k' which offers support for Norwegian. Every article is then individually analysed using the NB-BERT-base model and put into either the positive or negative category. The timestamp of every article is retrieved and converted to event dates based on whether the article was released during or after the market opening hours. For articles published before the market closes, the event date is set to the same day as release, for articles published after the closing hours, the next day is used as event day $t = 0$. Table 4.1 shows an excerpt of the news data.

4.3 Financials

The daily adjusted closing prices data for each company from 2009 to 2022, and the crude oil price series were retrieved through Yahoo! Finance's API. The time series of the OSEBX index was not provided by Yahoo! Finance and had to be retrieved directly from Euronext. The price series was merged into one dataframe with corresponding dates and transformed into series of logarithmic returns. For the adjusted market model, the event-date must be located in the returns dataframe. If the event-date cannot be found in the dataframe (i.e. given article was released on a non-trading day) the next trading day is used. The events' estimation windows consisting of the logarithmic returns of company i and the two indices is found by extracting trading days in the interval [-123,-3] relative to the event day 0. The event window is given by interval [-2,2].

Chapter 5

Results and discussion

Table 5.1 presents the results of the previously disclosed parametric and non-parametric tests of the single-day abnormal average market reactions. According to hypotheses 1 and 2, there is an expected positive reaction to positive news and negative reaction to negative news. The null hypothesis being tested is that the abnormal aggregated return (AAR) equals 0, indicating no abnormal market reaction. If evidence is found against the null, it is an indication that there exists a relationship between ESG-news and stock returns. The tests are performed using one-sided t-tests. Panel A in Table 5.1 shows high significance levels for all applied tests on event day 0, while the days surrounding the event day show no sign of abnormal market reactions. Panel B for negative news offers less uniform results. Again the most significant results are found at the event day. Here, the traditional t-test and cross-sectional t-test finds significance at the 1% level, while the adjusted BMP-test and generalized rank t-test find no evidence against the null on day 0. A possible explanation for this might be that the sample data contains event-induced variance, potentially causing a type 1 error in the traditional t-test. A few highly volatile stocks may have influenced the significance of the cross-sectional test. There is also the potential issue of cross-correlation in the estimation window residuals however the ordinary BMP test, which does include the correction variable $\bar{r}$ gave qualitatively the same results as the adjusted BMP test for negative news on the single event day.

Recall from section 3.1 that using single-day returns may prove inadequate for capturing the full effect of the news release. It is the event being reported on that is of interest, and it is uncertain whether the event occurred on the same day as the news release or the preceding day. This uncertainty is accounted for by using the cumulative sum of the abnormal returns. The common practice in the literature is to expand the event window to include the event day and the previous day. We experiment with other combinations to show that the results are robust. Table 5.2 shows the results of all possible coherent combinations within a [-2,2] event window interval. An argument for expanding the event window beyond the event day is that additional information relating to the event may be released to the market in the days following the event (Flammer, 2013).

The event windows that do not include the event day show minor signs of significance, which we expected. An exception is the adjusted BMP test for the negative news sample for

Table 5.1: Average daily market reaction

Panel A - Positive News

Day			Parametric tests			Non-parametric
	AAR	SAAR	T	Cross-sectional	ADJ-BMP	GRANKT
[-2]	0,26 %	-0,0018	0,797	0,538	-0,007	-0,295
[-1]	-0,15 %	0,0260	-0,456	-0,386	0,117	0,603
[0]	2,18 %	0,7572	6,690***	3,363***	2,972***	4,510***
[1]	-0,47 %	-0,2030	-1,427	-1,198	-0,986	-0,165
[2]	-0,09 %	-0,0079	-0,266	-0,375	-0,045	0,060

Panel B - Negative News

Day			Parametric tests			Non-parametric
	AAR	SAAR	T	Cross-sectional	ADJ-BMP	GRANKT
[-2]	0,09 %	-0,1472	0,287	0,346	-1,044	-1,302*
[-1]	-0,14 %	-0,1401	-0,456	-0,922	-0,874	-0,407
[0]	-0,81 %	-0,1582	-2,606***	-2,503***	-0,891	-1,150
[1]	-0,18 %	-0,1045	-0,566	-2,277**	-0,658	-1,521*
[2]	-0,02 %	-0,0134	-0,075	-0,108	-0,082	0,803

The table shows the average daily market impact positive and negative ESG-related news articles. The Adjusted-BMP (ADJ-BMP) test and GRANK T-test (GRANKT) uses a standardized form of the AAR (SAAR) as input. The statistical significance of the market reaction is tested using both parametric and non-parametric tests as specified in section 3.4. Statistical significance at the 10% (*), 5% (**) and 1% (***) level.

the interval [-2,-1]; the test statistic gives a significance below the 1% level. However, the corresponding GRANK t-test shows little evidence of significance, indicating that outliers heavily influence the result of the adjusted BMP test. Looking at the event window of days -1 to 0 [-1,0], the CAAR of positive news events of 2,03% deviates significantly from 0 across all the inference measures. The same interval in panel B shows significance below the 5% level for all parametric tests, yet only at the 10% level for the GRANK t-test. These results support the hypotheses that positive and negative news affect the market value of companies positively or negatively correspondingly. The prolonged event windows generally show strong statistical significance. Information is documented to be disseminated to the market through the media, so the reaction is often gradual (Peress, 2014).

These results suggest that both of the hypotheses put forward in section 3.4 hold. Our findings are in coherence with the findings of Flammer (2013), Capelle-Blancard and Petit (2019) and Serafeim and Yoon (2022), who all found a significant positive market reaction in light of positive corporate news articles being released, and a significant negative market reaction in the event of negative articles. Flammer (2013) and Capelle-Blancard and Petit (2019) found weaker positive reactions compared to negative reactions, in contrast to our results that find the positive reaction to be stronger. Their samples are drawn from earlier periods[1] than that of this thesis and Serafeim and Yoon (2022) who examines the period between 2010-2018, and also find positive reactions to be stronger. They found an average single-day abnormal price reaction to positive news was 1.91%, and a -0.99% reaction to negative news, similar to our findings of a 2.18% reaction towards positive news and -

[1]The sample used in Flammer (2013) consists of events in the period 1980-2009, and the study by Capelle-Blancard and Petit (2019) considers the period 2002-2010.

Table 5.2: Average cumulative market reaction

Panel A - Positive News

Event window			Parametric tests			Non-parametric
	CAAR	**SCAAR**	**T**	**Cross-sectional**	**ADJ-BMP**	**GRANKT**
[-2,-2]	0,26 %	-0,0018	0,797	0,538	-0,007	-0,295
[-2,-1]	0,11 %	0,0241	0,241	0,175	0,145	0,109
[-2,0]	2,29 %	0,7814	4,059***	2,153**	5,202***	2,593***
[-2,1]	1,83 %	0,5783	2,802***	1,457*	4,349***	2,111**
[-2,2]	1,74 %	0,5704	2,387***	1,283*	4,840***	1,851**
[-1,0]	2,03 %	0,7832	4,408***	2,646***	4,999***	3,915***
[-1,1]	1,57 %	0,5802	2,775***	1,612*	4,317***	3,040***
[-1,2]	1,48 %	0,5723	2,270**	1,373*	4,868***	2,763***
[0,1]	1,72 %	0,5542	3,721***	2,174**	3,470***	3,040***
[0,2]	1,63 %	0,5463	2,885***	1,837**	4,208***	2,471***
[1,2]	-0,55 %	-0,2109	-1,197	-1,081	-1,354	-0,181

Panel B - Negative News

Event window			Parametric tests			Non-parametric
	CAAR	**SCAAR**	**T**	**Cross-sectional**	**ADJ-BMP**	**GRANKT**
[-2,-2]	0,09 %	-0,1472	0,287	0,346	-1,044	-1,302*
[-2,-1]	-0,05 %	-0,2873	-0,119	-0,179	-2,815***	-1,373*
[-2,0]	-0,86 %	-0,4455	-1,602*	-2,554***	-5,260***	-2,185**
[-2,1]	-1,33 %	-0,5499	-1,671**	-3,250***	-6,980***	-2,494***
[-2,2]	-1,35 %	-0,5633	-1,528*	-2,655***	-7,623***	-2,089**
[-1,0]	-0,95 %	-0,2983	-2,166**	-2,760***	-2,574***	-1,433*
[-1,1]	-1,41 %	-0,4027	-2,095**	-3,361***	-3,909***	-1,880**
[-1,2]	-1,44 %	-0,4161	-1,852**	-2,956***	-4,582***	-1,827**
[0,1]	-1,27 %	-0,2627	-2,243**	-3,152***	-1,966**	-2,011**
[0,2]	-1,30 %	-0,2760	-1,875**	-2,772***	-2,686***	-1,724**
[1,2]	-0,49 %	-0,1178	-0,453	-1,613*	-1,086	-0,480

The table shows the average market impact (CAAR) surrounding positive and negative ESG-related news articles. The Adjusted-BMP (ADJ-BMP) test and GRANK T-test (GRANKT) uses a standardized form of the CAAR (SCAAR) as input. The statistical significance of the market reaction is tested using both parametric and non-parametric tests as specified in section 3.4. Statistical significance at the 10% (*), 5% (**) and 1% (***) level.

0.81% reaction to negative news. These findings are generally of greater magnitude than what studies using older samples find. One possible reason explaining this difference is the increasing attention ESG topics have been given in the recent years. Flammer (2013) finds a stronger negative reaction to eco-harmful than positive to eco-friendly events and theorizes that it may be due to green behaviour becoming an institutional norm causing companies' positive initiatives to be expected rather than surprising. In this scenario, firms get punished for not following the norm, which would explain the stronger negative response. Our findings suggest that firms do get punished in terms of market price reaction, for behavior that goes against the ESG-principles, but also get praised for positive initiatives. Similarities with this appraisal can be drawn to the increase seen in ESG asset values which has gone from approximately 3 trillion USD to 17 trillion in the period 2010-2020 (US SIF Foundation, 2020 as cited in Coqueret, 2022).

There is evidence that investors value sustainability as well as financial performance. Hartzmark and Sussman (2019) found evidence suggesting that investors do find utility and value in sustainability. Even though they do not find any evidence suggesting that funds employing SRI in their investment decisions outperform more conventional funds. Renneboog et al. (2011) further supports this by suggesting that SRI focused investors value ethical and social issues more than financial performance in their investment decisions. This might help to explain the increased price and demand of the stock as ESG news does not necessarily explain an immediate increase in financial performance for a firm. However as put forward by Cochran and Wood (1984) and Mozkowitz (1972) ESG announcements might lead to better resource use, better firm reputation, better employees and decrease stock price crash risk. Which can be argued to influence future financial performance.

Another reason for the stock price change can be explained due to ESG consciousness in businesses being a way to hedge against downside risk. A high level of proficiency on ESG matters within companies functions as insurance and make investors consider them less risky (Flammer, 2013). Coqueret (2022) also found literature suggesting that investors prefer green stocks as they are less prone to risks that are hard to evaluate. This should result in a positive stock price increase based on positive news and the opposite with negative news. Dimson et al. (2015) found that positive ESG interactions with companies gave a positive return where negative ESG interactions gave negative returns. Naughton et al. (2019) also found that companies who implement ESG as an important part of their daily operations do produce greater positive abnormal returns. The correlation between ESG interactions, implementation and returns can help explain some of the stock price reaction related to the news events.

The view expressed by Friedman (1970) is that ESG is not in line with profit maximisation and that it is an unnecessary part of value creation. By this view the expected result related to ESG news announcements should be accompanied by a following stock price reduction regardless of the sentiment of the news. However this is not the observed result. We observed a positive stock price reaction associated with positively charged ESG news and a negative stock price reaction associated with negative news. The stakeholder view holds other factors than just financial as a basis for value creation. Stakeholder theory is about

value creation for everyone affected by a firms daily operations not only the shareholders. ESG news rapports on issues related to factors that do not always directly affect financial performance. However, it will relate to the social value created by the firm for its stakeholders. As detailed by Hartzmark and Sussman (2019) investors do find value and utility in sustainability. As awareness surrounding ESG increases, investors and individuals might demand more information about their "environmental friendliness". Therefore disclosure of ESG efforts might also create some market gratitude (Griffin & Sun, 2013).

We believe that the results of this thesis where positive ESG news increase stock price and adverse ESG news decrease stock price, is in part due to investors valuing other factors than financial, when evaluating investment opportunities. This could support the idea that investors do consider the concept of creating shared value when making investment decisions. As put forward by Alex Edmans and his theory of pie-economics, investors should seek to increase the "size" of the pie for everyone, not split a bigger piece for themselves at the cost of others (Edmans, 2021). ESG efforts will increase a firms financial and administrative costs, but our result suggest that investors believe that ESG efforts will create more value than it costs.

From table 5.1 and 5.2 we see evidence suggesting that investors will consider ESG news as a part of their investment strategies. Positive news gave a stock price increase and negative news gave a stock price reduction. Stock prices are decided by supply and demand. If investors start to sell a stock as a reaction to an event the price decreases and if they start to buy stock the price will increase. The stock price increases and decrease caused by positive and negative events suggest a change in demand of that stock. We suggest that some of the increase and decrease in stock demand recorded by our study may be due to investors making investment decisions based on sustainable, responsible impact investing. As suggested by Coqueret (2022) ESG investing has become an important investor sentiment globally. As SRI has become increasingly prevalent in the investment decisions of shareholders it might explain some of the motivation for investors to act on the information. If they try to uphold a certain SRI level on their portfolios they might choose to include new or remove old companies as a result of the news announcements that are released. This will increase or decrease demand for the stock causing the result we observed in table 5.1 and 5.2.

Table 5.1 panel A gives a significant stock price reaction under the 1% level for positive news announcements. The event day created an abnormal average stock price reaction of 2.18%. However, we found no significant reaction from the days before and after the event day. The EMH states that the market is efficient and that any available information will be absorbed into the market quickly and represent a fair value for the asset (Cuthbertson & Nitzsche, 2004). Therefore, one can argue that the result presented in table 5.1, panel A is consistent with the underlying assumptions of the EMH. On the other hand, panel B gave slightly different results. This panel represents the same tests for negative news announcements. We found significant average abnormal stock price reactions for the traditional t-test and the cross-sectional test below the 1% level. However, the adjusted BMP test and the GRANK t-test were not significant.

With negative news, the information was assimilated into the market with an abnormal

average stock price reaction of -0.81% on the event day. The average abnormal stock price reduction was not observed to be significant, as opposed to the positive. Under the EMH there must be another explanation to why the shareholders respond differently to positive and negative ESG news. As mentioned earlier, Flammer (2013) suggests that sustainable societal behavior is becoming the norm. Thus, her results show that eco-friendly behavior is as expected and not reacted to, Serafeim and Yoon (2021) similarly find that positive reactions to positive ESG news are weaker when the firms have higher ESG ratings. We hypothesize that this relation also is the case in the opposite scenario, i.e., that companies with lower ESG ratings experience weaker market reactions to negative ESG news. Our sample of firms are drawn from the energy sector, where several companies are directly involved in oil and gas production. This industry has high greenhouse gas emissions, and the most environmentally aware investors are perhaps refraining from investing in these companies. Thus it could be true that the investors of these companies act less socially responsible and could explain a weaker reaction in light of negative unexpected ESG news.

From table 5.2 with expanded event windows, we find that all event windows for both negative and positive news containing the event day gave significant cumulative average abnormal stock price reactions. Suggesting that the news is indeed assimilated into the market, but in the case of negative news, the single-day reaction on the event day is not strong enough to show significance. The stock price reaction associated with negative news happens over a couple of days. This could look similar to a result not in line with what is expected under the assumptions of EMH. However, multiple factors could influence a reaction in stock price. The stock price reaction we observed with negative news releases could result from a disseminated information release. We would then expect the stock market response to be gradual. The slow stock price response to negative news could also result from investors being reluctant to sell stock in companies in which they are already invested. If the investor already believes in the company and its ESG initiatives and efforts, one negative announcement might not convince an investor to sell.

A limitation to this thesis, as with similar event studies, is that the results only consider the short-term market price reaction to the events. One could expand the event window in an attempt to capture the long-term effects of the news releases. However, as Flammer (2013) and Krüger (2015) point out, it becomes difficult to interpret whether the returns are driven by the event or some other latent factor. Issues regarding confounding events are also further amplified when the event horizon is expanded. Because of these issues, long-horizon event studies are regarded to have low power, and the inferences are demanding of careful analysis even when using "the best methods" (Kothari & Warner, 2007). Short-horizon event studies are more robust to confounding events, yet they are not immune. We have made efforts to remove cases with obvious confounding events in the event windows, such as annual reports, but we cannot guarantee that there are no confounding events tainting our data sample.

There is no clear concurrence in the literature as to which of the ESG pillars are most important to shareholders. Due to our sample size of 64 positive news and 77 negative news, we deemed it unreasonable to further divide the dataset into the three pillars and perform separate analyses on these. Furthermore, differentiating the news based on how material

they are for the firm, i.e. whether the news are associated with a main concern for the firm or not, is also something we were unable to do because of our sample size. Capelle-Blancard and Petit (2019) performed separate analyses on each of the ESG pillars and differentiated on the materiality of the events, and found no difference in the magnitude of the shareholder reaction. Contrary to this, Serafeim and Yoon (2022) found that ESG news on financial material issues were the only news that had an measurable market reaction, and social capital issues gives a larger reaction than environmental and governance related issues.

Another drawback of our sample is the distribution of companies, Equinor represent 81 of the total 141 events. In terms of company size, the distribution is fair because Equinor's market capitalization is tenfold in size compared to the second largest company our sample of energy sector firms. The distribution of events per year is also skewed, 82 articles are found in the latter three years of the sample, and the remaining 60 is spread across the period 2010-2018. Thus it was impractical to look at a plausible difference in time trends.

Chapter 6

Conclusion

In this paper, we examine how ESG news announcements motivate stock price reactions of energy companies on the Oslo stock exchange. We examine if sentiment indicators of ESG news announcements will correlate with the following stock price reaction. This is an important question because an increasing number of investors are integrating ESG information into their investment decisions. In addition, more companies are making efforts to improve their ESG-related performance. Therefore, investors are interested in understanding how ESG-related information affects the stock market in Norway and how news is assimilated into the market. We employ a unique dataset containing ESG-related news on the largest energy companies on the Oslo stock exchange to answer this question. The dataset includes indicators that classify the news as positive or negative.

We accumulate the dataset by defining some key ESG words that must be present in the news articles and perform a structured search in atekst's Retriever database. We find 141 articles that fit our given criteria in the period from 2010 to 2021. To determine the sentiment of each article, we employ a natural language processing model developed by the National Library of Norway. The model ensures that the articles are given the same sentiment regardless of who runs the process. Doing the sentiment analysis manually could incur selection bias. With the sentiment classification established, the dataset is divided into positive and negative news for performing separate analyses. Finally, implement an event-study research approach to measure the short-run market price reaction to the ESG news articles.

We find that ESG news announcements affect the stock price of energy companies on the Oslo stock exchange. News announcements that were indicated as having a positive sentiment motivated a positive stock price reaction. News announcements indicated by a negative sentiment motivated a negative stock price reaction. The reaction observed for positive news was stronger than the reaction associated with negative news. These findings suggest that shareholders value and assign utility to ESG initiatives by energy companies and may view ESG initiatives as a way to hedge against sustainability-related risks. We also find evidence that suggests that shareholders punish actions that hurt sustainability efforts. This could be a result of investors employing strict SRI "screenings" on news events when making investment decisions. The reaction we observe from negative news is similar to the results provided by similar studies. However, the reaction to positive news appears undetermined

in the literature. Some studies observe both weak negative and positive reactions to positive news, and some observe strong positive reactions. The latter is in accordance with our result. Negative news either assimilates into the market at a considerably slower pace than its counterpart, or there are other factors that explain the asymmetric reaction.

Future research could expand the sample by including more companies from the Oslo Stock Exchange. This would allow investigation of further questions, such as whether firm-specific factors are important to the magnitude of the market reaction? How market reactions have changed over time? Is there a difference in market reactions dependent on whether the topic of the article concerns environmental, social, or governance issues? How does the materiality of the event in the article affect the market reaction?

Bibliography

Aktas, N., de Bodt, E., & Cousin, J.-G. (2007). Event studies with a contaminated estimation period. *Journal of Corporate Finance*, *13*(1), 129–145.

Baker, M., Bergstresser, D., Serafeim, G., & Wurgler, J. (2018). *Financing the response to climate change: The pricing and ownership of us green bonds* (tech. rep.). National Bureau of Economic Research.

Ball, R., & Brown, P. (1968). An empirical evaluation of accounting income numbers. *Journal of accounting research*, 159–178.

Boehmer, E., Masumeci, J., & Poulsen, A. B. (1991). Event-study methodology under conditions of event-induced variance. *Journal of financial economics*, *30*(2), 253–272.

Borelli-Kjaer, M., Schack, L. M., & Nielsson, U. (2021). # Metoo: sexual harassment and company value. *Journal of Corporate Finance*, *67*, 101875.

Brooks, C. (2019). *Introductory econometrics for finance* (4th ed.). Cambridge University Press.

Brown, S. J., & Warner, J. B. (1980). Measuring security price performance. *Journal of Financial Economics*, *8*(3), 205–258.

Brown, S. J., & Warner, J. B. (1985). Using daily stock returns: The case of event studies. *Journal of Financial Economics*, *14*(1), 3–31.

Capelle-Blancard, G., & Petit, A. (2019). Every little helps? ESG news and stock market reaction. *Journal of Business Ethics*, *157*(2), 543–565.

Carberry, E. J., Engelen, P.-J., & Van Essen, M. (2018). Which firms get punished for unethical behavior? explaining variation in stock market reactions to corporate misconduct. *Business Ethics Quarterly*, *28*(2), 119–151.

Cochran, P. L., & Wood, R. A. (1984). Corporate social responsibility and financial performance. *Academy of management Journal*, *27*(1), 42–56.

Coqueret, G. (2022). *Perspectives in sustainable equity investing (1st ed.)* CRC Press.

Corrado, C. J. (1989). A nonparametric test for abnormal security-price performance in event studies. *Journal of financial economics*, *23*(2), 385–395.

Cowan, A. R. (1992). Nonparametric event study tests. *Review of Quantitative Finance and accounting*, *2*(4), 343–358.

Cuthbertson, K., & Nitzsche, D. (2004). *Quantitative financial economics* (Vol. 2). Wiley.

Dimson, E., Karakaş, O., & Li, X. (2015). Active ownership. *The Review of Financial Studies*, *28*(12), 3225–3268.

Edmans, A. (2021). *Grow the pie: How great companies deliver both purpose and profit–updated and revised.* Cambridge University Press.

Engle, R. F., Giglio, S., Kelly, B., Lee, H., & Stroebel, J. (2020). Hedging Climate Change News. *The Review of Financial Studies*, *33*(3), 1184–1216.

Euractiv. (2018). *Eus 2050 climate plan sees benefits of up to 2% of gdp.* https://www.euractiv.com/section/energy-environment/news/eus-2050-climate-plan-sees-benefits-of-up-to-2-of-gdp/ (accessed: 23.05.2022)

Fama, E. F. (1976). *Foundations of finan.* Basic books.

Flammer, C. (2013). Corporate social responsibility and shareholder reaction: The environmental awareness of investors. *Academy of Management Journal, 56*(3), 758–781.

Freeman, R. E. (1984). *Strategic management: A stakeholder approach.* Pitman Publishing Inc.

Friedman, M. (1970). The social responsibility of business is to increase its profits. *The New York Times Magazine, 13*, 32–33.

Gantchev, N., Giannetti, M., & Li, R. (2019). Does money talk? market discipline through selloffs and boycotts. *Market Discipline through Selloffs and Boycotts (May 20, 2021). European Corporate Governance Institute–Finance Working Paper*, (634), 19–9.

Global Reporting Initiative. (2016). GRI 101: Foundation. https://www.globalreporting.org/media/55yhvety/gri-101-foundation-2016.pdf

Global Sustainable Investment Alliance. (2020). Global sustainable investment review 2020.

Griffin, P. A., & Sun, Y. (2013). Going green: Market reaction to csrwire news releases. *Journal of Accounting and Public Policy, 32*(2), 93–113.

Grossman, S. J., & Stiglitz, J. E. (1980). On the impossibility of informationally efficient markets. *The American economic review, 70*(3), 393–408.

Harrington, S. E., & Shrider, D. G. (2007). All events induce variance: Analyzing abnormal returns when effects vary across firms. *The Journal of Financial and Quantitative Analysis, 42*(1), 229–256. http://www.jstor.org/stable/27647293

Hartzmark, S. M., & Sussman, A. B. (2019). Do investors value sustainability? a natural experiment examining ranking and fund flows. *The Journal of Finance, 74*(6), 2789–2837.

Hoepner, A. G., Oikonomou, I., Sautner, Z., Starks, L. T., & Zhou, X. (2018). Esg shareholder engagement and downside risk.

Hong, H., & Kacperczyk, M. (2009). The price of sin: The effects of social norms on markets. *Journal of Financial Economics, 93*(1), 15–36.

Hong, H., Karolyi, G. A., & Scheinkman, J. A. (2020). Climate finance. *The Review of Financial Studies, 33*(3), 1011–1023.

Ioannou, I., & Serafeim, G. (2015). The impact of corporate social responsibility on investment recommendations: Analysts' perceptions and shifting institutional logics. *Strategic Management Journal, 36*(7), 1053–1081.

Khan, M., Serafeim, G., & Yoon, A. (2016). Corporate sustainability: First evidence on materiality. *The accounting review, 91*(6), 1697–1724.

Kliger, D., & Gurevich, G. (2014). *Event studies for financial research: A comprehensive guide.* Springer.

Kolari, J. W., & Pynnonen, S. (2011). Nonparametric rank tests for event studies. *Journal of Empirical Finance, 18*(5), 953–971.

Kolari, J. W., & Pynnönen, S. (2010). Event study testing with cross-sectional correlation of abnormal returns. *The Review of Financial Studies, 23*(11), 3996–4025. http://www.jstor.org/stable/40961306

Kothari, S. P. (2001). Capital markets research in accounting. *Journal of Accounting and Economics, 31*(1), 105–231.

Kothari, S. P., & Warner, J. B. (2007). Econometrics of event studies. *Handbook of empirical corporate finance* (pp. 3–36). Elsevier.

Krüger, P. (2015). Corporate goodness and shareholder wealth. *Journal of Financial Economics*, *115*(2), 304–329.

Kummervold, P. E., De la Rosa, J., Wetjen, F., & Brygfjeld, S. A. (2021). Operationalizing a national digital library: The case for a Norwegian transformer model. *Proceedings of the 23rd Nordic Conference on Computational Linguistics (NoDaLiDa)*, 20–29. https://aclanthology.org/2021.nodalida-main.3

Larsen, V. H., & Thorsrud, L. A. (2019). The value of news for economic developments [Annals Issue in Honor of John Geweke "Complexity and Big Data in Economics and Finance: Recent Developments from a Bayesian Perspective"]. *Journal of Econometrics*, *210*(1), 203–218.

Liang, H., & Renneboog, L. (2020). Corporate social responsibility and sustainable finance: A review of the literature. *European Corporate Governance Institute–Finance Working Paper*, (701).

MacKinlay, A. C. (1997). Event studies in economics and finance. *Journal of Economic Literature*, *35*(1), 13–39. http://www.jstor.org/stable/2729691

McWilliams, A., & Siegel, D. (1997). Event studies in management research: Theoretical and empirical issues. *Academy of management journal*, *40*(3), 626–657.

McWilliams, A., Siegel, D., & Teoh, S. H. (1999). Issues in the use of the event study methodology: A critical analysis of corporate social responsibility studies. *Organizational Research Methods*, *2*(4), 340–365.

Mozkowitz, M. (1972). Choosing socially responsible stocks. *Business and Society Review*, *1*, 71–75.

National Library of Norway AI Lab. (2021). *Nbailab/nb-bert-base*. https://huggingface.co/NbAiLab/nb-bert-base (accessed: 03.02.2022)

Naughton, J. P., Wang, C., & Yeung, I. (2019). Investor sentiment for corporate social performance. *The Accounting Review*, *94*(4), 401–420.

Parmar, B. L., Freeman, R. E., Harrison, J. S., Wicks, A. C., Purnell, L., & De Colle, S. (2010). Stakeholder theory: The state of the art. *Academy of Management Annals*, *4*(1), 403–445.

Peress, J. (2014). The media and the diffusion of information in financial markets: Evidence from newspaper strikes. *The Journal of Finance*, *69*(5), 2007–2043.

Renneboog, L., Ter Horst, J., & Zhang, C. (2011). Is ethical money financially smart? nonfinancial attributes and money flows of socially responsible investment funds. *Journal of Financial Intermediation*, *20*(4), 562–588.

Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F. S., Lambin, E. F., Lenton, T. M., Scheffer, M., Folke, C., Schellnhuber, H. J., et al. (2009). A safe operating space for humanity. *nature*, *461*(7263), 472–475.

Serafeim, G., & Yoon, A. (2021). Stock price reactions to esg news: The role of esg ratings and disagreement. *Forthcoming, Review of Accounting Studies*.

Serafeim, G., & Yoon, A. (2022). Which corporate esg news does the market react to? *Financial Analysts Journal*, *78*(1), 59–78.

Sharpe, W. F. (1963). A simplified model for portfolio analysis. *Management science*, *9*(2), 277–293.

Smith, A. (1937). *The wealth of nations [1776]* (Vol. 11937). na.

The New York Times. (2018). *U.s. climate report warns of damaged environment and shrinking economy*. https://www.nytimes.com/2018/11/23/climate/us-climate-report.html (accessed: 23.05.2022)

US SIF Foundation. (2020). *Report on US Sustainable and Impact Investing Trends 2020*.

Appendix A

The Adjusted Market Model

The adjusted market model is estimated using the ordinary least squares (OLS) regression approach. OLS estimators minimize the sums of squared residuals. For an OLS estimator to be the best linear unbiased estimator, some assumptions must hold. This thesis follows the assumptions as defined in Brooks (2019). The **first** assumption is that the mean value of the error terms is zero. This assumption is upheld as long as a an intercept is included in the model. The **second** assumption is that the variance of the error terms is constant (i.e. we assume homoscedasticity). We apply the Breusch-Pagan Test on all events to check for evidence against homoscedasticity. The **third** assumption states that covariance of the error terms is zero over time. This is known as autocorrelation. The Durbin Watson test is applied to check for autocorrelation in all events. Table A.1 provides an overview of events that fail the tests for homoscedasticity and/or autocorrelation. The **fourth** assumption is that the regressors are non-stochastic. Brooks (2019) demonstrate that because of the first assumption that $E(\varepsilon) = 0$, the estimator is still unbiased even if the regressors are stochastic. This is the case only if regressors are uncorrelated with the residuals, we have not found evidence against this assumption. The **fifth** and final assumption is that the error terms are normally distributed, this is examined through residual plots. An example for a single event is given below.

The plots in the example of A show that the assumptions of linearity, homoscedasticity and normality can reasonably be expected to hold. We find these results to roughly be the case for most of the events examined in this thesis.

Figure A.1: Residual plots
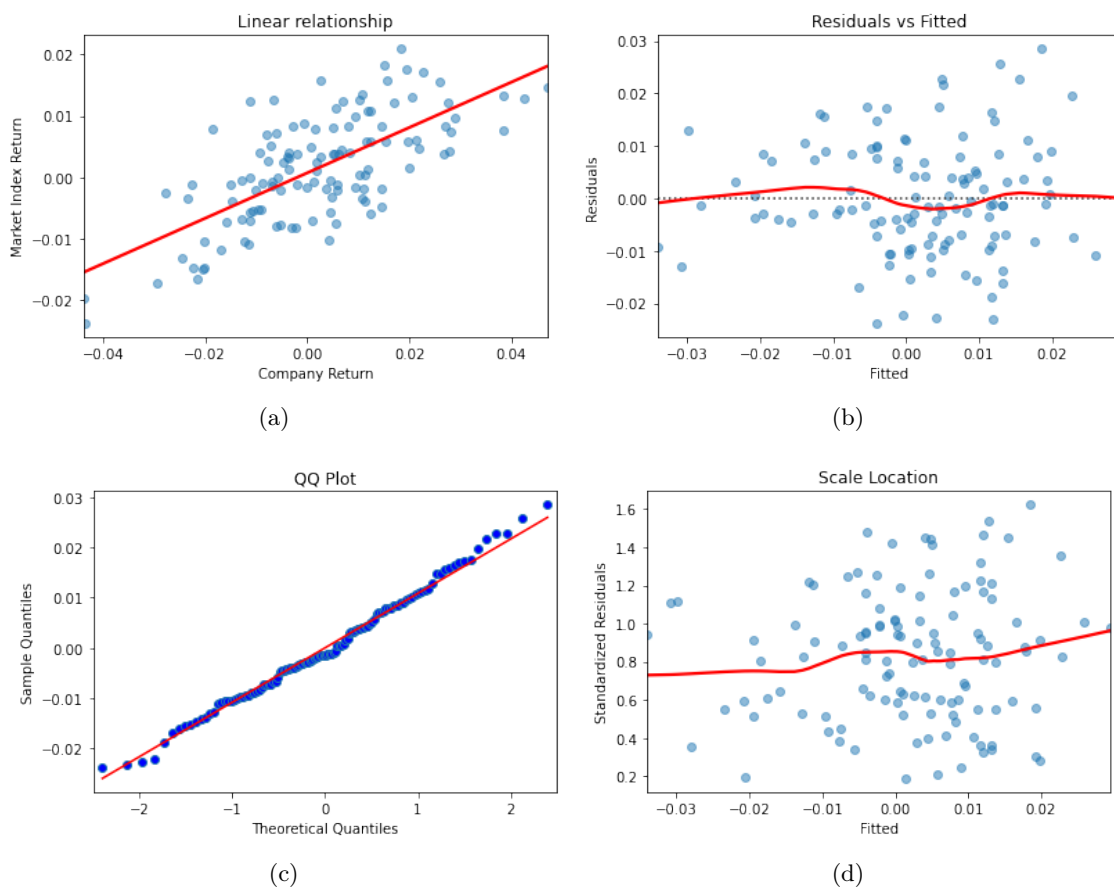
A set of four subfigures of residual plots for an Equinor event on the date 15.06.2021: (a) illustrates the linear relationship between the Equinor stock returns during estimation window [-123,-3] relative to the event day and the corresponding returns of market index OSEBX. A similar linear pattern is found when market index is replaced with oil returns. (b) Is a scatter plot showing the residuals compared to the predicted (fitted) model. This plot is used for checking the linearity, which is the case when the residuals are spread evenly around the horizontal line. (c) Is a QQ-plot, used to determining normality. If the residuals are normally distributed, they will lie along the straight diagonal line. (d) This plot checks for homoscedasticity, if the residuals form a cone-shaped pattern, this is evidence of heteroscedasticity.

Table A.1: Rejected Durbin Watson- or Breusch-Pagan tests

Ticker	Event Date	Breusch-Pagan	Durbin Watson
EQNR	24.11.2010	0,0034	1,7849
AKAST	28.12.2015	0,0348	1,9977
EQNR	13.05.2020	0,0020	1,9008
EQNR	15.05.2020	0,0018	1,9212
EQNR	08.06.2020	0,0014	1,8948
EQNR	01.07.2020	0,0026	1,9092
EQNR	10.08.2020	0,0029	1,9510
AKSO	17.08.2020	0,7906	1,6492
AKRBP	16.09.2020	0,0243	1,9506
ODL	15.10.2020	0,0221	2,0694

Table A.1 shows the events in which either the Durbin Watson test for autocorrelation or the Breusch-Pagan test for heteroskedasticity have been rejected. The null-hypothesis for the Durbin Watson test is that there is no autocorrelation in the residuals, for Breusch-Pagan the null-hypothesis is that the variance is constant (i.e. homoscedasticity is present). The Breusch-Pagan column consist of p-values while the Durbin Watson column consist of test statistics. With n=120 and k=2 (independent variables market index and oil price), the lower critical value for rejecting the null in the Durbin Watson test is 1.6684.

At the 5 percent confidence level, 9 events in total with evidence for heteroskedasticity in the estimation window residuals. To account for this finding, heteroskedastic robust standard errors are used in the modelling of all events. There is one event that slightly breaches the critical lower bound for the Durbin Watson test of autocorrelation, suggesting that autocorrelation is not an issue in the data used for the adjusted market model.

Appendix B

Articles per company

Table B.1: Articles per company

Company	Positive	Negative
Aker Carbon Capture	2	1
Akastor	0	1
Aker BP	4	2
Aker Solutions	15	6
Awilco Drilling	0	0
DNO	1	6
DOF	1	1
Eidesvik Offshore	0	1
Equinor	31	50
Fjordkraft	0	2
Interoil Exploration and Production	0	2
Magnora	1	0
Nel	2	0
Odfjell Drilling	0	2
Questerre Energy Corporation	1	0
Scatec	3	0
Seadrill	0	1
Siem Offshore	1	0
Solstad Offshore	1	0
Subsea 7	1	1
TGS	0	1
Sum	**64**	**77**

An overview of articles accumulated per company.

Appendix C

Event clustering

Table C.1: Sample event clustering

Positive news	
Event date	**Clustered events**
14.10.2021	2
Event window	**Overlapping event windows**
18.09.2019 - 20.09.2019	2
21.09.2020 - 22.09.2020	2
15.12.2020 - 17.12.2020	2
29.06.2021 - 30.06.2021	2
Negative news	
Event date	**Clustered events**
27.11.2020	2
Event window	**Overlapping event windows**
14.05.2013 - 16.05.2013	2
25.08.2021 - 26.08.2021	2
01.09.2021 - 02.09.2021	2

Table C.1 provides an overview of events with equal event dates, and event dates which are close enough for event windows to overlap.

Appendix D

Discussion papers

Discussion paper: International - Even Fyljesvoll Larsen

The following discussion paper is written in the context of our master's thesis, "Stock market reaction to ESG news in Norway" The thesis seeks to answer the research question: "Do firm related ESG news affect company stock price in the Oslo Stock Exchange energy companies?". I have been given the task of discussing how my thesis can be related to international trends and forces.

Presentation of the thesis

We developed a string of key ESG words aimed at finding relevant ESG news. Using this string, we gathered 141 articles through atekst's Retriever database on companies in the energy sector noted in the Oslo Stock Exchange. The sample period we extracted the articles from were from 2010 to the end of 2021. The articles were processed using a natural language processing model, which determined whether each of the independent articles' sentiments could be labelled negative or positive. Furthermore, we implemented an event study approach. Using OLS regression, each of the article's pre-event periods were modelled. Thus, we had a basis for our normal and abnormal returns (residuals) to be used in the event study testing methods. The abnormal returns were aggregated cross-sectionally and separated into two groups, those with articles of negative sentiments and those of positive. As such two null hypotheses were established, the first that positive news have no effect on abnormal returns, second that negative news have no effect on abnormal returns.

Four methods of statistical analysis testing were implemented, these were the 'traditional' t test, a cross-sectional test, The adjusted Boehmer, Musumeci and Poulsen (BMP) test, and the generalized RANK t test. The reasoning for implementing several statistical tests is that there commonly occur some issues in event studies' data, which the tests handle differently. Such as event induced variance, event clustering and cross-correlated return series. Applying several testing methods allows us to distinguish some possible issues and assures robustness in the results we got.

The thesis found evidence against both null hypotheses indicating that there exists a relationship between abnormal returns and ESG related news releases. Connections can be

drawn to a general heightened interest in companies' CSR initiatives, and avoidance of 'sin' stocks from a shareholder perspective which in turn can result in selling or buying shares as a result of new information about company behaviour being released to the market. We measure a higher market reaction in the event of positive ESG news than we measure negative market reaction to negative news. In the literature we find that it is typical for studies using earlier sample periods to find a strong negative reaction to negative news, and a weak positive reaction for positive news (eg. Flammer (2013) and Capelle-Blancard and Petit (2019)). While the study by Serafeim and Yoon (2022) uses a more recent period similar to our study and finds a stronger positive reaction compared to negative.

International

In light of the broad concept 'international' I find the current global sustainability trends in finance to be the most relevant to the thesis. There has been a growing increase in funds invested into assets that are deemed sustainable over the years. Global Sustainable Investment Alliance (2020) reported that the global sustainable investment market had reached 35 trillion dollars in 2020. Up from 23 trillion in 2016. The alliance reports that the most common sustainable investment strategy is ESG integration, followed by negative screening. ESG integration refers to when investment managers incorporate factors related to environmental, societal, and governmental issues in their financial analysis of firms. Negative screening refers to when investment managers exclude firms involved in operations and activities that cannot be deemed investable (Global Sustainable Investment Alliance, 2020). One exclusion criteria can for example be cases where corruption is known to be present in a company's management. Another common exclusion criteria is to exclude product categories such as weapons or tobacco.

Although we have seen a significant increase in the capital located in sustainable assets globally, the literature examined by Coqueret (2022) find that the general consensus is that there exists a dichotomy between sustainability and profitability in ESG investing. Yet some claim that it is possible to do sustainable investing without spoiling the profitability of the investments, so the conclusions are not clear-cut in the literature. On the opposite end of ESG investing, we find sin-stocks. These are stocks of companies that i.e., produce products that ESG integration strategies typically exclude or find themselves in controversies that ESG-oriented investors would typically exclude. Hong and Kacperczyk (2009) wanted to see how these sin-stocks perform against their counterparts and found that these stocks were often neglected and thus under-priced. Their study concluded that the expected return of the sin-stocks was higher than their counterparts who followed the societal norm.

With the trade-off observed between sustainability and profitability in investing, it appears counter-intuitive that the amount invested globally into ESG-friendly assets has experienced such an increase. One explanation might be that there are more investors now who place value into societal gains as an addition to the profitability preferences. The preferences of the investors can be related to the shareholder and stakeholder views. When speaking of the shareholder view, the typical reference being made is the article of Milton Friedman (1970) in the New York Times. Friedman was a firm believer that the only responsibility of a business

should be to increase its profits, his belief was that if the investors were interested in spending money on social interests, they could use their profits from the investments, rather than the business having the responsibility of choosing the appropriate societal investment. A problem with this view however, is that one dollar spent by the business towards a sustainable goal can be arguably more valuable than a dollar invested by an independent shareholder. An example of this is if a company invests some amount into a new solution to reduce emissions in their supply chain, it will likely be more effective than a same amount donated to an NGO whose goal is to reduce carbon emissions. This is relevant because several of the news articles we use in our sample concerns companies in the oil and gas industry who announce plans to develop renewable energy operations.

The opposing view is the stakeholder view, promoted by Freeman and Reed in 1983. Here, the responsibility of the business is to create value to the people, parties or entities who in some way have a substantiated interest in the business's operations as they either are involved or affected by it. The term has since then gained a lot of recognition. For example, in 2019, the Business Roundtable consisting of CEOs of some of the world's leading companies declared that the general purpose of their businesses was to deliver value to all of their stakeholders (Business Roundtable, 2019). This declaration aligns with the interests we see among investors who increase funding in ESG assets.

Thus far, I have assumed that the interest in sustainable assets is motivated by goodwill. However, there is a connection to risk aversion that can be drawn. The world is facing major consequences related to global warming and emissions of greenhouse gases. Our sample of companies are drawn from the energy sector in the Oslo Stock Exchange, herein are companies such as Equinor and Aker BP, who are producers of oil and gas corresponding to hundreds of millions of CO2 equivalent emissions annually in the latter years (Equinor, 2022). Not only is this impacting the climate, but international organizations are forced to place extra costs related to emissions, which in turn may reduce profitability of the firms making it less desirable for investors to hold stocks in the company. The European Union is currently employing and developing several measures aimed at reaching the climate goals, such as the EU taxonomy and the EU emissions trading system. The EU emissions trading systems is a system where emission allowances must be bought by participating installations covered by the EU. It is reasonable to assume that it will become more expensive to emit greenhouse gases (GHG) in the future, as the consequences get more pressing. When oil and gas companies announce that they are going to develop renewable energy solutions, the interpretation might be that they become less susceptible to increased future taxes and limitations on GHG emissions.

From the results in the thesis, we see that shareholders reward ESG initiatives from the included energy companies, and we see a punishment in the light of negative ESG news concerning the company being released. We find that the market reaction towards ESG news with a positive sentiment are stronger than we find negative reaction towards negative ESG news. This is different from what studies using older samples find. For instance, Flammer (2013) finds a strong negative reaction towards eco-harmful news and a weak positive to eco-friendly, she argues that it has become the norm to act sustainable, and thus

a eco-friendly announcement would be as expected rather than surprising. Our results are contradictory to this, because we find that the reaction to the positive news is significant and thus unexpected. There may be several reasons for this, it might be because of a time trend. ESG has been given a lot of attention in the latter years, and we find the most amount of articles in the latter years of our sample period. We can assume that newspapers write about topics that are of interest for the readers, and can confidently say that ESG topics has been gaining recognition in Norway in recent times. Which is also the trend we see globally. This increased attention might transmit into a heightened demand for ESG assets, and companies' ESG initiatives are perhaps more likely to be noticed. As for the weaker negative reactions we observe, similarities can be drawn to Flammer's argument of expected behavior. The companies in our samples belong to a sector that is emissions-heavy, and some socially responsible investors may exclude the companies from their portfolios because of this. The shareholders may hold these companies to a lower standard in terms of sustainability and social responsibility than that of shareholders in greener companies. The positive ESG initiatives that are announced have the potential to draw investors who place value in social and environmental efforts, driving the stock price up as a result.

In conclusion, our thesis show that the energy companies on the Oslo Stock Exchange follow the same ESG-trend we observe globally. Companies are rewarded for positive ESG initiatives in terms of a positive market reaction, and they are punished when news with a negative sentiment concerning ESG issues are announced. Although the event reported on in the news might not have a significant financial impact, it has a societal impact. It is not easy to determine whether the reactions form because more shareholders are becoming socially responsible investors, or whether it is because the reactions are a result of risk-aversion. Either way the companies are given an incentive to act more sustainably, which is undoubtedly positive for our planet and the people on it.

Bibliography

Alliance, G. S. I. (2020). Global sustainable investment review 2020.

Business Roundtable. (2019). *Business roundtable redefines the purpose of a corporation to promote 'an economy that serves all americans'.* https://www.businessroundtable.org/business-roundtable-redefines-the-purpose-of-a-corporation-to-promote-an-economy-that-serves-all-americans (accessed: 01.03.2022)

Capelle-Blancard, G., & Petit, A. (2019). Every little helps? ESG news and stock market reaction. *Journal of Business Ethics, 157*(2), 543–565.

Coqueret, G. (2022). *Perspectives in sustainable equity investing (1st ed.)* CRC Press.

Equinor. (2022). *2021 Sustainability report.* https://cdn.sanity.io/files/h61q9gi9/global/df1f0cb19f173c1e616f83263540fd98e366212f.pdf?sustainaiblity-report-2021-equinor.pdf

Flammer, C. (2013). Corporate social responsibility and shareholder reaction: The environmental awareness of investors. *Academy of Management Journal, 56*(3), 758–781.

Freeman, R. E., & Reed, D. L. (1983). Stockholders and stakeholders: A new perspective on corporate governance. *California management review, 25*(3), 88–106.

Friedman, M. (1970). The social responsibility of business is to increase its profits. *The New York Times Magazine, 13*, 32–33.

Hong, H., & Kacperczyk, M. (2009). The price of sin: The effects of social norms on markets. *Journal of Financial Economics, 93*(1), 15–36.

Serafeim, G., & Yoon, A. (2022). Which corporate esg news does the market react to? *Financial Analysts Journal, 78*(1), 59–78.

Discussion paper: International - Kjell Schage Larsen

This is a discussion paper that aims to discuss how our thesis *Stock Market Reaction to ESG News in Norway* relates to the broad concept of international trends and forces.

Introduction

Our thesis *stock Market Reaction to ESG News in Norway* aims to investigate the relationship between ESG news announcements and the stock price reaction of energy companies on the Oslo stock exchange. We created a unique dataset that contained 141 news articles related to ESG announcements on these companies and tracked the following change in stock price. We also developed a sentiment analysis based on a language model created by the national library of Norway. We used this sentiment analysis to determine if a news announcement was negatively or positively charged. Based on the sentiment indicators, we could then test if there was a correlation between the sentiment indices and the associated stock price reaction.

We found significant results where positive news announcements would give a positive stock reaction on the event day. We also found significant results for negative news announcements. Conversely, negative news gives a negative stock reaction. However, the positive stock reaction was greater than the negative stock reaction. This suggests that investors react more positively to positive news than negatively to negative news.

Discussion

Our thesis is particularly interesting when assessing the broad concept of international trends and forces. Our paper is similar to other studies on the same topic that have researched such effects on the international scene. Papers such as Borelli-Kjaer et al., 2021; Capelle-Blancard and Petit, 2019; Flammer, 2013; Griffin and Sun, 2013; Krüger, 2015; Serafeim and Yoon, 2022 research how ESG news affect stock prices on the international scene. We represent internationality by creating a similar study and applying that to the Norwegian market in order to find similar results and effects as in the international market. I find that there are multiple international trends detailed in our literature that our study also finds indications of in the Norwegian market. These trends are an increased focus on environmental, social, and governmental (ESG) issues in modern finance and business. There is also evidence for an international shift from the neoclassical shareholder view detailed by Friedman (1970) toward the modern stakeholder view put forward by Freeman (1984). The shareholder view expresses that business has no responsibility outside that of following the law and creating value for shareholders (Friedman, 1970). On the other hand, the stakeholder view tells us that everyone affected by the company's doings should be considered when producing goods or services. The stakeholder view is about creating shared value for everyone, not only the shareholders (Freeman, 1984). I would also argue that the result of our study could be affected by the international trend of sustainable, responsible impact investing. This is the theory of investors "screening" their investments based on set sustainable goals that the portfolio wants to uphold (Liang & Renneboog, 2020).

These trends are relevant and international because the research we have performed gave

similar results to those detailed by the previous literature. Furthermore, as expressed earlier, the literature research has been performed on studies from different markets worldwide. Especially interesting is that our study gave similar results to the study performed by Serafeim and Yoon (2022) which was performed recently with a very similar method to the one employed in our thesis. They performed their study on 3126 companies. We found similar results, where positive news gave positive stock market reactions, and negative news gave negative stock market reactions. We also found a stronger reaction associated with positive news than with negative news, which was consistent with the findings by Serafeim and Yoon (2022). This is interesting because we see evidence for similar effects in the Norwegian stock markets as in other stock markets. This could suggest that such effects is international in the way they relate to investors.

In our thesis, we discuss how ESG news announcements affect the stock return of Norwegian energy companies. This relates greatly to international trends. In recent years a large number of researchers have documented how ESG factors can affect company value. As discussed by Dimson et al. (2015) ESG interactions from 1999 through 2009 gave positive returns. Flammer (2013) further supported this work by detailing how the positive stock price reaction associated with ESG-related efforts increased as time passed. We can also argue that the stock price changes based on ESG news can indicate that there is an international trend of skewing away from shareholder view towards a stakeholder view. When implementing ESG processes, a business can decrease its impact on the ecosystem, create healthy and safe work environments, help to build good communities around itself, and create increased value for its shareholders (Liang & Renneboog, 2020). This is important to all communities in the international world. Everyone shares the same globe, and we are dependent on businesses not to damage the environment or the social world on an international level.

For our thesis, we employed an event study that is easily replicated in different markets around the world. In other words, it is easily adaptable on an international level. This is supported by the fact that other researchers have employed event studies on a wide range of markets. To measure our result, we chose to use the stock returns which is available across the globe on different stock exchanges. The sentiment analysis is the only part of our method that is not as simple to recreate on an international level. However, the sentiment analysis itself is easy to replicate. We based the sentiment analysis on a language model created by the national library of Norway. In order to achieve such a sentiment analysis in other languages on the international scene, such language models have to be available or constructed for the occasion. Such a language model might be hard to produce for markets and languages that find themselves in less developed areas of the globe.

Our research question *How does firm-related ESG news announcements affect company stock price in energy companies of the Oslo stock exchange?* is not easily affected by international changes in sustainability-related trends. This is because our research question aims to discover how such trends affect the Norwegian market. However, such trends can greatly affect the answer to our research question. How future investors in Norway and globally value ESG when making investment decisions will affect the research outcome.

The nature of our study is very prone to international forces. Our study seeks to document

how the investors of the Norwegian Energy sector react to ESG news announcements. International ESG investing trends such as sustainable, responsible impact investing (SRI) will greatly affect Norwegian investors. Investor trends such as SRI and how SRI is conducted will also affect Norwegian investors who regularly follow such efforts. If new SRI screening processes and new SRI trends occur. It could change which stocks an investor will pick and affect how likely an investor will be to buy or sell a stock based on positive or negative news announcements.

Coqueret (2022) in his literature review found research that supports the idea that ESG has become an important part of investor sentiment globally. A change in how global investors consider the value of ESG efforts will greatly affect the observed result in a study like ours. If the value associated with ESG efforts, however unlikely, changes in the eyes of the investors and become associated with agency cost and low value. Stock price reactions observed from ESG news announcements might be negatively impacted. And if the global investor valuation of sustainability efforts increase, the result observed from such analysis might be greatly exaggerated. Norwegian investors are a part of the international market. We observed similar results from our study compared to the previous literature performed in other markets. Therefore i would expect that Norwegian investors value and follow similar principles as international investors.

International trends such as the shift from shareholder view to stakeholder, combined with the rise of ESG consciousness and SRI investing has an effect on the result a study like ours will produce in the future. ESG and sustainability issues have become more important, and we believe that investors value such efforts on an international scale. This can be interpreted as a sign of an international shift towards a stakeholder view of business as opposed to an earlier shareholder view. Investors starting to employ SRI in their portfolio management could also be considered a reaction to that shift. The stakeholder view itself is mainly about value creation (Freeman 2013). However, it is not only about economic value creation. It is about value creation for everyone in society. Edmans (2021) in his book on pie-economics details how one can describe value creation as a pie. Every piece of the pie is defined as value creation in different areas. It might be classified as financial, environmental, societal, or governance value creation. Alex Edmans suggest that modern business should seek to increase the pie for everyone, such that all stakeholders will benefit. Instead of just splitting the pie between the stakeholders. After the traditional pie-splitting mentality, an increase in financial value creation which shareholders value, would decrease value creation within other areas such as environmental or societal arenas. This is not sustainable for the future world where a business has to operate within the planetary boundaries and where humans have become the main drivers of global climate change (Rockström et al., 2009). Edmans propose the idea of increasing the pie instead of just splitting it between the stakeholders. Implementing sustainability efforts in business society can increase value creation for everyone on an international scale. On a long-term basis, this would benefit everyone, including everyone with financial motives. I suggest that this is the actual international trend that motivates the rise of ESG, sustainability, and SRI trends in modern finance and business. I believe this to be true because the findings from my thesis and the results found by other researchers suggest that investors value and assign utility to sustainable efforts. From the

view put forward by Friedman (1970) ESG efforts are unnecessary and not in line with profit maximization. From the shareholder view, one would expect all ESG efforts to cause unnecessary agency costs, hurt financial performance, and reduce the stock price. However, we found this not to be true. We found significant stock price increases related to positive ESG news. This supports the view of investors valuing sustainable and ESG efforts. Cochran and Wood (1984) and Mozkowitz (1972) argued that ESG and sustainability efforts would lead to better resource use, better employees, better reputation, better marketing success, higher quality employees, and reduce the risk of a stock price crash. Which are all factors that will help grow future financial performance. This will be true for all international markets.

Conclusion

In this discussion paper, I argue that the modern trends such as sustainability-driven investment and the inclusion of ESG efforts in business is an international trend that also affects Norwegian investors. The shift from a mainly shareholder-driven view to a stakeholder-driven view and the implementation of SRI goals in portfolios is a result of the move towards value creation driven by factors other than financial and are present on an international level. I argue that these modern trends will continue to exaggerate the value investors assign to sustainability and ESG efforts both in the Norwegian and international markets. From the result we observed in our research, Norwegian investors seem to follow and make investment decisions in line with international investors. We observed very similar results in our thesis as what was published in multiple other international studies. This suggests that Norwegian investors follow and work to implement news and international trends when making investment decisions on the Oslo stock exchange. Finally, I would argue that international trends will impact the results found by researchers that want to perform a similar event study covering how ESG news affects stock price in the future in all international stock markets.

Bibliography

Borelli-Kjaer, M., Schack, L. M., & Nielsson, U. (2021). # Metoo: sexual harassment and company value. *Journal of Corporate Finance*, *67*, 101875.

Capelle-Blancard, G., & Petit, A. (2019). Every little helps? ESG news and stock market reaction. *Journal of Business Ethics*, *157*(2), 543–565.

Cochran, P. L., & Wood, R. A. (1984). Corporate social responsibility and financial performance. *Academy of management Journal*, *27*(1), 42–56.

Coqueret, G. (2022). *Perspectives in sustainable equity investing (1st ed.)* CRC Press.

Dimson, E., Karakaş, O., & Li, X. (2015). Active ownership. *The Review of Financial Studies*, *28*(12), 3225–3268.

Edmans, A. (2021). *Grow the pie: How great companies deliver both purpose and profit–updated and revised.* Cambridge University Press.

Flammer, C. (2013). Corporate social responsibility and shareholder reaction: The environmental awareness of investors. *Academy of Management Journal*, *56*(3), 758–781.

Freeman, R. E. (1984). *Strategic management: A stakeholder approach.* Pitman Publishing Inc.

Freeman, R. E. (2013). *What is the stakeholder theory.* Youtube. https://www.youtube.com/watch?v=epxmG3YRgok

Friedman, M. (1970). The social responsibility of business is to increase its profits. *The New York Times Magazine*, *13*, 32–33.

Griffin, P. A., & Sun, Y. (2013). Going green: Market reaction to csrwire news releases. *Journal of Accounting and Public Policy*, *32*(2), 93–113.

Krüger, P. (2015). Corporate goodness and shareholder wealth. *Journal of Financial Economics*, *115*(2), 304–329.

Liang, H., & Renneboog, L. (2020). Corporate social responsibility and sustainable finance: A review of the literature. *European Corporate Governance Institute–Finance Working Paper*, (701).

Mozkowitz, M. (1972). Choosing socially responsible stocks. *Business and Society Review*, *1*, 71–75.

Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F. S., Lambin, E. F., Lenton, T. M., Scheffer, M., Folke, C., Schellnhuber, H. J., et al. (2009). A safe operating space for humanity. *nature*, *461*(7263), 472–475.

Serafeim, G., & Yoon, A. (2021). Which corporate esg news does the market react to? *Financial Analysts Journal*, *78*(1), 59–78.

Word count: 2000