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Value relevance of ESG

Is ESG performance value relevant for stock prices in Europe?

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Abstract

This study investigates the value relevance of environmental, social and governance (ESG) performance for stock prices in Europe. The analysis is conducted using the Ohlson price model, which allows us to examine the association between ESG and stock price, where stock price is a function of financial and non-financial information. We apply a data panel of 5354 firm-year observations during the period 2011 – 2017 collected from the Thomson Reuters Eikon Database. The sample consists of 791 companies in member countries of the EU and EFTA. Our results indicate that ESG performance is value relevant for stock prices in Europe. This is consistent with previous research. We also find that board gender diversity is positively associated with ESG and stock prices. However, when analyzing the individual ESG scores, the governance pillar is not significant. Furthermore, our results suggest that the association between high ESG score and stock prices is stronger among companies operating in environmentally sensitive industries. Overall, the study is in line with the stakeholder theory as ESG score has a positive and significant effect on stock price while providing relevant and valuable information regarding stock prices in Europe. Our study is motivated by the increasing discussion of sustainability world-wide. We aim to provide insight on how ESG score is reflected in stock prices in Europe and contribute with relevant information on sustainable investments for managers, investors and stakeholders.

Keywords: ESG, board gender diversity, sustainability, value relevance, stock price, shareholder theory, stakeholder theory.

Preface

This master thesis has been completed as part of the master's degree in Business Administration at Oslo Metropolitan University. The thesis is a part of the compulsory education plan and amounts to 30 credits.

The purpose of this study has been to look at the value relevance of ESG performance on stock prices for European listed companies. This has been especially interesting to look at during a time where sustainability, climate change and human rights are becoming more and more important for both companies and investors to focus on.

We want to thank our supervisor, Muhammad Azeem Qureshi, for his enthusiasm, valuable input and constructive feedback during this process. His support has been imperative towards our inspiration to write this thesis.

Lastly, we would like to thank each other for the excellent collaboration. We have complimented each other completely when working with this thesis.

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1 Introduction

This study examines the value relevance of environmental, social and governance (ESG) performance on company stock prices in European countries. Today investors, portfolio managers, businesses and governments are all discussing sustainability and responsible investments and we find ESG to be a relevant and interesting topic for us.

In recent years there has been a number of large scandals relating to environmental and social issues. One should mention Volkswagens emissions test cheating, BP's Deepwater Horizon oil spill, accusations of H&M's involvement in child labor, and most recent, Norsk Hydro's emissions in Brazil in the beginning of 2018. As a direct consequence these companies faced negative reputation and reduced stock price along with increased pressure from the public surrounding these incidents. In light of recent events, companies increasingly see the need to protect themselves against future possible catastrophes finding it necessary to improve their businesses today. Pressure from the public leads to awareness of environmental and social issues, which again leads to more sustainability related initiatives by both corporations and the public. We argue that this positive reinforcing feedback loop engages the corporations and their stakeholders in a continuous process of value relevant investments in ESG. The spillover from large corporations has encouraged other companies and society to have more focus on sustainability to make an impact. Ethical trade and sustainable investments are important aspects of the business today and it can be costly and risky for companies not to consider these factors. Companies and investors might face large losses if and when the company experiences an environmental, social or governance crisis if they do not safeguard themselves by acting responsible.

We are motivated to study whether responsible and sustainable investments can be profitable, or if this is only associated with increased costs. Previous studies have investigated the value relevance of ESG performance on company's stock price in specific countries like the United Kingdom, Denmark, Finland, Sweden, the United States and the BRICS-countries. Other studies focus on the value relevance of GRI-reporting and average stock return. We contribute to the existing literature of value relevance by providing insight into how ESG score is reflected in the stock prices in member countries of EU and EFTA. Our motivation for writing our master thesis is to investigate whether ESG performance has a positive effect on stock prices. We therefore formulate the following research question:

Is ESG performance value relevant for stock prices in European listed companies?

In addition, we want to incorporate board gender diversity as an additional variable in this study to see whether or not this has an effect on firm value. This has not been studied in previous research on the value relevance of ESG. We study board gender diversity to investigate whether women on boards can have an effect on stock prices through an excessive focus on ESG related matters in Europe. Our next research question is:

Does board gender diversity affect the value relevance of ESG on stock prices?

The thesis is organized into five sections. In section 2 we present our theoretical framework that consists of four parts. The first part describes the sustainability theory, the second part presents economic theories, the third part presents the value relevance theory and lastly, part four presents previous research. After presenting our theoretical framework we give a brief summary before presenting our hypotheses. In section 3 we describe our data and the methodology we use for our analysis. The analysis, results and further discussion of the value relevance of ESG performance in Europe, is presented in section 4. Section 5 sets out the conclusion of our study, policy implications, comments on limitations and suggestions for further research.

2 Theoretical Framework

In this section we want to present the concept of Environmental, Social and Governance (ESG) factors along with theories and research that leads to the design of our hypotheses.

2.1 Sustainability Theory

Sustainability in the economics literature describes the development of corporate social responsibility (CSR) with a focus on non-financial aspects of an organization. There are several definitions of CSR and how this is used in business. Marc Goergen (2012, p. 153) defines corporate social responsibility as a framework that considers social aspects such as environmental protection, employee welfare and community programs. These activities go beyond the normal scope of the corporate activity.

Archie Carroll (1979) is the first to present a conceptual model describing three different aspects of corporate social responsibility. He defines social responsibility through four components of business performance: economic, legal, ethical and discretionary. It is conceivable that all four categories are partly dependent on each other and belong together when a company is to decide on social responsibility aspects. In detail, he defines economic responsibility as businesses' core obligation to produce and sell goods and services that meet the consumers' needs in society. Legal responsibility indicates that a business' economic responsibility must be met according to the law. A company's ethical responsibility is assumed to go over and above its legal requirements (Carroll, 1979, p. 500), including norms and values that must be considered when conducting a business. At last, the discretionary responsibility of businesses is somewhat voluntary, but nevertheless include societal expectations that should be considered. The model can help to understand what social issues one faces and what corporate social responsibility one should adapt.

The concept of "Triple bottom line" and sustainability framework introduced by John Elkington (1994) explains how businesses can achieve sustainable development by integrating economic, social and environmental aspects of their business. Businesses can profit themselves, their customers and the environment by focusing on sustainable strategies that will be a "win-win-win" strategy. Elkington (1994, p. 91) argues that businesses needs to play an active role in achieving sustainable development goals. The idea that CSR investments, hereby known as ESG, will create value for a business is much in line with the TPL (triple-

bottom-line) framework, as focusing on more aspects of the company's surroundings is believed to be profitable.

Michael Porter and Mark Kramer (2002, p. 3) discuss how social improvements related to a corporation's business can lead to competitive advantage and economic benefits for the company. Eventually, social and economic goals are fundamentally connected. They also state that one of the most effective methods for dealing with world issues is in fact to mobilize corporations in ways that benefit both society and the company. According to Porter and Kramer (2002) a company can achieve higher economic benefit when using their resources efficiently and producing goods that consumers value.

2.1.1 International focus on sustainability

From a relatively stable world, to a world with climate changes, slowing global growth and economic inequality: the government, society, corporations and individuals need to take action to face these changes (World Economic Forum, 2019). Some of the major challenges the world will face are extreme weather events, natural disasters, cyber-attacks, water crisis and asset bubbles (World Economic Forum, 2019). Some major contributors to this focus internationally are the United Nations, The Global Reporting Initiative, and in Europe, the Eurosif organization.

In 1972 the United Nations (UN) developed the UN Environmental Program (UNEP) at a conference in Stockholm, encouraging the society and businesses to take action on world issues of environment, poverty and human rights. In 1987, the term "Sustainable development" was first stated in the published report from the World Commission for Environment and Development (FN Sambandet, 2019). The purpose of the commission, also known as the Brundtland-commission, is to educate and inspire to a new way of thinking on issues of poverty and the environment (FN Sambandet, 2019). The UN Global Compact (UNGC), created in 2006, is an initiative and network for businesses who wants to improve their corporate social responsibility and their actions for sustainability and responsibility. The UNGC's purpose is to make businesses implement ten principles, concerning human rights, the environment and anti-corruption in their business while promoting activities that contribute to the UN's sustainable goals (FN Sambandet, 2017). In 2015 the UN introduced the UN Sustainable Development Goals (UNSDG). These goals are related to poverty, inequality, climate, environmental degradation, prosperity, peace and justice. Their aim is to

have a better sustainable future for all stakeholders in the society by 2030 (UN, 2015). The UNSDG has provided a framework to investors and corporations for decision-making for their investments, strategy and management (Citi GPS, 2018).

The Global Reporting Initiative (GRI) is the first to adopt global sustainability reporting in 1997. GRI provides a set of standards on how organizations can report on their economic, environmental and social impacts. The purpose of reporting these standards is to give reliable information to stakeholders about the organization's impacts and contributions to sustainable development (GRI, 2017). GRI divide the standards of reporting in two sets: the universal standards and top-specific standards (ESG-reports). The universal standards provide foundation of a starting point on using the GRI standards and the top-specific standards provide specific disclosure for each of the individual ESG factors (GRI, 2017).

The development of UNGC and UNSDG has increased the focus on CSR and sustainability in Europe. The European Union (EU) agreed with the UN in 2015 to set an agenda towards a sustainable Europe by 2030 for all EU member countries and institutions, including all stakeholders and public authorities (European Commision, 2017). The EU's agenda towards sustainability will improve their competitiveness, investments into sustainable opportunities and encourage governments to take action that is in line with UNSDG. Eurosif is a membership organization that acts as a representative for the European sustainable and responsible investments (SRI) community to the EU institutions. Their purpose is to promote SRI for investors and stakeholders by providing reports and research on the topic in Europe (Eurosif, 2019).

Guidelines offered by the UN, GRI and Eurosif encourage an increased focus on sustainability internationally and puts pressure on organizations, shareholders and investors to make a sustainable impact. In the next section, we present ESG as a tool for sustainable development and responsibility.

2.1.2 Environmental, Social and Governance (ESG)

CSR, responsible investments (RI) and sustainability has made the foundation for the term ESG, which stands for Environmental, Social and Governance. The first report elaborating on ESG factors is "Who Cares Wins: Connecting Financial Markets to a Changing World" by the UNGC and Swiss Federal Department of Foreign Affairs in 2004. The report gives

recommendation on how ESG can yield better investments and more sustainable societies. Their aim is to increase awareness around ESG factors to all parties involved in the financial market, both investors, corporations, regulators, stock exchanges, analysts and financial advisors (UN Global Compact, 2004).

Standards for ESG ratings provided by the GRI and UNSDG is used as guidelines for many organizations. ESG can be defined in many ways and there is no consensus as of what should be included in the ESG factors. Today, there is little uniformity on this matter, as there exists a lot of definitions of what ESG is and how it should be measured. Many organizations and initiatives provide voluntary guidance on reporting and disclosure of ESG to ensure the quality of the information. There is also disagreement on what is seen as valuable information related to ESG. According to PwC's ESG Puls report (2019), PwC emphasize that there is a gap between corporations and investors on what is seen as satisfactory data. Corporations see their company-reported data as valuable and well documented data, but this might not be recognized by investors as reliable information.

Several studies have established that there is a relation between a company's focus on ESG and their financial performance. Ortas, Álvarez and Garayar (2015, p. 1932) find that companies who adapt to the principles of UNGC obtain a significant impact on financial performance from their ESG activities. The authors claim that their results provide both financial and non-financial incentives for corporations to adopt to these voluntary principles. Fatemi, Glaum and Kaiser (2017) find that the effect of ESG disclosure on firm value differ depending on whether the firm has ESG *strengths* or *concerns*, where the former increase firm value and the latter decrease it. However, high disclosure of ESG weakens the positive effect of the ESG strengths, as investors could interpret this as a firm's attempt to justify overinvestment in ESG activities (Fatemi et al., 2017, p. 58). Next, we elaborate on the three main focus areas: environmental (E), social (S) and governance (G). In addition, we present board gender diversity which is included as an additional variable in this thesis.

The environmental perspective (E) of ESG is today viewed as the most pressing issue. Climate change is affecting people all around the world and is once again on the top of the agenda at this year's World Economic Forum in Davos (Kottasová, 2019). Thomson Reuters (2019) measure the environmental pillar based on a company's information of their impact on air, land, water and ecosystems. The measure reflects how management is used to avoid

environmental risks as well as to generate long term shareholder value. Resource use, reduction of emissions and innovation of environmental products are some of the aspects of the environmental perspective (Thomson Reuters, 2019). Information on energy use, water recycling, and spills and pollution controversies are other aspects related to this factor (Cheng, Ioannou, & Serafeim, 2014, p. 6).

According to the UNGC report (2004), the social perspective (S) of ESG refers to social issues in the society such as workplace health and safety, community relations and human rights. Cheng et al. (2014, p. 6) include employee turnover, injury rate or accidents, female employees, donations, and health and safety controversies in the social factor. Thomson Reuters (2019) further include product responsibility, training and social development, and measure the company's ability to generate trust and loyalty with the workforce, customers and society.

The governance perspective (G) can be comprised of CSR strategy, board structure and functions and shareholder rights (Thomson Reuters, 2019). This factor measures how the company's systems and processes ensure the best interest for its long-term shareholders (Thomson Reuters, 2019). MSCI (2018) divide governance into two groups: corporate governance and governance behavior. The factors included in corporate governance are board-diversity, ownership and control, executive pay and accounting. Governance behavior is related to business ethics, tax transparency, financial system instability, corruption and anti-competitive practices (MSCI, 2018).

Finally, we look at board gender diversity which is by some defined as part of the governance pillar. Today, several debates focus on gender equality and how women are represented on the board and in organizations. According to a report by Chanavat and Ramsden in Thomson Reuters (2016), board diversity has improved in recent years, but the progress of implementing board diversity is slow. In Europe, the growth of female representation on board is relatively strong and steady compared to other regions like Asia, America, Oceania and Africa. Ellis and Eastman in MSCI (2018), report that Europe has a stronger growth due to mandates and legislations for increasing the percentage of female representatives on board. This is especially seen in Norway, Sweden and France, where the number of female board members is above what is required by law. In Norway, the law requires public companies to have at least 40 % women on their board (Ellis & Eastman, 2018, p. 26).

2.1.3 Responsible Investments (RI)

Socially responsible investment is defined as "an investment process that considers the social and environmental consequences of investments, both positive and negative, within the context of rigorous financial analysis" (Goergen, 2012, p. 154). The UN have defined six principles of responsible investments, where they focus on ESG related issues such as climate change, human rights and corruption (UNPRI, 2018). Their aim is to incorporate ESG factors into the investment process and decision to better manage risk and generate sustainable long-term returns. Many managers already consider ESG in the investment processes, typically because they want to reduce risk and increase returns. ESG factors can have financial significance for the company however investors should pay attention to ESG as they are affected by the same risk in the investment process.

2.1.4 Whitelist vs. Blacklist

In a screening process, a set of criteria is used to give guidelines as to which industries and companies should be seen as responsible and "good" ESG investments, and which should be excluded (Robeco, 2019). The criteria used for screening differs from one participant to another based on different views of business ethics and values. Indexes such as FTSE Kinder, Lydenberg, Domini (KLD) 400 Social Index are excluding companies who are engaged in industries such as alcohol, tobacco, gambling, nuclear power and military weapons – so called *sin* industries (Goergen, 2012, p. 157). Funds might exclude companies due to different environmental, social and governmental reasons, or they can place them on an observation list (Norges Bank, 2019). The screening process can be divided into two contraries: positive and negative screening. Negative screening, also referred to as "blacklist", has been most commonly used by investors throughout the years (Hassel & Semenova, 2013, p. 7). Negative screening imply that "bad" companies are kept outside a fund or investment strategy. Positive screening, referred to as a "whitelist", implies that a fund manager only invests in companies that can show that their operations are consistent with a high ESG score.

There are several different screening strategies that exist today. One of these are "Best-In-Class", which allows funds to invest in certain "sin industries" like the oil and gas sector, but only in companies who have the best scores in their specific industry (Eurosif, 2018). Other strategies are sustainability themed investment, engagement and voting, ESG-integration and norms-based screening, where the latter indicate that the investor select companies based on their fulfilment of certain norms that effect the ESG criteria (Eurosif, 2018, p. 20).

2.2 Economic theory

In this chapter, we present two main economic theories that we use as our core theoretical framework. There are several other theories related to corporate social responsibility that could be of interest. We choose to focus on the shareholder- and stakeholder theory because these are commonly used in similar research as an explanation for ESG value relevance (Cheng et al., 2014; Miralles-Quirós, Miralles-Quirós & Valente Gonçalves, 2018).

The shareholder and stakeholder theory are two conflicting theories related to corporate social responsibility and a corporation's duty regarding such issues. Milton Friedman and Edward Freeman might be seen as the main contributors (Freeman, Harrison, Wicks, Parmar and De Colle, 2010). Friedman (1970) states that a corporations' only responsibility is toward shareholders' value creation, while Freeman states that corporations have a responsibility to all stakeholders. When implementing these theories in our hypotheses, the shareholder theory is used to argue that ESG is solely a cost for the corporation and will not increase its value. The stakeholder theory is used to state that ESG is a valuable investment which will lead to value creation for the company.

2.2.1 The Debate: Shareholder Theory-vs-Stakeholder Theory

The shareholder theory, with Milton Friedman at the forefront, claims that corporations' engagement should not prevent shareholders value creation. If the corporations' focus on ESG can be considered as unprofitable investments by the shareholders, this will be a violation of their core responsibility and will not increase firm value.

Friedman (1962, p. 102) describe social responsibility as a "fundamentally subversive doctrine" and states that the only social responsibility of businesses is to engage in activities that is designed to increase its profits. If a corporations' engagement in social activity prevents value creation for the investors, this will violate their social responsibility and be a threat to the free society (Friedman, 1962, p. 114). Friedman further argue that managers who spend money on behalf of the business should only act in the interests of the owners, and spending money on social responsibility is a violation of their duty (Friedman, 1970).

The opponents of the shareholder theory states that businesses have a "social conscience" and have a responsibility to provide employment, eliminate discrimination and avoid pollution

(Friedman, 1970). Geoffrey Lantos (2001, p. 595) argues that corporate social responsibility is obligatory, which is far from what the shareholder theory suggests.

The stakeholder theory suggests that a corporation involved in activities beyond profit maximization will be rewarded with value creation for the firm and its stakeholders. Edward Freeman (2010) describe stakeholders as employees, customers, suppliers, shareholders, government, environmentalists and other groups or individuals that are affected by a corporation. According to Freeman et al. (2010, p. 9), "stakeholder theory is about value creation, and how to manage a business effectively… by taking full account of its effect on and responsibility towards stakeholders."

Shleifer and Vishny (1997) argue against this view, and state that all other stakeholders of a firm have a safety net. The management of a company should therefore solely work towards maximizing shareholder value, as these are the ones providing the capital. If the company does not work for shareholder value maximization, the shareholders will simply stop supplying capital. The investment made by the shareholder is a sunk cost, and there is no other way the shareholders can get a return on their investment than having the management work on their behalf (Shleifer & Vishny, 1997, p. 753).

Today, the stakeholder theory seems to be relevant, as we increasingly see firms tend for both shareholders, employees, communities and the environment. A focus on ESG issues and a firm's actions towards this will create value as this integrates all stakeholders affected by the business. Miralles-Quirós et al. (2018) expresses this theory as a "value enhancing theory", which is an expression that fits well to the idea that ESG investments increase value.

2.3 Value Relevance

2.3.1 Definition of Value Relevance

We use value relevance theory to get an insight into what indicators affects firm value and how this information is provided to the market. The theory of value relevance addresses "the usefulness of accounting information from the perspective of equity investors" (Beisland, 2009, p. 8), and is by Barth, Beaver and Landsman (2001, p. 95) described as research examining "the association between accounting amounts and equity market values".

Furthermore, the theory is often used to see how financial as well as non-financial information can provide insight on firm value (De Klerk, De Villiers and Van Staden, 2015; Miralles-Quirós et al., 2018). Francis and Schipper (1999, p. 320) operationalize value relevance in two ways: total return earned from foreknowledge of financial statement information and earnings' ability to explain annual market-adjusted returns, as well as the ability of earnings and book values to explain market values of equity. We want to investigate further the non-financial aspect of value relevance research by looking at how ESG score can affect stock prices, and if adding this non-financial information explains stock prices better than looking at financial information alone.

2.3.2 The Ohlson price model

James Ohlson (1995) finds that firm value is a function of both financial and non-financial factors. He studies how a firm's market value relates to future earnings, book values and dividends, and the valuation model combines bottom-line items and the clean surplus relation. The clean surplus relation requires that a change in book value equals earnings minus dividends (Ohlson, 1995, p. 661). The model states that a firm's value is a function of the weighted average of capitalized earnings and book value. This paper laid the foundation for what is later known as the Ohlson price model. The price model is intended as a model where a company's market value is a function of both financial information and some unspecified non-financial information (Ohlson, 1995). This makes the model useful when conducting our study where we want to investigate the value relevance of ESG scores as non-financial information.

Ohlson (1995, p. 663) specify three assumptions for the valuation model:

1. The present value of expected dividends determines the market value.

2a. The model satisfies the clean surplus relation.

2b. Dividends reduce book value without affecting current earnings.

3. A linear model frames the stochastic time-series behavior of abnormal earnings.

The assumptions are used to formulate a "linear, closed-form, valuation solution explaining goodwill, that is, value equals book value plus a linear function of current abnormal earnings and the scalar variable representing other information" (Ohlson, 1995, p. 664). The linear model includes information of abnormal earnings and other information and place no restrictions on the variances and covariances of the disturbance terms (Ohlson, 1995, p. 668).

2.3.3 The financial aspect of value relevance theory

From the financial side of the theory, Collins, Maydew and Weiss (1997) looks at the combined value-relevance of earnings and book values, which has increased over the past forty years. They see a shift in the value-relevance from earnings to book values, which is mainly explained by one-time extraordinary items and more frequent negative earnings (Collins et al., 1997, p. 40). This is followed up by Francis and Schipper in 1999, where they show that there is a decline in the relevance of earnings information and an increased relevance of balance sheet and book value information.

Barth and Clinch (2009, p. 254) investigate the relation between equity market value, equity book value and earnings using a modified version of the Ohlson (1995) valuation model, and how five potential scale-related effects might cause an inference problem. The scale effects are: multiplicative and additive correlated omitted scale variables, scale-varying valuation parameters, survivorship and scale-related heteroskedasticity (Barth & Clinch, 2009, p. 253). The purpose of their study is to give a better understanding of how scale effects can potentially lead to incorrect inferences. They investigate several possible solutions to the presence of scale effects and find that share price specifications and undeflated market value of equity specifications are most effective (Barth & Clinch, 2009, p. 255).

2.4 Previous research

In this subsection we present fourteen different research articles on value relevance, ESG and board gender diversity that we use as a theoretical frame of reference for our hypotheses. The hypotheses we define are presented in subsection 2.6.

2.4.1 Value relevance of ESG

Hassel, Nilsson and Nyquist (2005) study whether companies receive financial benefit from being "green", as the company will receive financial gains or returns. The purpose of their study is to investigate if the value relevance of financial statement information increase when combined with environmental performance ratings. Their sample consists of 71 companies listed on the Swedish stock exchange from June 1998 to the end of September 2000, with a total of 337 firm-quarter observations prior to excluding outliers. Hassel et al. (2005) use an accounting-based valuation method by Ohlson (1995) for modelling the relationship between

market value and environmental performance. They define value relevance as the ability of accounting or non-accounting measures to capture and summarize the information that affects market value (Hassel et al., 2005, p. 45). They find that quarterly financial statements of Swedish companies, both book value of equity and net income, provide value relevant information to the investors. According to their results, environmental performance is value relevant for the market value of listed Swedish companies, with a significant negative relationship. The authors propose that the reason for the negative relationship is that "investors perceive that environmental performance is used for window-dressing of book values and financial performance" (Hassel et al., 2005, p. 56). Further, they suggest that investors perceive these activities as commenced at the expense of profit maximization with no corresponding reduction in risk, and therefore the environmental performance has a negative relation with market value.

Schadewitz and Niskala (2010) study the value relevance of communication via responsibility reporting on firm value in Finland. They study all firms listed on OMX-Helsinki that publishes Global Reporting Initiative (GRI)-based annual reports from the period 2002 to 2005. The authors apply the Ohlson residual income valuation model in their analysis, where responsibility reporting (GRI) is used as a proxy for additional information in the model. The authors exclude firms from the finance and insurance sector and eliminate negative earnings from their sample. Further, they apply a portfolio index to avoid large firms to dominate the analysis, where each firm has a maximum weight of 10 %. Their overall results show that the model explains market valuation well. The results support the conclusion that GRI responsibility reporting is important in assessing a firm's market value (Schadewitz & Niskala, 2010, p. 104). They find that "disclosure of GRI have value-relevant information above and beyond that given in the earnings and book value" (Schadewitz & Niskala, 2010, p. 103). Lastly, their results show that companies can increase the information content of share price via responsibility reporting, and by this decreasing information asymmetry between shareholders and the company.

De Klerk, De Villiers and Van Staden (2015) investigate the value relevance of CSR disclosure on share prices in the UK. They use a modified Ohlson model, with the share price specification suggested by Barth and Clinch (2009), to study whether higher level of CSR disclosure by the 100 largest UK companies are associated with higher share prices. The authors contribute to the existing literature by doing analyzes in a setting where there is an

increase on CSR disclosure regulations and legislations. In their analyses they use three measures of CSR disclosure: an indicator variable of whether the GRI-framework is used for CSR disclosure or not, the level of compliance with these guidelines and lastly a composite measure of CSR disclosure practises based on data collected by a third-party (De Klerk et al., 2015, p. 212). They windsorize their data at 90 percent to avoid any large effect that outliers might have on the data. Companies from the bank and finance sector are not excluded, but the authors perform additional tests to control for their special characteristics.

Their results show that GRI-related disclosure levels are positively associated with share prices. The authors conclude that they find "evidence that the level of CSR disclosure by UK companies is value relevant in such a way that higher levels of CSR disclosure are associated with higher share prices" (De Klerk et al., 2015, p. 210). Information asymmetry is used as an explanation for why higher CSR disclosure has a positive association with share price. Further, they find support for their hypothesis that a higher CSR disclosure by companies operating in environmentally sensitive industries is associated with higher share prices (De Klerk et al., 2015, p. 224). Through the disclosure of CSR, investors receive useful information for risk assessment of companies' future cash flow.

Kaspereit and Lopatta (2016) study whether SAM's corporate sustainability ranking and GRI sustainability reporting is value relevant and associated with a higher market valuation. They investigate the 600 largest European listed companies, defined by the Sustainability Asset Management Group's (SAM), over an eleven-year period from 2001 to 2011. To conduct the value relevance study, they use the Feltham and Ohlson valuation model. Kaspereit and Lopatta (2016) remove outliers by eliminating observations with values below the 1st and above the 99th percentile. In addition, they perform robustness tests where they exclude companies from the finance sector.

The two main contributions of their paper to the existing literature is the measuring of value relevance of being in the top quintile of a given sector in terms of corporate sustainability, and the analysis of the value relevance of self-reported data according to the GRI guidelines (Kaspereit & Lopatta, 2016, p. 2). Using both self-reported data presented in company reports and the SAM index ranking, they are able to simultaneously investigate the value relevance of third-party corporate sustainability measures and companies' voluntary sustainability disclosure. Further, they look at the interaction and difference between a company being

sustainable, measured by SAM's Dow Jones Sustainability Index Europe, and *claiming to be* sustainable, measured by GRI reporting.

They find a positive association between corporate sustainability and market valuation. Further, the overall tendency of their results is that sustainability reporting is positively perceived by the capital markets (Kaspereit & Lopatta, 2016, p. 18). They do not find any effect of external assurance on the value relevance of the GRI application levels, nor do they find evidence of an interaction or difference between *being sustainable* and *claiming to be sustainable*. Lastly, their study supports the stakeholder theory in the way that ethical and sustainable business is in fact a value-increasing strategy for shareholders.

Miralles-Quirós, Miralles-Quirós and Valente Gonçalves (2018) investigate the value relevance of CSR performance levels of companies listed on the São Paulo Stock Exchange, which they study over a six-year period from 2010 – 2015. The method used in the study is based on Ohlson's price model, adjusted with scaling measures proposed by Barth and Clinch (2009). Particularly, they scale the variables and use the share price, as this maintains the financial significance of the variables (Miralles-Quirós et al. 2018, p. 4). They investigate three different models: 1) whether the financial information book value and earnings is connected with the stock price, 2) including a measure of CSR performance to see whether this non-financial information is relevant in relation to the stock price, and 3) including a variable for companies operating in environmentally sensitive industries, to investigate whether the valuation of CSR performance differs according to industries (Miralles-Quirós et al., 2018, p. 5). They use panel data to be able to control for company effects. In order to avoid outliers from effecting the analysis, they rank the companies by market value and eliminate the top and bottom 2,5 %. They also eliminate any negative book value observations.

By looking at companies in Brazil, the authors are able to do an analysis of an emerging economy, which has not been done extensively so far (Miralles-Quirós et al. 2018). Additionally, they use a score variable prepared by Thomson Reuters Eikon instead of a binary variable which has been widely used in previous research. When using the score variable, they are able to do separate analysis on all three of the ESG pillars. Their study shows that the market does not particularly value ESG. However, their results indicate that

activities related to the ESG pillars does in fact enhance firm value. This is in line with the stakeholder theory.

2.4.2 Social performance and responsibility

Ziegler, Schröder and Rennings (2007) investigate the effect of sustainability performance on European corporations' stock performance. For their analysis, they calculate average stock returns using total return indexes from January 1996 to August 2001. They retrieve their data from Thomson Financial Datastream and use Fama-French Multifactor Model and the Capital Asset Pricing Model as basis for their empirical method. In the study they look at corporation's behavior and motives for improving their performance by focusing on environmental and social factors. For investors, shareholders and managers, it is important to know the nature of the relationship between the environmental and social performance and how it can affect stock performance (Ziegler et al., 2007, p. 662). They find that the average environmental performance of the industry where a company operates has a positive and significant effect on average monthly stock return, and average social performance has a negative influence on stock performance (Ziegler et al., 2007, p. 677). Further, their study shows that a relative sustainability performance of a company operating in a given industry has no significant effect on stock performance. Therefore, a strong environmental or social behavior of the management does not decrease the stock performance of a company (Ziegler et al., 2007, p. 678). Overall, environmental performance seems to have a more positive effect on investor's portfolio value than social performance.

Barnea and Rubin (2010) investigate whether a firm's policy towards CSR expenditure can create conflicts between shareholders due to different interests and opinions regarding allocation of resources. They use a cross-sectional database and have a sample of 2650 firms, where 2278 firms are defined as socially responsible (SR), and 372 firms are defined as socially irresponsible (SI). According to the authors, the firm's insiders might seek to over-invest in CSR in order to improve their reputations. The firm's insiders benefit from the increased expenditure on CSR because of the positive association with high CSR-ratings. However, over-investing in CSR might have consequences for the firm's financial performance and shareholders' wealth (Barnea & Rubin, 2010, p. 73). On the other hand, CSR can be seen in a positive way because it generates greater alignment of corporate and social goals, increase total welfare and benefit the society (Barnea & Rubin, 2010, p. 84). They conclude that a firm's CSR policy can create conflicts between shareholders. Finally,

they propose that the conflicts can be mitigated if the insiders own a large portion of the firm, so that they bear a large cost in relation to any expenditure made by the firm.

Dhaliwal, Li, Tsang and Yang (2011) study whether disclosure of CSR activities can contribute to a reduced cost of equity capital for the firm. Their results show that firms who voluntarily publish CSR reports have superior CSR performance relative to other firms in the same industry. Further, their results suggest that CSR disclosure in combination with superior CSR performance is associated with a reduction in the cost of equity capital (Dhaliwal et al., 2011, p. 79). The authors find that these firms attract more institutional investors and analyst coverage with an improved forecast accuracy, as disclosure reduces information asymmetry (Dhaliwal et al., 2011, p. 90). In addition, voluntary disclosure leads to higher transparency regarding risk management, which provides useful information for investors to examine the firm's long-term sustainability (Dhaliwal et al., 2011, p. 63). They contribute to the existing literature by extending the traditional research on voluntary disclosure. An increasing trend in CSR disclosure and the firm's activity towards implementing CSR can lead to lower cost of equity capital, which is beneficial for shareholders (Dhaliwal et al., 2011). This is proposed as an explanation for the increasing trend in CSR disclosure.

Cheng, Ioannou and Serafeim (2014) study whether there is a link between greater CSR performance strategies and better access to finance. They argue that better CSR performance will lead to lower capital constraints for a company as this is connected to more and better stakeholder engagement and less short-term opportunistic behavior (Cheng et al., 2014, p. 2). They use a panel data set of 2439 publicly listed firms over a seven-year period from 2002 – 2009 collected from Thomson Reuters ASSET4. Specifically, they use firm-scores for ESG dimensions as independent variables, and a measure for capital constraint, found through the KZ index, as explanatory variable. They limit extreme values for each of the five measures in the KZ index by keeping only the 99^{th} percentile. In their model, they control for firm size, industry, country and year fixed effects. Their results confirm that a superior CSR performance leads to better access to finance. They contribute to the existing literature by focusing on the impact CSR has on idiosyncratic firm capital constraints and investigate a broad sample of firms from 49 countries (Cheng et al., 2014, p. 3). Evidence show that firms with better CSR performance do indeed face lower capital constraints, due to superior stakeholder engagement and publicly disclosure of their CSR activities, which leads them to become more transparent and accountable (Cheng et al., 2014, p. 16). Further, transparancy

reduces information asymmetries between investors and the firm, which minimize perceived risk. In specific, their results imply that these firms are in a better position to receive financing in the capital markets.

Garcia, Mendes-Da-Silva and Orsato (2017) study the relationship between the financial performance and ESG performance of 365 firms operating in sensitive industries from 2010 – 2012. Industries defined as sensitive in this study are energy (oil and gas), chemicals, pulp and paper, steel making and mining. According to the authors, firms in these industries are often exposed to moral debates and political pressure due to their socio-environmental impact. Garcia et al. (2017) collect their data from the Thomson Reuters Eikon database and use linear regressions with a data panel for their analysis. They use both pooled regression, random effects and fixed effects method for estimating their model. The authors find that firms in sensitive industries have higher overall ESG performance compared to firms in other industries, and that the firms with the best environmental performance are found in these industries (Garcia et al., 2017, p. 146). These findings indicate that firms want to protect their reputation by working for a higher ESG performance. According to the authors, this affects company risk profile, as ESG investments is seen as a way of reducing future risk. The authors contribute to the existing literature by investigating the relationship between ESG and financial performance in emerging economies, specifically the BRICS countries.

2.4.3 Board gender diversity

Cucari, Esposito De Falco and Orlando (2018) investigate whether there is a relation between diversity of the board of directors and ESG disclosure. They study more than 54 listed companies in Italy during the period 2011 – 2014. The authors measure CSR disclosure by ESG scores available from Bloomberg's. In this study they focus only on one country since ESG disclosure will differ between countries and therefore might be less comparable (Cucari et al., 2018, p. 256). In addition, Italy does not have any legislations or regulations for ESG reporting, and this is therefore voluntary. The method they use is multiple regression analysis with a panel data. Their findings show that women on board of directors is negatively correlated with ESG disclosure, concluding that gender does not have an effect on ESG disclosure (Cucari et al., 2018, p. 260). However, they find that board diversity might have an effect on ESG data and disclosure (Cucari et al., 2018, p. 259).

Caspar Rose (2007) studies if a higher representation of women on boards has an impact on the firm's financial performance by measuring Tobin's Q. Rose (2007) investigates Danish firms listed on the Copenhagen Stock Exchange during the period 1998 – 2001. He excludes firms from the bank and insurance sector, some football clubs and the six largest shipping companies in Denmark. When including the control variable woman (indicating at least one woman on the board), Rose (2007) finds that this does not have a significant relation to firm performance. There is no relation between the firm performance and female board representation. The gain of having female board members is not reflected in the firm's performance, indicating that board diversity does not matter for a firm's financial performance (Rose, 2007, p. 412).

Bear, Rahman and Post (2010) explore if board diversity and the number of women on boards can have an impact on firm's performance and their reputation, and how CSR ratings can be associated with board diversity. To investigate this relationship, they use CSR ratings from KLD as the mediation effect and investigate companies listed on Fortune's 2009 Most Admired List in the U.S. The purpose of the study is to examine whether the gender composition and the professional background of the members of the board can affect a corporation's reputation through improved CSR (Bear et al., 2010, p. 216). The authors find that a higher percentage of women on boards does increase the company's CSR ratings and find this relation to be positively associated with the company's reputation. Bear et al. (2010, p. 217) suggest that women on boards enhances corporate reputation by contributing to an increase in the firm's CSR. The authors further suggest that these results sends a signal to investors to value the positive impact of women on boards as this can improve CSR ratings, reputation, financial performance, investments and share price (Bear et al., 2010, p. 218).

Adams and Ferreira (2009) examine how gender diversity and women in the boardroom can have different effects on companies' performance with different levels of shareholders rights. They find that female directors behave differently than male directors, and that the relation between gender diversity and firm performance is positive. The reasoning may be complex, but it appears that diversity has a positive impact when the firm has weak governance, while for firms with strong governance diversity decrease shareholder value (Adams & Ferreira, 2009, p. 308). Further, the authors state that female directors have a value-relevant impact on the board structure, but there is no evidence that a policy with diversity would improve firm performance.

2.5 Summary

Many companies strive to take responsibility to fulfill UN's Sustainable Development Goals. Different screening processes like whitelist and blacklist sets guidelines for investors and fund managers on considerations in the investment process. Furthermore, the debate between the stakeholder and shareholder theory provides different opinions on what creates value for the company and their stakeholders. The value relevance theory provide insight on how firm value can be affected by financial and non-financial information that relates to equity market value. Using the Ohlson price model when conducting a value relevance study with ESG as non-financial information is common practice by researchers. The price model is used in the studies of Hassel et al. (2005), Schadewitz and Niskala (2010), De Klerk et al. (2015), Kaspereit and Lopatta (2016), and Miralles-Quirós et al. (2018).

The previous studies we present provide different views on how ESG can be valuable for the company and its stakeholders. ESG score is widely used to understand the company's overall performance on corporate social responsibility. Most of these studies adopt the value relevance theory to investigate if ESG scores have an effect on firm value, where the majority of the studies find that ESG has a positive association with market value. Hassel et al. (2005) are the only ones that find a significant negative relation between ESG and firm value. Although the general results from the previous studies show a positive relation, the studies postulate different samples, time frames, firm-year observations, collection of ESG-ratings and models. Table 1 show a schematic overview of the various studies:

Table 1: Literature review

Authors	Sample	Time frame	Firm-Year Obs.	ESG-rating	Model	Relation
Adams & Ferreira (2009)	U.S	1996-2003	8253	Compustat	Unbalanced paneldata	+
Barnea & Rubin (2010)	U.S	2003	2650	KLD	Multivariate regression	+
Bear, Rhaman & Post (2010)	U.S	2007-2009	689	KLD	Baron & Kenny (1986)	+
Caspar (2007)	Denmark	1998-2001	443	GreensOnline	Tobin's Q	
Cheng et al. (2014)	49 countries	2002-2009	10078	ASSET4	OLS regression	+
Cucari et al. (2018)	Italy	2011-2014	215	Bloomberg	Multiple regression with panel data	-
Dhaliwal et al. (2011)	U.S	1993-2007	294	KLD	Lead-lag approach	+
De Klerk et al. (2015)	UK	2007/2008	89	GRI	Ohlson model, Barth & Clinch (2009)	+
Garcia et al. (2017)	BRICS	2010-2012	1095	T.R. Eikon	Panel data regression	
Hassel et al. (2005)	Sweden	June 1998-Sept. 2000	329	CC	Ohlson model	-
Kaspereit & Lopatta (2016)	Europe	2001-2011	5021	GRI	Feltham & Ohlson model	+
Miralles-Quirós et al. (2018)	Brazil	2010-2015	276	T.R.Eikon	Ohlson model, Barth & Clinch (2009)	+
Schadewitz & Niskala (2010)	Finland	2002-2005	276	GRI	Ohlson model	+
Ziegler et al. (2007)	Europe	1996-2001	212	Sarasin & Cie	Fama & French, CAPM	+

Notes: The table gives an overview of the studies presented in Previous Research. Sample indicate the origin of the study. Time frame indicate when the study was undertaken. Firm-Year Observations indicate the number of firms in the sample. ESG-rating represent the database where ESG/CSR data is collected from. Model shows what method is used. "+/-" denotes whether the study find a positive or negative relation with firm value.

2.6 Hypotheses

We propose four hypotheses to answer our research question based on the previous research presented above, the debate on shareholder-vs-stakeholder theory, as well as the literature on sustainability and value relevance.

Barnea and Rubin (2010) argue that over-investing and commitment to sustainability can create conflicts among shareholders because it reduces shareholder's wealth and firm value, which is consistent with the shareholder theory. However, our first hypothesis is based on the stakeholder theory, where the idea is that ESG is value relevant for a company's stock price. Hypothesis 1 is inspired by the studies conducted by Schadewitz and Niskala (2010), De Klerk et al. (2015), Kaspereit and Lopatta (2016) and Miralles-Quirós et al. (2018), who all investigate the value relevance of ESG on market value and stock price. Schadewitz and Niskala (2010) conclude that GRI reporting is important for assessing a firm's market value. This disclosure may increase stock price as well as decrease information asymmetry between shareholders and the firm. De Klerk et al. (2015) find that CSR disclosure has a positive association with stock price and CSR is value relevant for stock prices in the UK. Kaspereit and Lopatta (2016) find a positive association between corporate sustainability ranking and market valuation of companies. Similar results are also found by Miralles-Quirós et al. (2018), who report a positive association between ESG and firm value. In addition, Dhaliwal et al. (2011) find that disclosure of ESG and an increase in these activities can lead to a reduced cost of equity capital, which is beneficial for firm value. Cheng et al. (2014) find that companies with higher CSR performance experience lower capital constraints and reduced asymmetric information between the company and investors. These studies all find results supporting the stakeholder theory. Based on this reasoning, we present the following hypothesis:

H1. *Higher ESG scores are associated with higher stock prices.*

A company's focus on ESG factors will differ according to their business agenda and what impact they choose to have. Today, the environmental factor is frequently highlighted as the most pressing issue, as climate change is something that affects people all around the world. Carroll (1979) suggests that the economic responsibility is a corporation's core obligation to meet consumers' needs in the society. Seeing as the world is changing, so are the societies'

needs and it is becoming vital to run a more environmentally friendly business. Hassel et al. (2005) find that environmental performance has a negative impact on company stock price. However, Ziegler et al. (2007) find in their study that environmental performance has a more positive effect on firm value than social performance. With the increased attention on environmental issues that affect both organizations and the public, we want to investigate whether this factor is more value relevant for a company's stock price than the social and governance factor. This brings us to hypothesis 2:

H2. *The Environmental score is more value relevant than the Social and Governance score.*

We find the international focus and social debates on gender equality to be an important topic to investigate. Many companies change their corporate governance to increase board gender diversity, either this is mandatory by law or voluntarily. The previous research on board gender diversity and ESG provides some conflicting results on how board gender diversity might affect company performance. Rose (2007) finds that there is no relation between board diversity and firm performance. Cucari et al. (2018) find that women on boards have a negative effect on ESG disclosure. However, according to Bear et al. (2010), women on boards influence the company's reputation and the financial performance as the company achieve higher CSR-ratings when having female board representatives. Adams and Ferreira (2009) find that women on boards impact companies' performance as they are better monitors and have better attendance. Our aim for the next hypothesis is to analyze whether board gender diversity is value relevant for the firm's performance and shareholder value, as the previous research have different conclusions on this matter.

H3. *The association between high ESG scores and stock prices is stronger among companies with a high percentage of female representatives on board.*

From the studies included under hypothesis 1, De Klerk et al. (2015), Miralles-Quirós et al. (2018) and Garcia et al. (2017) study companies operating in environmentally sensitive industries and their approach to ESG. The effect ESG has on valuation can differ for companies in environmentally sensitive industries and non-sensitive industries because of their operating activities. Companies in sensitive industries are more likely to be exposed to environmental issues and therefore the ESG requirements are higher for these companies. Miralles-Quirós et al. (2018) find that social and governance performance is value relevant for

companies operating in sensitive industries, and that environmental performance is important in these industries, but this is already reflected in the stock prices. According to De Klerk et al. (2015), the disclosure of ESG can have a higher effect on stock prices among companies operating in sensitive industries. Garcia et al. (2017) study sensitive industries in depth and find that companies operating in these industries tend to have higher overall ESG scores because the companies bear a higher risk. We want to test whether this is the case in our data set and present the following hypothesis:

H4. *The association between high ESG scores and stock prices is stronger among companies operating within sensitive industries.*

3 Data description and methodology

In this section, we present the methodology we use and describe our data. First, we introduce the four price models we include in our analysis. Next, we describe the statistical method used in the analysis and lastly, we present the selection of data.

In our study of value relevance, we propose to use a benchmark price model presented by Ohlson (1995). According to De Klerk et al. (2015), the objective for using a price model is somewhat different from doing an analysis based on share return. When using a share return approach, you investigate changes in share prices during a specific period and what is reflected in these changes (De Klerk et al., 2015, p. 211). Contrarily to the latter, De Klerk et al. (2015) state that the Ohlson model is a share price model in which the objective is to value the market's view on future risk profiles and cash flows of a company, based on share prices at a specific point in time.

Barth and Clinch (2009, p. 281) state that the number of shares outstanding is an effective proxy for scale and that price, book value and earnings deflated by shares outstanding is a preferable and recommended specification when conduction a value relevance study. This is common practice by many researchers, and we follow De Klerk et al. (2015) and Miralles-Quirós et al. (2018) when we use the deflated specification of these variables.

The model we incorporate in our analysis provides a useful framework to derive the firm's market value as a function of financial- and non-financial information. The financial information we include is book value per share (BVPS) and earnings per share (EPS), and the non-financial information is ESG scores and board gender diversity (BGD). ESG and BGD is added as a proxy for non-financial information. Further, we add the control variables size, leverage and industry.

3.1 The price models

3.1.1 Price model 1

In our analysis, we use the baseline valuation model of Ohlson (1995) with the stock price specification recommended by Barth and Clinch (2009). We use this model to first look at the value relevance of the financial variables. The model is as follows:

$$P_{i,t} = \beta_0 + \beta_1 BVPS_{i,t} + \beta_2 EPS_{i,t} + \varepsilon_{i,t} \qquad (1)$$

Stock price, $P_{i,t}$, of company i at year-end t is the dependent variable in all our models. The two independent variables in price model (1) is book value per share (BVPS) of company i at year-end t, and earnings per share (EPS) of company i at year-end t. $\varepsilon_{i,t}$ is the disturbance of company i in year t which contains unobserved factors.

We examine whether the information extracted from the financial statements is associated with the stock price. This baseline model is used to comment on and investigate the value relevance of non-financial information when this is added in subsequent models. To be able to test this model, we follow Collins et al. (1997) and Francis and Schipper (1999), and further divide this into two separate models that isolate each of the two variables BVPS and EPS:

$$P_{i,t} = \beta_0 + \beta_1 BVPS_{i,t} + \varepsilon_{i,t} \qquad (1.1)$$
$$P_{i,t} = \beta_0 + \beta_1 EPS_{i,t} + \varepsilon_{i,t} \qquad (1.2)$$

Equation 1.1 examines the stock price $P_{i,t}$ of company i at year-end t and book value per share $BVPS_{i,t}$. Equation 1.2 examines the stock price $P_{i,t}$ and earnings per share $EPS_{i,t}$. The separation of the baseline model into one containing only book value as financial information and one containing earnings, is useful in our analysis as we extend these models further. We elaborate on the extension of these models under subsection 3.1.5.

3.1.2 Price model 2

In this model we add ESG to see whether this variable provide additional information on stock prices.

$$P_{i,t} = \beta_0 + \beta_1 BVPS_{i,t} + \beta_2 EPS_{i,t} + \beta_3 ESG_{i,t} + \varepsilon_{i,t} \qquad (2)$$

Price model 2 is an extension of the baseline model (1) with the addition of the ESG score variable for company i at year-end t. The ESG variable represents non-financial information that is believed to be relevant for the company's stock price. We expect that the coefficient for ESG score, β_3, will be significant and positive, which supports hypothesis 1 and the

stakeholder theory. In addition, we regress the three individual ESG scores for each company to find which factor might be more relevant for stock prices.

3.1.3 Price model 3

In our third model, we want to study if board gender diversity leads to a higher focus on ESG relations in a company, and thereby has a stronger effect on the company's stock price.

$$P_{i,t} = \beta_0 + \beta_1 BVPS_{i,t} + \beta_2 EPS_{i,t} + \beta_3 ESG_{i,t} + \beta_4 BGD_{i,t} + \varepsilon_{i,t} \qquad (3)$$

We include a variable for board gender diversity, $BGD_{i,t}$, that represents company i in year t. Isolated, the coefficient for BGD, β_4, shows the association between the percentage of women on boards and stock price. Based on our discussion of board gender diversity, we expect this coefficient to have a positive effect on stock price.

3.1.4 Price model 4

We further extend our model with inspiration from Miralles-Quirós et al. (2018), Garcia et al. (2017) and De Klerk et al. (2015), to investigate whether ESG scores are associated with higher stock prices for companies operating in sensitive industries. We identify the sectors manufacturing, construction, transportation and warehousing, mining, quarrying, oil and gas extraction and administrative, waste management and remediation services as sensitive industries in our data set. The selection is based on the NAICS sector codes, where these are identified as environmentally sensitive industries.

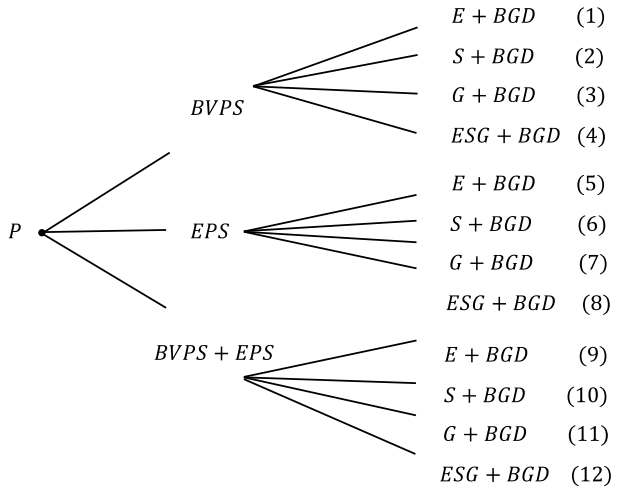
$$P_{i,t} = \beta_0 + \beta_1 BVPS_{i,t} + \beta_2 EPS_{i,t} + \beta_3 ESG_{i,t} + \beta_4 ESG_{i,t} * SENI_i + \varepsilon_{i,t} \qquad (4)$$

We create a dummy variable for sensitive industries, $SENI_i$ which equals 1 if the company is in the sensitive industry category, and 0 for non-sensitive industries. The interaction variable $ESG_{i,t} * SENI_i$ represents the interaction between ESG scores and sensitive industries and is calculated by multiplying ESG score with the dummy variable $SENI_i$. Based on the sign and significance of β_4, we can see whether companies operating in sensitive industries in Europe will be rewarded with a higher stock price for their ESG performance. Following Miralles-Quirós et al. (2018), Garcia et al. (2017) and De Klerk et al. (2015), we expect that companies in environmentally sensitive industries have higher ESG scores, as the ESG requirements and standards are higher in these industries and they are more exposed to risks.

3.1.5 All models

In Figure 1 we present the 12 models that we use in our core analysis. Model (1) – (4) is an extension of Equation 1.1, in which we include the ESG variable, the individual factors and board gender diversity. Model (5) – (8) is an extension of Equation 1.2, and finally model (9) – (12) represents price model 2 and 3. We further extend these models to include a dummy variable for sensitivity and the interaction variable, which represents price model 4.

Figure 1: Overview of core models



Notes: The figure shows the 12 core models included in our analysis.

3.2 Statistical method

We have a panel data set with 5684 firm-year observations from 2011 – 2017. Panel data is a data set consisting of both time series and cross-sectional elements (Brooks, 2014, p. 526). It allows us to investigate each company at several subsequent points in time and examine the relationship between the variables that changes over time (Brooks, 2014, p. 527). To analyze our models, we use ordinary least square (OLS) which is an estimation method used in multiple regression analysis. The OLS methodology allows us to measure the partial effect of one independent variable on the dependent variable, when the other independent variables are held fixed (Wooldridge, 2016, p. 91).

In order to use OLS estimation, there are five assumptions by Gauss-Markov that must be fulfilled. If there is a violation of the assumptions, the regression can be biased and we may

have important variables that are omitted (Wooldridge, 2016). The assumptions are as follows:

1. Constant linearity in the parameters.
2. Random sample of n observations.
3. The independent variables should not be perfectly correlated.
4. The error term u is expected to be zero for all values of x.
5. The variance of the errors is constant, assuming homoskedasticity.

Under these assumptions, the OLS estimators are unbiased and referred to as the best linear unbiased estimator (BLUE) (Wooldridge, 2016, p. 89). It is common in time-series and cross-sectional analysis like this that OLS assumptions are violated due to the nature of the data (Landsman & Magliolo, 1988; Kothari & Zimmerman, 1995). However, Wooldridge (2016, p. 388) propose to use OLS, relax some of the assumptions, and finally correct for the violations appropriately. We follow this practice as done by several researchers (Hassel et al., 2005; Cheng et al. 2014), and use OLS regression estimation in our main analysis.

It is common to either use price models, return models or both when conducting cross-sectional and time-series analysis. On some aspects, a return model specification has some advantages over price models: heteroskedasticity is less likely to be a problem and possible omitted variables are eliminated by the differencing of the variables (Landsman & Magliolo, 1988, p. 592). This could indicate a lesser risk of violations of the OLS assumptions when using a return model over a price model. However, our choice of using a price model relies on the fact that the ESG scores we investigate are only reported once a year, and it is therefore more appropriate for us to use a model based on share prices at a specific point in time.

With a panel data set, we can control for unobserved factors that might be correlated with our explanatory variables (Wooldridge, 2016, p. 425). We distinguish between unbalanced and balanced panel data. According to Brooks (2014, p. 529), balanced panel data has the same number of observations for each cross-sectional unit and unbalanced panel data has some cross-sectional elements with few or missing observations at different times. There are two panel estimator approaches, namely fixed and random effects. In a random effect model the different intercepts for each entity are constant over time and assumed to have a common intercept that is the same for all cross-sectional units (Brooks, 2014, p. 536). The intercept in

a regression with fixed effects model might differ cross-sectionally but not over time. Further, all slope estimates are fixed both cross-sectionally and over time (Brooks, 2014, p. 528). Random effect model is more appropriate when the entities in the sample are seen as randomly selected from the population, while fixed effect is more appropriate when the entities represent the entire population (Brooks, 2014, p. 537).

3.3 R^2 as a measurement for value relevance

The R-squared (R^2) measure is used in a regression to see how much of the variation in the dependent variable *y* is explained by the independent variable *x* (Wooldridge, 2016, p. 35). This measure will always increase when more independent variables are added to a model, regardless of their relevance. The adjusted R^2 ($\bar{R}^2$) impose a penalty for including more independent variables in a model (Wooldridge, 2016, p. 182). In contrast to R^2, the $\bar{R}^2$ measure will only increase if the t-value of the additional independent variable is greater than one in absolute value.

R^2 is frequently commented on when evaluating the value relevance of financial and non-financial factors on firm value. Among the studies presented earlier, both Hassel et al. (2005) and Schadewitz and Niskala (2010) use this measure to support or reject their hypotheses of value relevance. We therefore look at the adjusted R^2 when conducting our analyzes and presenting our results.

3.4 Regression coefficients as a measure for value relevance

Equally important as the adjusted R^2 measure, we comment on the sign and significance of the regression coefficients obtained in our analysis. This is a usual approach and is done by several researchers named in our thesis (Hassel et al., 2005; Garcia et al., 2017; Miralles-Quirós et al., 2018). By looking at the size and sign of the coefficients, we are able to discuss statistical, economic and practical significance of our estimates (Wooldridge, 2016, p. 120). Further we recognize that excessive focus on the statistical significance of a variable might oversee the actual interpretation of the variable (Wooldridge, 2016, p. 121). Lastly, as suggested by Wooldridge (2016), we might not settle for a 5 % significance level for our variables, as the sample size is fairly large with more than 5000 observations.

3.5 Robustness tests

To investigate the robustness of our analyses, we perform several modifications of the baseline price model to see if the statistics and conclusions are valid. First, we perform a panel data regression. We use the Hausman test to investigate whether a random or fixed effects model is best suited for our data (Brooks, 2014, p. 537). Our results show that the test is in favor of a fixed effects model. Therefore, we include fixed effects panel data regression as a robustness test in our analysis which allows us to control for company fixed-effects. In addition to panel data regression with fixed effects, we conduct a robustness test where we perform a regression with a generalized least square (GLS) estimation method. This regression is robust for both heteroskedasticity and autocorrelation (Wooldridge, 2016, p. 424). In particular, this method lets us control for individual company effects that is unobservable in the independent variables. GLS estimation is conducted on a panel data model, which allows us to investigate how the variation in price can be reflected over time within the companies (Brooks, 2014, p. 526).

Second, we include a control variable for size and leverage to see if these firm characteristics have an effect on stock price in our model. This is done by Kaspereit and Lopatta (2016), Cheng et al. (2014) and Miralles-Quirós et al. (2018). Further, we transform the financial variables into logarithmic form, which is done as a robustness test by Francis and Schipper (1999) and is an alternative for dealing with heteroskedasticity (Brooks, 2014, p. 186). This leads to less observations in the analysis as we lose all book value and earnings observations that have negative values (Wooldridge, 2016, p. 173). When transforming the models to logarithmic form, the models have a greater chance of satisfying the OLS assumptions, as taking the log leads to less variation of a variable and outlier influence (Wooldridge, 2016, p. 195). The coefficients are interpreted as a percentage change and this transformation is appropriate for our variables as these are monetary values (Wooldridge, 2016, p. 172). Finally, we exclude companies from the finance and insurance sector to see whether these companies' characteristics affects the analysis as is done by De Klerk et al. (2015), Kaspereit and Lopatta (2016) and Miralles-Quirós et al. (2018).

3.6 Data selection

We use Thomson Reuters Eikon's database to gather our data because this is available and recommended at our university. Thomson Reuters Eikon is widely used by researchers, analysts and investors. In 2014 it was estimated that investors who represents assets under management for more than €2.5 trillion used this database (Cheng et al., 2014, p. 6). Thomson Reuters provide a comprehensive database which gives us access to most recent data on companies all over the world. The database provides data on more than 2600 companies with headquarter in Europe. To collect our data, we use two criteria for the selection of companies. First, we include companies with headquarter in Europe. Second, we include only companies with ESG scores reported in the sample period.

Our price variable represents the closing price at the fiscal period end date. The variable EPS represents diluted earnings per share excluding extraordinary items for the fiscal period, divided by diluted weighted average shares. Lastly, book value per share is the ratio of total equity to basic weighted average shares outstanding at the fiscal period end date. We retrieve all data in NOK to be able to compare the numbers without producing unnecessary scale effects (Kaspereit & Lopatta, 2016).

The ESG scores we use are collected through the Screener App provided by Thomson Reuters Eikon. The score is composed by three main pillars, namely environmental, social and governance. This ESG score reflects the companies' performance, commitment and effectiveness based on the reported information (Thomson Reuters, 2019, p. 6). Overall the score is a composition of over 400 measures collected and based on company-reported data, companies' annual report, company website, NGO websites, stock exchange filings and CSR reports (Thomson Reuters, 2019). From the measures collected, the database comprises this into 10 main categories which the reported scores are based on. The calculated ESG scores are updated once a year according to companies' own ESG disclosure (Thomson Reuters, 2019, p. 4). Due to the fact that the ESG ratings are only available on a yearly basis, this is the frequency we use for our analysis. The categories used by Thomson Reuters Eikon are presented in Table 2.

Table 2: Thomson Reuters main ESG categories

Environmental	Social	Governance
Resource Use	Workforce	Management
Emissions	Human Rights	Shareholders
Innovation	Community	CSR Strategy
	Product Responsibility	

Notes: This table shows the 10 main categories included in Thomson Reuters ESG score (Thomson Reuters, 2019).

We focus on the member countries in EU and EFTA since these are most likely to be affected by EU's work towards sustainability. The 22 countries included in our sample are: Austria, Belgium, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxemburg, Malta, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland and the United Kingdom. Most of these countries are ranked as the best on sustainable development in 2018 (RobecoSAM, 2018).

4 Results and discussion

In this section we analyze our data and present our results and discussions. We start with presenting data dropping and dealing with extreme values in our data set. This is followed by a section of descriptive statistics, correlation matrix, multicollinearity and heteroskedasticity. In section 4.3 we present our analyses and comment on the results in relation to value relevance and our hypotheses. We simultaneously discuss our results while comparing previous research. Further, we perform robustness tests which are compared with the results from our main model to increase the validity and reliability of our study. Lastly, we summarize the results and hypotheses.

4.1 Data dropping and further dealing with extreme values

To make the analysis more reliable and accurate, we focus on the companies where Thomson Reuters have reported an ESG score over the last seven years, from year 2011 to 2017. Further, we follow De Klerk et al. (2015) and Kaspereit and Lopatta (2016) and choose not to exclude companies from the finance and insurance sector from the overall analysis. Rather we do a robustness check where we look for any changes in our results when excluding these companies, as these companies' financial data might be less comparable to other companies. We choose to exclude two companies from the Netherlands and Switzerland since they have not reported data on board gender diversity (BGD). This gives us a data set of 791 companies and 5684 firm-year observations.

Following Collins et al. (1997), we remove observations that are identified as outliers in the regressions. There are several ways in which this can be done. We have excluded the upper and lower 1 % of the observations, in line with Collins et al. (1997), Francis and Shipper (1999) and Kaspereit and Lopatta (2016). This is done for all three financial variables, price, earnings per share and book value per share. By doing this we remove 330 observations from our data set, 112, 110 and 108 observations for price, EPS and BVPS, respectively. After excluding extreme values, we have a total of 5354 firm-year observations in our analysis.

4.2 Descriptive statistics and correlation matrix

The descriptive statistics of our dependent and independent variables are presented in Table 3, Panel A. The table includes mean, median, standard deviation, skewness, kurtosis, minimum and maximum values.

Panel A of Table 3 show that the mean ESG score for European companies in our sample is 59.82 and the median score is 61. The actual ESG scores ranges from 7.76 to 96.13 out of the potential score from 0 to 100. This shows that there is a large variation in the best performing and worst performing companies in our sample. For the individual ESG factors the mean is 64.75 for the environmental score, 61.66 for the social score and 52.16 for the governance score. The median of these variables is slightly higher, indicating that some companies obtain a low score that decreases the mean values. Board gender diversity has a mean percentage of 21 and a median of 20. The maximum is 71 % and the minimum is zero. Similarly, for BGD, there is a large variation in the companies in our sample.

Table 3: Descriptive statistics

Variable	N	Mean	Median	Std. dev.	Min.	Max.	Skewness	Kurtosis
	Panel A: Descriptive statistics							
Price	5354	232.40	114.75	330.59	1.60	4391.48	4.04	30.90
EPS	5354	10.89	5.83	20.01	-79.00	166.61	1.66	12.34
BVPS	5354	120.30	57.52	158.25	-13.11	1037.41	2.55	10.62
Environmental	5354	64.75	66.95	20.33	5.15	99.44	-0.47	2.46
Social	5354	61.66	63.51	20.17	4.75	99.09	-0.41	2.51
Governance	5354	52.16	52.58	20.70	1.02	98.78	-0.06	2.13
ESG	5354	59.82	61.00	15.94	7.76	96.13	-0.35	2.65
Board Gender Diversity	5354	20.99	20.00	12.91	0.00	71.43	0.29	2.73
	Panel B: Correlation matrix							
	1	2	3	4	5	6	7	8
1. Price	1.0000							
2. EPS	0.7013*	1.0000						
	(0.0000)							
3. BVPS	0.6493*	0.5867*	1.0000					
	(0.0000)	(0.0000)						
4. Environmental	0.1132*	0.0921*	0.1005*	1.0000				
	(0.0000)	(0.0000)	(0.0000)					
5. Social	0.1202*	0.0913*	0.0553*	0.6727*	1.0000			
	(0.0000)	(0.0000)	(0.0001)	(0.0000)				
6. Governance	0.0101	0.0129	0.0133	0.2209*	0.2937*	1.0000		
	(0.4622)	(0.3458)	(0.3290)	(0.0000)	(0.0000)			
7. ESG	0.1083*	0.0875*	0.0748*	0.8166*	0.8489*	0.6288*	1.0000	
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)		
8. Board Gender Diversity	0.1154*	0.0980*	0.0679*	0.3071*	0.2592*	0.2180*	0.3378*	1.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	

Notes: This table shows the descriptive statistics (mean, median, standard deviation, minimum, maximum, skewness and kurtosis) in Panel A. Panel B provides the correlation matrix of the variables: Price, Book value per share (BVPS), Earnings per share (EPS), Environmental score, Social score, Governance score and Board Gender Diversity (percentage measure). P-values in parentheses, * indicating significance at the 1 % level.

Skewness measures to what extent the distribution of observations is symmetric about its mean value (Brooks, 2014, p. 66). A normal distribution has zero skewness. Our financial variables, Price, EPS and BVPS are all positively skewed, which means that the tail of the distribution is stretching towards the right and the data is grouped towards the left. The price variable, with a skewness measure of 4.04, is the most skewed variable which is to be expected as large mean values drag the data in one direction. The ESG variables are all slightly negatively skewed. Finally, board gender diversity is positively skewed with a skewness of 0.29.

Kurtosis is a measure of how fat the tails of the distribution are. A normal distribution will have a coefficient of kurtosis of minus 3 (Brooks, 2014, p. 66). Further, a normal distribution will have an excess kurtosis equal to zero, as this measure equals kurtosis minus 3. Our financial data have a leptokurtic distribution, a fat tail, as the coefficients of kurtosis ranges from 10.62 to 30.90. This is quite common in economic time series (Brooks, 2014, p. 67). E, S, G, ESG and BGD have a kurtosis of less than 3 and may have sign of a platykurtic distribution, being less peaked in the mean and having thinner tails than a normal distribution (Brooks, 2014, p. 67).

Panel B of Table 3 presents a correlation matrix with the correlation coefficients between the variables in our data set. A correlation coefficient lies between the values 1 and -1, where a correlation of 1 indicates a perfect positive correlation and -1 a perfect negative correlation (Brooks, 2014, p. 69). We find that there are no negative correlations between the variables. The parenthesis shows the corresponding p-value to each coefficient. All of the coefficients are significant except from governance score which has insignificant correlation coefficients with Price, BVPS and EPS. This may indicate that governance score is less important in relation to financial performance. EPS and BVPS are both highly correlated with Price, with a correlation coefficient of 0.70 and 0.65, respectively. This is in line with the value relevance theory, which indicate that there should be a high correlation between these variables. The variables E, S, G, ESG and BGD have a lower correlation with Price, where G has the lowest with a correlation coefficient of 0.01 (insignificant). E, S and G have a strong correlation with ESG which is to be expected as these are all included in the ESG measure. The BGD coefficient has a stronger correlation with ESG than with Price. In the next section we investigate if there are any problems with multicollinearity in our data set.

4.2.1 Multicollinearity

To investigate whether there is a problem with collinearity in our independent variables, we use the variance-inflation factor (VIF) to find how much of the variation of the slope coefficient is determined by the correlation between x_j and the explanatory variables (Wooldridge, 2016, p. 86). Multicollinearity occurs when the correlation is high (but not perfect) between two or more independent variables (Wooldridge, 2016, p. 84). This may lead to large standard errors of the OLS estimates. Even if there exists a high correlation between the explanatory variables, it will not violate any OLS assumptions, but it might be difficult to estimate the partial effect of the explanatory variables (Wooldridge, 2016, p. 293). We do a VIF test in STATA which shows that our variables have a VIF value below 10. This indicates that there are no problems estimating β_j, and assumption 3 is not violated.

4.2.2 Heteroskedasticity

When the variance of the errors in a model is not constant, the errors are heteroskedastic (Brooks, 2014, p. 182). If our errors are heteroskedastic and this is not handled accordingly, we will no longer have BLUE estimators, and the standard errors could be wrong (Brooks, 2014, p. 183). To see whether our data suffers from heteroskedasticity we use White's and Breusch-Pagan/Cook-Weisberg general test for heteroskedasticity. In addition to these tests, we can detect whether the errors are heteroskedastic by plotting the estimated residuals against one of the explanatory variables. In this scatter plot, no apparent pattern would imply that the errors are *homoskedastic*. Results from the White and Breusch-Pagan/Cook-Weisberg tests in STATA indicate that we should reject the null hypothesis of homoskedasticity and constant variance. The scatter plot yields the same results, which indicate that our data suffers from heteroskedasticity.

To deal with the heteroskedasticity in our data, we use heteroskedasticity-consistent standard error estimates, also known as robust standard errors (often attributed to White (1980)). This estimate is a correction for degrees of freedom and the squared OLS residuals are the same for all observations (Wooldridge, 2016, p. 246). This makes the regression more conservative and more evidence is needed in order to reject the null hypothesis (Brooks, 2014, p. 186). We report the robust standard errors as this suggest that we need more evidence in order to support our hypotheses.

4.3 Value relevance

In this subsection we present the results from the regression analyses. These results are connected with the price models and hypotheses in order to answer our research question and discuss if ESG is value relevant for stock prices in European companies.

4.3.1 Price model 1

In model (I) – (III) in Table 4, we regress the estimation based on the Ohlson price model, with the size specification suggested by Bart and Clinch (2009), by looking at the financial information book value per share and earnings per share. In model (IV) – (VII), we include the set of ESG scores as independent variables in addition to the financial variables to examine the value relevance of ESG. In Table 4, both β_1 and β_2 are statistically significant at the 1 % level in model (III). The coefficient of BVPS has a value of 0.758, which implies that an increase in book value per share of NOK 1 leads to, on average, an increase in stock price of NOK 0.758. Earnings per share has a coefficient of 8.072 which implies that the price is more sensitive for changes in earnings than in book value per share. If only one of the two financial variables are included in the model (model (I) and model (II)), the regression coefficient increases, which indicate that price is more sensitive to either when this is the only explanatory variable in the model.

Table 4: Regression results – Baseline model

	Model (I)	Model (II)	Model (III)	Model (IV)	Model (V)	Model (VI)	Model (VII)
BVPS	1.356***		0.758***	0.753***	0.757***	0.758***	0.755***
	(0.044)		(0.047)	(0.046)	(0.046)	(0.047)	(0.046)
EPS		11.589***	8.072***	8.045***	7.989***	8.072***	8.030***
		(0.518)	(0.611)	(0.613)	(0.621)	(0.612)	(0.617)
Environmental				0.522***			
				(0.150)			
Social					0.918***		
					(0.182)		
Governance						-0.017	
						(0.134)	
ESG							0.805***
							(0.217)
Constant	69.207***	106.169***	53.311***	20.355**	-2.351	54.210***	5.999
	(3.772)	(5.313)	(3.925)	(9.905)	(10.597)	(7.541)	(12.551)
Observations	5,354	5,354	5,354	5,354	5,354	5,354	5,354
Adjusted R-squared	0.422	0.492	0.578	0.579	0.581	0.578	0.579
F-test	955.4***	500.5***	562.6***	391.4***	456.6***	381.5***	415***

Notes: This table shows the results obtained for estimates of the OLS regression using the baseline models (I) - (VII). Robust standard errors in parentheses, *** p < 0.01; ** p < 0.05; * p < 0.1 based on two-tailed tests.

4.3.2 Price model 2

Hypothesis 1: *Higher ESG scores are associated with higher stock prices,* is connected to the models presented in Table 4 and 5. We find that BVPS and EPS has an explanatory factor of 0.578 in model (III). This tells us that more than half of the variation in price can be explained by changes in book value and earnings per share. When including the ESG variable in model (VII), the explanatory factor increases to 0.579. The regression coefficients for all three variables are positive and significant at the 1 % level. Further, the environmental and social score are positive and significant at the 1 % level in model (IV) and model (V), with the coefficients of 0.522 and 0.918 respectively. The only explanatory variable that is not significant at the 1 % level is the coefficient for governance, which is negative and insignificant (–0.017). The adjusted R^2 is highest in model (V), where the social score is included, with an explanatory power 0.581. The significance of the explanatory variables in this model as well as the increase in explanatory power supports hypothesis 1, and we may further assume that ESG is value relevant for stock prices in European companies.

Our results support hypothesis 1. This relation show that there is a positive association between ESG score and stock prices. ESG provide value relevant information above and beyond the financial information obtained from a company's book value and earnings. We find that the coefficient for ESG score is positive and significant, which is in line with Miralles-Quirós et al. (2018), De Klerk et al. (2015), Kaspereit and Lopatta (2016) and Schadewitz and Niskala (2010). Our findings are in accordance with the stakeholder theory, indicating that ESG activities have a positive effect on stock prices and enhance shareholder value. This further corresponds to Elkington's (1994) "Triple bottom line" framework, where the company creates value through sustainable activities and to the ideas of Porter and Kramer (2002) that ESG positively influence the company by enhancing their competitive advantage.

Table 5 presents our 12 core models. The extension with the board gender diversity variable is presented in Panel B. Model (1) – (4) in Table 5, Panel A consider only BVPS as the financial variable together with ESG and individual ESG factors as non-financial variables. Model (5) – (8) include EPS and the ESG factors, and models (9) – (12) consider both the financial variables BVPS and EPS. Overall, all coefficients are positive and significant except from the governance score, which is positive and insignificant in model (3) and (8), and negative in model (10). When we include the overall ESG scores in the models, we see that the coefficient for ESG is highest in model (4), with 1.246, in which only BVPS is included as

financial information. In model (8), the coefficient for ESG is 0.982 when controlling for EPS. In model (12), when including both variables BVPS and EPS, the overall ESG is positive and significant by 0.805. The ESG coefficient is significant at the 1 % level in all models. When we include both financial variables BVPS and EPS in the regression, this increase the adjusted R^2 from model (1) – (8). The F-test shows that the increase is statistically significant at the 1 % level. The explanatory power of model (9) – (12) is 0.579 in model (9) and (12), 0.578 in model (11) and 0.581 in model (10).

Table 5: The value relevance of ESG performance

	Panel A: Regression results price model 2											
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)	Model (10)	Model (11)	Model (12)
BVPS	1.346***	1.347***	1.356***	1.347***					0.753***	0.757***	0.758***	0.755***
	(0.044)	(0.044)	(0.044)	(0.044)					(0.046)	(0.046)	(0.047)	(0.046)
EPS					11.515***	11.504***	11.589***	11.521***	8.045***	7.989***	8.072***	8.030***
					(0.521)	(0.526)	(0.518)	(0.524)	(0.613)	(0.621)	(0.612)	(0.617)
Environmental	0.787***				0.797***				0.522***			
	(0.165)				(0.166)				(0.150)			
Social		1.386***				0.928***				0.918***		
		(0.203)				(0.186)				(0.182)		
Governance			0.022				0.016				-0.017	
			(0.160)				(0.146)				(0.134)	
ESG				1.246***				0.982***				0.805***
				(0.246)				(0.224)				(0.217)
Constant	19.455*	-15.061	68.056***	-4.222	55.383***	49.863***	105.328***	48.190***	20.355**	-2.351	54.210***	5.999
	(10.769)	(12.151)	(8.604)	(14.346)	(10.567)	(10.636)	(8.746)	(12.632)	(9.905)	(10.597)	(7.541)	(12.551)
Observations	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354
Adjusted R-squared	0.424	0.429	0.421	0.425	0.494	0.495	0.492	0.494	0.579	0.581	0.578	0.579
F-test	504.9***	588.6***	499.8***	546.3***	304.3***	367.3***	259.6***	333.3***	391.4***	456.6***	381.5***	415***
	Panel B: Regression results price model 3											
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)	Model (10)	Model (11)	Model (12)
BVPS	1.341***	1.341***	1.346***	1.342***					0.753***	0.756***	0.756***	0.755***
	(0.044)	(0.043)	(0.043)	(0.044)					(0.046)	(0.046)	(0.046)	(0.046)
EPS					11.473***	11.460***	11.512***	11.481***	8.001***	7.955***	8.007***	7.992***
					(0.521)	(0.525)	(0.518)	(0.523)	(0.614)	(0.621)	(0.613)	(0.616)
Environmental	0.478***				0.623***				0.341**			
	(0.172)				(0.171)				(0.153)			
Social		1.161***				0.784***				0.789***		
		(0.218)				(0.196)				(0.192)		
Governance			-0.237				-0.154				-0.175	
			(0.161)				(0.149)				(0.134)	
ESG				0.844***				0.739***				0.570**
				(0.270)				(0.240)				(0.231)
Board Gender Diversity	1.606***	1.368***	1.916***	1.485***	0.910***	0.896***	1.259***	0.902***	0.946***	0.796***	1.169***	0.874***
	(0.308)	(0.319)	(0.300)	(0.323)	(0.284)	(0.290)	(0.282)	(0.295)	(0.261)	(0.268)	(0.257)	(0.270)
Constant	6.363	-29.221**	42.589***	-10.693	47.983***	40.453***	88.621***	44.196***	12.636	-10.648	38.783***	2.142
	(11.253)	(12.082)	(9.881)	(14.303)	(10.930)	(10.770)	(9.455)	(12.658)	(10.308)	(10.710)	(8.582)	(12.594)
Observations	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354
Adjusted R-squared	0.427	0.431	0.427	0.428	0.495	0.496	0.494	0.495	0.580	0.582	0.580	0.580
F-test	339.5***	394.2***	337.6***	367.2***	205.7***	249.3***	183***	224.3***	297.5***	345***	293.5***	313.4***

Notes: This table shows the results obtained for estimates of the regression parameters in OLS. Panel A shows the results from price model 2 and Panel B shows the results from price model 3, with the inclusion of BGD (board gender diversity). Robust standard errors in parentheses, *** p < 0.01; ** p < 0.05; * p < 0.1 based on two-tailed tests

Hypothesis 2: *The Environmental score is more value relevant than the Social and Governance score*, is discussed based on the results presented in Table 5, Panel A. We find that the coefficients for the environmental score is positive and significant at the 1 % level for

both model (1), (5) and (9) (0.787, 0.797 and 0.522 respectively). The reported results show that price is more sensitive to the social score, where the coefficients are 1.386, 0.928 and 0.918 in model (2), (6) and (10). All coefficients are significant at the 1 % level. The coefficient for governance score is insignificant in model (3), (7) and (11). The social score has a higher coefficient than the environmental score in all models, indicating that the social score is more value relevant for stock price than the environmental score. However, as the governance score is insignificant in these models, we might assume that the environmental score is more value relevant than the governance score. We partially support hypothesis 2 on the basis that the environmental score is positively significant and value relevant for stock prices, but no more than the social score. This implies that stock prices are more affected by the social score than the environmental score. Our findings are inconsistent with Hassel et al. (2005), who find that the environmental performance has a significantly negative relationship with stock price. Ziegler et al. (2007) find that environmental performance has a positive effect on stock price, but the social performance is negative.

4.3.3 Price model 3

In our next model, we include board gender diversity as an additional explanatory variable to see whether this has an impact on the variable's sensitivity and explanatory power. We investigate whether companies with higher gender diversity on the board of directors achieve higher explanatory power in the model, and a stronger association between ESG scores and stock price. In Table 5, Panel B, the coefficient for board gender diversity is positive and significant at the 1 % level in all models. The coefficients are highest in model (1) – (4) with 1.606, 1.368, 1.916 and 1.485, respectively. All coefficients except from the constant and the governance score are statistically significant in all models. The coefficient for social score decreases slightly from Panel A but remains statistically unchanged. The coefficient for environmental score is significant at the 1 % level in model (1) and (5), with 0.478 and 0.623. The significance level decreases to the 5 % level in model (9). We find that the coefficient for governance score is negative in model (3) with –0.237, –0.154 in model (7) and –0.175 in model (12), none of which are significant. The coefficient for ESG score is positive and significant at the 1 % level in model (4) and (8) and decreases to the 5 % level in model (12).

Hypothesis 3: *The association between high ESG scores and stock prices is stronger among companies with a high percentage of female representatives on board,* is discussed based on Table 5. The total explanatory power in Table 5 increases when including the board gender

diversity variable in Panel B. The adjusted R^2 in model (9) – (12) is 0.580 and above, and significant for all models. Model (10) has the highest measure of adjusted R^2 by 0.582. The coefficient for BGD is 0.946 in model (9), 0.796 in model (10), 1.169 in model (11) and 0.874 in model (12). These results show that the association between ESG scores and stock prices is stronger for companies with a larger percentage of female representatives on the board of directors. We find with this support for hypothesis 3, as our results show that BGD has a positive effect on ESG and stock price. This is in line with Bear et al. (2010), who find that higher ESG score has a positive impact on the companies' reputation and performance when there are more female representatives on the board of directors. Further, Adams and Ferreira (2009) find that women on the board of directors are more effective and have a value-relevant impact on the board structure. In contrast to our results, Cucari et al. (2018) find that an increasing number of women on boards do not have a positive impact of ESG. Rose (2007) do not find any relation between board gender diversity and firm value.

4.3.4 Price model 4

Out of the 5354 firm-year observations we have in our data set, approximately 50 % of these, 2738, observations are related to sensitive industries. In model (1) – (12) in Table 6 we add a dummy variable for environmentally sensitive industries and an interaction variable between these industries and ESG scores. The interaction variable between sensitive industries and ESG is positive and significant at the 1% level in all models. The coefficient for the interaction variable is 1.358 in model (4), 1.106 in model (8) and 1.130 in model (12). When including this variable, the coefficient for ESG score is no longer significant in model (12), and significant only at the 10 % level in model (8) and 5 % level in model (4). The coefficient for governance score is currently negative and significant in model (3), (7) and (11) by –0.378, –0.308 and –0.342, respectively. The explanatory power of model (1) – (12) in Table 6 is higher than for previous models, and this increase is statistically significant at the 1 % level. Adjusted R^2 is 0.591 for model (9) – (11) and 0.590 for model (12).

Table 6: Environmentally sensitive industries

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)	Model (10)	Model (11)	Model (12)
BVPS	1.337***	1.338***	1.342***	1.339***					0.756***	0.758***	0.758***	0.757***
	(0.043)	(0.043)	(0.043)	(0.043)					(0.045)	(0.045)	(0.045)	(0.045)
EPS					11.392***	11.403***	11.433***	11.414***	7.909***	7.888***	7.915***	7.911***
					(0.518)	(0.521)	(0.514)	(0.520)	(0.609)	(0.614)	(0.606)	(0.610)
Sensitivity x ESG	1.381***	1.282***	1.468***	1.358***	1.104***	1.078***	1.192***	1.106***	1.132***	1.079***	1.194***	1.130***
	(0.104)	(0.108)	(0.105)	(0.107)	(0.099)	(0.101)	(0.101)	(0.100)	(0.089)	(0.090)	(0.089)	(0.090)
Environmental	0.433***				0.519***				0.236			
	(0.162)				(0.163)				(0.147)			
Social		0.807***				0.447**				0.437**		
		(0.209)				(0.187)				(0.184)		
Governance			-0.378**				-0.308**				-0.342***	
			(0.158)				(0.143)				(0.131)	
ESG				0.503**				0.383*				0.192
				(0.251)				(0.222)				(0.218)
Constant	0.748	-18.035	45.117***	-0.827	40.524***	47.205***	86.998***	50.921***	5.013	-5.014	35.822***	8.672
	(10.810)	(11.991)	(8.556)	(14.156)	(10.635)	(10.544)	(8.736)	(12.481)	(9.909)	(10.458)	(7.557)	(12.363)
Observations	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354
Adjusted R-squared	0.441	0.443	0.441	0.441	0.505	0.505	0.504	0.504	0.591	0.591	0.591	0.590
F-test	383.6***	426.4***	385.4***	403.3***	250.2***	276.1***	235.2***	257.9***	361.6***	387.3***	360.8***	367.5***

Notes: This table shows the results obtained for estimates of the OLS regression of price model 4. The model includes an interaction variable for ESG score of firms operating in sensitive industries. Robust standard errors in parentheses, *** p < 0.01; ** p < 0.05; * p < 0.1 based on two-tailed tests.

Hypothesis 4: *The association between high ESG scores and stock prices is stronger among companies operating within sensitive industries*, is discussed based on Table 6. We find that the interaction variable for sensitive industries and ESG score is positive and significant in all models, which indicate that there is a stronger association for these companies. These results support hypothesis 4 that the association between high ESG scores and stock prices is stronger for companies operating in environmentally sensitive industries compared to non-sensitive industries. This is consistent with the results presented by De Klerk et al. (2015), Garcia et al. (2017) and Miralles-Quirós et al. (2018). The value relevance of ESG can be an important indicator for investors and managers when considering consequences and risk of investments, both positive and negative, in a decision-making process.

4.4 Robustness tests

In this section we perform different robustness tests to further increase the validity and reliability of our study. Following Kaspereit and Lopatta (2016) and Miralles-Quirós et al. (2018), we control for size and leverage. Further, we exclude companies from the finance and insurance sector, include extreme values and the financial variables in logarithmic form. Finally, we conduct a regression using panel data techniques and feasible GLS estimation.

4.4.1 Size and leverage

Size is measured as the natural logarithm of total assets of each company. Leverage is a ratio of long-term debt to total equity (Miralles-Quirós et al., 2018). This is, along with the rest of our data, collected from Thomson Reuters Screener App. As pointed out by Barnea and Rubin (2010, p. 79), large firms are more visible and have a larger operational impact and are thought to spend more on ESG activities to receive a higher score.

Table 7: Controlling for size and leverage

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)	Model (10)	Model (11)	Model (12)
BVPS	1.336***	1.349***	1.336***	1.346***					0.901***	0.924***	0.899***	0.915***
	(0.041)	(0.040)	(0.041)	(0.040)					(0.045)	(0.044)	(0.046)	(0.045)
EPS					10.403***	10.358***	10.406***	10.390***	6.103***	5.926***	6.119***	6.014***
					(0.479)	(0.474)	(0.481)	(0.478)	(0.510)	(0.500)	(0.515)	(0.506)
Environmental	1.240***				0.963***				1.135***			
	(0.191)				(0.222)				(0.180)			
Social		2.465***				1.352***				1.999***		
		(0.195)				(0.202)				(0.172)		
Governance			0.342**				-0.177				0.187	
			(0.161)				(0.167)				(0.140)	
ESG				2.491***				1.280***				2.024***
				(0.259)				(0.274)				(0.233)
Board Gender Diversity	1.892***	1.768***	2.182***	1.602***	1.034***	1.061***	1.388***	0.990***	1.306***	1.264***	1.607***	1.120***
	(0.298)	(0.295)	(0.310)	(0.306)	(0.313)	(0.311)	(0.319)	(0.321)	(0.273)	(0.270)	(0.281)	(0.278)
Size	-15.556***	-20.815***	-10.803***	-19.401***	-1.422	-2.815	3.204*	-1.824	-15.646***	-19.315***	-11.007***	-18.194***
	(2.264)	(2.202)	(2.009)	(2.251)	(2.184)	(2.070)	(1.843)	(2.176)	(2.010)	(1.950)	(1.756)	(2.007)
Leverage	-0.353	-0.284	-0.257	-0.189	0.521	0.542	0.519	0.602	0.722***	0.750***	0.789***	0.842***
	(0.391)	(0.315)	(0.387)	(0.316)	(0.670)	(0.641)	(0.692)	(0.640)	(0.218)	(0.180)	(0.219)	(0.180)
Constant	326.494***	384.792***	266.200***	357.034***	67.960	80.945*	18.485	64.608	335.937***	376.136***	279.599***	354.021***
	(50.188)	(49.178)	(48.374)	(49.351)	(46.792)	(45.419)	(43.842)	(46.043)	(44.116)	(43.419)	(42.294)	(43.557)
Observations	4,148	4,148	4,148	4,148	4,148	4,148	4,148	4,148	4,148	4,148	4,148	4,148
Adjusted R-squared	0.518	0.534	0.514	0.525	0.473	0.476	0.470	0.473	0.618	0.627	0.614	0.622
F-test	235.3***	247.1***	238.4***	239.5***	136.8***	142.7***	134.2***	138.6***	220***	236***	220.1***	225.1***

Notes: This table shows the results obtained for estimates of the regression parameters including control variables Size and Leverage. Robust standard errors in parentheses, *** p < 0.01; ** p < 0.05; * p < 0.1 based on two-tailed t-test.

After including control variables for size and leverage in Table 7, we see that the results are consistent with the results reported in Table 4 and 5. We notice a change in the results, where the coefficient for governance is currently positive and statistically significant in model (3). The size coefficient is negative and statistically significant at the 1 % level in model (1) – (4), and (9) – (12). Where BVPS is not included (model (5) – (8)), the coefficient for size is only significant (10 % level) in model (7) with a positive coefficient of 3.204. The coefficient for size is largest in model (2) in which the variables BVPS and social score are included, with a significant coefficient of –20.815. The coefficient for leverage is insignificant in model (1) – (8), in which it is negative in model (1) – (4) and positive in model (5) – (8). However, when including both explanatory variables for financial information, BVPS and EPS in model (9) – (12), the leverage coefficient is positive and statistically significant at the 1 % level. We have an increase in adjusted R^2 from Table 5 in all models which are statistically significant at the 1 % level. The model with the highest explanatory power of 0.627 is model (10), which include the financial variables as well as the social score, board gender diversity and the

control variables size and leverage. The coefficients for environmental score, social score, ESG score and board gender diversity remain unchanged from Table 5, where the coefficients are positive and significant at the 1 % level. Based on the results reported in Table 7, this further strengthens our support for hypothesis 1 and 3, and the partial support of hypothesis 2.

4.4.2 Exclusion of sectors

Following De Klerk et al. (2015), Kaspereit and Lopatta (2016) and Miralles-Quirós et al. (2018) we exclude companies from the finance and insurance sector in the analysis to see whether this has an effect on our results. Removing observations related to these sectors leaves us with 4492 firm-year observations.

Table 8: Regression excluding the finance and insurance sector

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)	Model (10)	Model (11)	Model (12)
BVPS	1.467***	1.468***	1.477***	1.470***					0.876***	0.881***	0.881***	0.879***
	(0.054)	(0.054)	(0.054)	(0.054)					(0.051)	(0.051)	(0.051)	(0.051)
EPS					11.993***	12.001***	12.069***	12.021***	8.274***	8.226***	8.296***	8.265***
					(0.597)	(0.603)	(0.591)	(0.599)	(0.659)	(0.669)	(0.656)	(0.663)
Environmental	0.762***				0.870***				0.466**			
	(0.205)				(0.203)				(0.184)			
Social		1.305***				0.741***				0.737***		
		(0.261)				(0.230)				(0.228)		
Governance			-0.158				-0.205				-0.119	
			(0.178)				(0.167)				(0.146)	
ESG				1.167***				0.860***				0.668**
				(0.327)				(0.285)				(0.277)
Board Gender Diversity	2.173***	1.980***	2.591***	2.038***	1.252***	1.353***	1.734***	1.299***	1.439***	1.352***	1.700***	1.377***
	(0.342)	(0.365)	(0.335)	(0.371)	(0.323)	(0.336)	(0.323)	(0.343)	(0.285)	(0.301)	(0.284)	(0.303)
Constant	-20.735	-49.329***	26.826***	-39.119**	32.058***	39.657***	88.041***	35.323**	-6.469	-20.733*	23.607**	-15.439
	(12.716)	(13.393)	(10.396)	(16.266)	(12.373)	(12.132)	(10.757)	(14.458)	(11.595)	(11.855)	(9.270)	(14.243)
Observations	4,492	4,492	4,492	4,492	4,492	4,492	4,492	4,492	4,492	4,492	4,492	4,492
Adjusted R-squared	0.446	0.450	0.444	0.447	0.498	0.497	0.496	0.497	0.601	0.602	0.601	0.602
F-test	287.3***	349.7***	270.3***	317.1***	190.2***	223.6***	155.3***	199***	260.3***	319.4***	245.2***	279.5***

Notes: This table shows the results obtained for estimates of the regression parameters, excluding observations from the finance and insurance sector. Robust standard errors in parentheses, *** p < 0.01; ** p < 0.05; * p < 0.1 based on two-tailed t-test.

The results in Table 8 are consistent with the results reported in Table 5, even after excluding observations from the finance and insurance sector. We notice that the coefficient for environmental score is currently significant at the 1 % level in model (1) and (5), but only significant at the 5 % level in model (9). Further, the coefficients for the financial variables, social score, ESG score and board gender diversity are all positive and significant at the 1 % level. This is consistent with the results reported in Table 5 and gives us reason to believe that hypothesis 1 and 3 hold when firms from the finance and insurance sector are excluded from the sample. These results again show partially support for hypothesis 2 that the environmental score is more value relevant than the social and governance score. The results reported after

excluding observations from the finance and insurance sector further strengthens the support for hypothesis 1 and 3.

4.4.3 Variables in logarithmic form

We want to test our models using a different functional form of the financial variables, taking the natural logarithm of the price, book value and earnings variable. Following Francis and Schipper (1999), we include this as a robustness test in our analysis.

Table 9: Regression with logarithmic values

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)	Model (10)	Model (11)	Model (12)
BVPS (LN)	0.750***	0.745***	0.753***	0.749***					0.328***	0.326***	0.329***	0.326***
	(0.012)	(0.012)	(0.012)	(0.012)					(0.016)	(0.016)	(0.016)	(0.016)
EPS (LN)					0.774***	0.771***	0.777***	0.773***	0.538***	0.537***	0.538***	0.538***
					(0.011)	(0.011)	(0.011)	(0.011)	(0.016)	(0.016)	(0.016)	(0.016)
Environmental	0.001*				0.002***				0.000			
	(0.001)				(0.001)				(0.000)			
Social		0.004***				0.004***				0.003***		
		(0.001)				(0.001)				(0.000)		
Governance			-0.001				0.001				0.000	
			(0.001)				(0.000)				(0.000)	
ESG				0.003***				0.004***				0.002***
				(0.001)				(0.001)				(0.001)
Board Gender Diversity	0.009***	0.008***	0.010***	0.008***	0.004***	0.004***	0.005***	0.004***	0.005***	0.004***	0.005***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	1.393***	1.252***	1.470***	1.318***	3.121***	3.031***	3.199***	3.038***	2.318***	2.201***	2.334***	2.243***
	(0.060)	(0.059)	(0.056)	(0.063)	(0.039)	(0.039)	(0.036)	(0.044)	(0.050)	(0.051)	(0.048)	(0.054)
Observations	5,307	5,307	5,307	5,307	4,635	4,635	4,635	4,635	4,599	4,599	4,599	4,599
Adjusted R-squared	0.604	0.607	0.604	0.605	0.718	0.721	0.718	0.719	0.771	0.772	0.771	0.771
F test	1591***	1601***	1589***	1596***	1752***	1769***	1676***	1773***	2763***	2777***	2763***	2777***

Notes: This table shows the results obtained for estimates of the regression parameters, with logarithmic transformation of the financial variables Price, Book value per share (BVPS(LN)) and earnings per share (EPS(LN)). Robust standard errors in parentheses, *** p < 0.01; ** p < 0.05; * p < 0.1 based on two-tailed tests.

Table 9 shows that the results stay more or less unchanged when including book value and earnings in their logarithmic form. From Table 9 we see that the number of observations is reduced to 5307 as we can not take the logarithm of negative values or zero. The coefficient for board gender diversity is positive and significant at the 1 % level for all models, indicating a stronger association between ESG scores and stock prices for companies with gender diversity on the board of directors. The coefficients for environmental, social and governance score, as well as the ESG score, all show the same tendencies as in Table 5. The coefficient for governance score is still insignificant, and the coefficients for social score and ESG score are positive and significant at the 1 % level. When including the financial variables in their logarithm form, the coefficient for environmental score is significant at the 1 % level only in model (5), significant at the 10 % level in model (1) and insignificant in model (9). It appears that the environmental score is affected by the transformation of the financial variables and is

less relevant for the stock prices of European companies after the transformation. The results are too weak to strengthen the partial support of hypothesis 2.

We should not directly compare the adjusted R^2 from these models with the ones reported in Table 5, as the variables are no longer the same due to the logarithmic transformation (Wooldridge, 2016, p. 173). However, we see that the adjusted R^2 in model (1) – (12) in Table 9 are all significant at the 1 % level, which further increase our confidence in supporting hypothesis 1 and 3.

4.4.4 Including extreme values

In the next robustness test, we include the extreme values that are identified as outliers and removed from the main analysis. This takes us back to the original number of 5684 firm-year observations. As is evident from Table 10, some of the models are no longer statistically significant. Model (11) is currently the only model that is significant at the 1 % level and has an adjusted R^2 of 0.387. The governance score, with a coefficient of –26.975, is negative and significant at the 5 % level. Further, the coefficient for governance score is significant at the 1 % level in model (3) and 5 % level in model (7). This contradicts the results reported in Table 5 where none of the coefficients for governance score are significant. The ESG coefficient in model (4), (8), and (12) is no longer significant. In addition, the explanatory power of the models reported in Table 11 show a strong reduction from Table 5. This indicates that the extreme observations excluded from our main analysis do have a large effect on the results. Based on this test, we no longer find support for hypothesis 1, 2 or 3.

Table 10: Regression including extreme values

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)	Model (10)	Model (11)	Model (12)
BVPS	1.060*	1.060*	1.057*	1.059*					1.794**	1.794**	1.790**	1.794**
	(0.604)	(0.604)	(0.602)	(0.604)					(0.903)	(0.903)	(0.902)	(0.903)
EPS					0.002	0.001	0.002	0.001	-0.693**	-0.693**	-0.691**	-0.693**
					(0.042)	(0.042)	(0.042)	(0.042)	(0.326)	(0.326)	(0.325)	(0.326)
Environmental	11.224				10.747**				3.938			
	(7.425)				(5.381)				(9.442)			
Social		9.613*				10.785*				4.788		
		(5.271)				(5.554)				(6.461)		
Governance			-37.515***				-47.932**				-26.975**	
			(13.051)				(20.054)				(10.470)	
ESG				-8.216				-13.678				-9.539
				(7.374)				(8.638)				(7.616)
Board Gender Diversity	12.476	14.048	31.282**	21.398*	22.751	23.616	44.986*	33.740*	19.891*	19.869*	31.389**	25.820**
	(10.358)	(10.680)	(14.158)	(12.394)	(16.043)	(16.745)	(24.069)	(20.437)	(12.037)	(11.508)	(12.426)	(12.525)
Constant	-291.718	-190.567	1,981.911***	734.799*	-282.439	-269.313	2,427.564***	994.957***	-274.096	-313.511	1,137.259	423.620
	(414.442)	(297.916)	(642.909)	(388.933)	(424.907)	(378.052)	(799.260)	(380.745)	(363.791)	(272.084)	(696.560)	(338.722)
Observations	5,684	5,684	5,684	5,684	5,684	5,684	5,684	5,684	5,684	5,684	5,684	5,684
Adjusted R-squared	0.228	0.228	0.230	0.228	0.000164	0.000168	0.00369	0.000161	0.385	0.385	0.387	0.385
F-test	2.167*	2.501*	3.733**	1.287	1.666	1.844	2.866**	1.161	2.842**	2.988**	4***	1.627

Notes: This table shows the results obtained for estimates of the regression parameters including extreme values of Price, Book value per share (BVPS) and Earnings per share (EPS). Robust standard errors in parentheses, *** p < 0.01; ** p < 0.05; * p < 0.1 based on two-tailed t-test.

4.4.5 Panel data techniques

The results obtained from the panel data and GLS regression is shown in Table 11. Panel A show the panel data regression with fixed effects. The results show that the coefficients for BVPS, EPS, board gender diversity, environmental, social, governance, and ESG score are significant in all models. The coefficient for governance score is significant at the 1 % level in model (7), and at the 5 % level in model (3) and (11). The coefficients for governance score in model (3), (7) and (11) are –0.354, –0.487 and –0.384, respectively. This contradicts the main analysis in Table 5, Panel A and B, which shows that the coefficient for governance is insignificant. According to the results in Table 11, Panel A, governance score has a negative effect on company stock price. All other relations remain qualitatively unchanged from the main analysis. We find the highest measure for overall R^2 in model (9) – (12) with 0.508 in model (9), 0.513 in model (10), and 0.510 in model (11) and (12). These measures are significance at the 1% level in all models. Panel B shows the results obtained from the feasible GLS regression. The coefficients in Panel B have approximately the same values as the ones presented in Table 5 and are significant at the 1% level.

Table 11: Panel data techniques

	Panel A: Panel data data regression parameters - Fixed Effects											
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)	Model (10)	Model (11)	Model (12)
BVPS	1.561***	1.565***	1.579***	1.569***					1.316***	1.320***	1.332***	1.325***
	(0.038)	(0.038)	(0.037)	(0.038)					(0.038)	(0.038)	(0.038)	(0.038)
EPS					4.470***	4.472***	4.512***	4.476***	2.940***	2.940***	2.948***	2.939***
					(0.151)	(0.151)	(0.151)	(0.151)	(0.141)	(0.141)	(0.141)	(0.141)
Environmental	1.136***				1.774***				1.108***			
	(0.222)				(0.238)				(0.212)			
Social		0.836***				1.454***				0.798***		
		(0.213)				(0.228)				(0.203)		
Governance			-0.354**				-0.487***				-0.384**	
			(0.159)				(0.171)				(0.152)	
ESG				0.903***				1.646***				0.816***
				(0.294)				(0.316)				(0.281)
Board Gender Diversity	2.798***	2.901***	3.186***	2.840***	4.211***	4.346***	4.831***	4.228***	2.573***	2.677***	2.963***	2.631***
	(0.242)	(0.240)	(0.242)	(0.249)	(0.255)	(0.253)	(0.254)	(0.263)	(0.232)	(0.230)	(0.232)	(0.238)
Constant	-87.760***	-68.346***	-5.918	-70.001***	-19.548	2.799	107.248***	-3.593	-83.722***	-63.864***	-2.128	-62.966***
	(14.163)	(13.191)	(9.463)	(16.708)	(15.089)	(14.028)	(9.590)	(17.891)	(13.534)	(12.608)	(9.044)	(15.973)
Observations	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354
Overall R-squared	0.425	0.429	0.426	0.427	0.356	0.369	0.383	0.369	0.508	0.513	0.510	0.510
F-test	808.9***	803.5***	798.1***	800.4***	494.3***	487.9***	473.6***	481.9***	773.3***	768.4***	764.6***	765.5***

	Panel B: Panel data data regression parameters - FGLS											
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)	Model (10)	Model (11)	Model (12)
BVPS	1.341***	1.341***	1.346***	1.342***					0.753***	0.756***	0.756***	0.755***
	(0.022)	(0.022)	(0.022)	(0.022)					(0.023)	(0.023)	(0.023)	(0.023)
EPS					11.473***	11.460***	11.512***	11.481***	8.001***	7.955***	8.007***	7.992***
					(0.162)	(0.161)	(0.161)	(0.162)	(0.181)	(0.181)	(0.181)	(0.181)
Environmental	0.478***				0.623***				0.341**			
	(0.177)				(0.166)				(0.152)			
Social		1.161***				0.784***				0.789***		
		(0.175)				(0.165)				(0.150)		
Governance			-0.237				-0.154				-0.175	
			(0.169)				(0.159)				(0.145)	
ESG				0.844***				0.739***				0.570***
				(0.228)				(0.214)				(0.195)
Board Gender Diversity	1.606***	1.368***	1.916***	1.485***	0.910***	0.896***	1.259***	0.902***	0.946***	0.796***	1.169***	0.874***
	(0.278)	(0.274)	(0.272)	(0.281)	(0.262)	(0.258)	(0.256)	(0.265)	(0.239)	(0.235)	(0.233)	(0.241)
Constant	6.363	-29.221**	42.589***	-10.693	47.983***	40.453***	88.621***	44.196***	12.636	-10.648	38.783***	2.142
	(11.731)	(11.495)	(10.257)	(13.426)	(10.952)	(10.698)	(9.495)	(12.542)	(10.045)	(9.863)	(8.780)	(11.502)
Observations	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354	5,354
Chi2	3998***	4062***	3989***	4009***	5255***	5272***	5229***	5251***	7404***	7458***	7396***	7412***

Notes: This table shows the results obtained for estimates of the panel data regression parameters. Panel A shows the results using a Fixed Effects method. Panel B shows the results obtained using a GLS estimation method. Standard errors in parentheses, *** p < 0.01; ** p < 0.05; * p < 0.1 based on two-tailed tests. Overall R-squared represents a weighted average of the variance in the model.

We conclude that our results are robust even when performing different statistical methods. Conducting a regression with fixed effects, we obtain the same results as reported in the main analysis, and we see that the significance, size and sign of key variables remain unchanged. We receive the same results when performing a feasible GLS regression that is consistent against both autocorrelation and heteroskedasticity. These results indicate that we have a proper model that holds for our analysis.

4.5 Further discussion of main results

Table 12 shows the summarized results of our hypotheses which are based on the regression results. In addition, the robustness tests we conduct generally yield the same results, and we see that our analysis is robust for different statistical methods. We find support for hypotheses 1, 3 and 4 by analyzing the regression results presented in Table 4, 5 and 6. Furthermore, we partially support hypothesis 2 as the environmental score is positive and significant which indicates that it is value relevant for stock price. Based on the support of these hypotheses, we may conclude that ESG is value relevant for stock prices in Europe. As shown in Table 11 Panel A, the coefficient for governance is significant and negative when applying a panel data with fixed effects method. This may imply that the statistical method used has some effect on the results obtained.

Table 12: Summarized results of our hypotheses

Models	Hypothesis		Conclusion
Price model 1 & 2	H1	*Higher ESG score are associated with higher stock prices.*	Accept
Price model 2	H2	*The Environmental score is more value relevant than the Social and Governance score.*	Partially accept
Price model 3	H3	*The association between high ESG score and stock prices is stronger among companies with a high percentage of female representatives on board.*	Accept
Price model 4	H4	*The association between high ESG scores and stock prices is stronger among companies operating within sensitive industries.*	Accept

Notes: This table shows the results of the four hypotheses.

From the shareholder perspective, a focus on ESG can create conflicts as this might not be in the best interest of the shareholders due to increased costs. The shareholder theory implies that ESG investments are solely a cost for shareholders. Further, managers should only spend company funds on investments that are in line with the shareholder's interest, which is profit maximization. On the other hand, the stakeholder theory believes ESG to be value enhancing for both the company and their stakeholders. Companies will be rewarder for their engagement in ESG through value creation where shareholders experience increased share prices and stakeholders reek benefits from a more sustainable business. As expected, we find that ESG performance is value relevant and positively associated with stock price, which is consistent with the stakeholder theory. These findings suggest that companies with a high ESG score are valued by stakeholders and that ESG investments leads to value creation.

5 Conclusion

In this section we conclude our study and highlight some policy implications this study might address. In addition, we suggest areas for further research on this topic and stress some limitations of our research.

5.1 Conclusion

The purpose of this study is to analyze and answer the research question: *Is ESG performance value relevant for stock prices in European listed companies, and does board gender diversity affect the value relevance of ESG on stock prices?*

We aim to provide a broader perspective on the value relevance of ESG by applying the Ohlson price model. This allows us to investigate the association between ESG performance and stock prices in Europe. Further, we study whether the individual ESG scores and board gender diversity have an effect on stock prices. Lastly, we examine companies in environmentally sensitive industries to see if they have a stronger association between ESG scores and stock prices than non-sensitive industries. Our results are used to evaluate which of the two main economic theories *shareholder theory* vs. *stakeholder theory*, best explains the position of ESG in today's financial markets. Based on our findings, we dismiss the idea that ESG is solely a cost for companies and shareholders. We find that ESG performance does enhance value for both shareholders and the corporation, which is in line with the stakeholder theory. We conclude that ESG performance is value relevant for the European companies in our data set.

5.2 Policy implications

The positive association between ESG and stock prices might be a reflection of the increasing pressure from international organizations to focus on sustainability. This study shows that it is beneficial for stakeholders to invest in companies that focus on ESG, as this yields a higher stock price. Companies should integrate ESG in their business and operate sustainably, as this may prosper a potential advantage in the financial markets due to more investor interest. Furthermore, operating responsible and being proactive towards ESG relations can affect and

improve the company's image and reputation. Lastly, these results imply that the government should motivate organizations to invest in ESG and operate more sustainable.

5.3 Further research

We would find it interesting to study only the best ESG performers, to see whether ESG is still value relevant for stock prices among countries ranked as the best on sustainability. Among the well over 2600 European companies that Thomson Reuters Eikon provide data for in their database, approximately 800 of these have sufficient data of ESG for the years we investigate. Future research on ESG in Europe may use other indexes such as the Dow Jones Sustainability Eurozone Index or FTSE4Good Europe Indexes to provide a broader data set where more companies are represented. We recommend investigating whether there is a two-way relationship between ESG score and firm value. This would involve looking at a company's financial performance in terms of return on assets (ROA) to see whether higher financial performance leads to more investments in ESG and consequently higher scores. Lastly, we believe that studying ESG over time, and especially after the Paris Agreement was signed in 2015, can provide some interesting research.

5.4 Limitations

Seeing as it takes time before there is an apparent effect on firm value from the implementation of ESG, we could have included more control variables, e.g. research and development (R&D) and life cycle in our study. These variables reflect companies' innovation and progression over time. Further, testing for stock prices three months after year end, which is done in many studies (De Klerk et al. (2015); Miralles-Quirós et al. (2018)), is recommended to be sure that all relevant information is captured in the stock price. This is not controlled for in our study. Another variable not controlled for in our study is country. From our data set we see that there is an uneven distribution of observations per country as the UK is represented with more than 1800 firm-year observations and Cyprus with 3. The uneven distribution may have an effect on the results.

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Appendix

Appendix 1: List of sectors

Sector name	Sector code	Sensitive	Number of observations
Information	51	0	438
Finance and Insurance	52	0	862
Other Services (except Public Administration)	81	0	20
Retail Trade	44	0	249
Wholesale Trade	42	0	125
Utilities	22	0	229
Real Estate and Rental and Leasing	53	0	309
Professional, Scientific, and Technical Services	54	0	233
Health Care and Social Assistance	62	0	21
Arts, Entertainment, and Recreation	71	0	21
Accommodation and Food Services	72	0	109
Manufacturing	31	1	1845
Construction	23	1	222
Transportation and Warehousing	48	1	193
Mining, Quarrying, and Oil and Gas Extraction	21	1	325
Administrative and Support and Waste Management and Remediation Services	56	1	153

NAICS Sector Name	NAICS Sector Code	Obs	Mean ESG	Min ESG	Max ESG	Mean E	Mean S	Mean G	Mean BGD
Accommodation and Food Services	72	109	0.61	0.29	0.86	0.68	0.68	0.44	0.22
Admin., Support and Waste Man.	56	154	0.61	0.31	0.88	0.64	0.64	0.53	0.27
Arts, Entertainment, and Recreation	71	21	0.53	0.30	0.77	0.53	0.54	0.50	0.14
Construction	23	222	0.60	0.24	0.89	0.68	0.64	0.47	0.18
Finance and Insurance	52	862	0.59	0.13	0.93	0.66	0.57	0.53	0.22
Health Care and Social Assistance	62	21	0.59	0.40	0.87	0.66	0.60	0.50	0.14
Information	51	438	0.61	0.16	0.96	0.64	0.65	0.54	0.22
Manufacturing	31	1851	0.61	0.08	0.95	0.65	0.64	0.53	0.21
Mining, Quarrying, and Oil and Gas Extraction	21	324	0.58	0.13	0.92	0.58	0.57	0.58	0.17
Other Services (Except Public Administration)	81	20	0.47	0.30	0.59	0.50	0.4	0.53	0.20
Professional, Scientific, and Technical Services	54	233	0.59	0.20	0.93	0.65	0.60	0.51	0.22
Real Estate and Rental and Leasing	53	316	0.57	0.15	0.92	0.65	0.56	0.49	0.18
Retail Trade	44	251	0.60	0.25	0.95	0.67	0.61	0.50	0.23
Transportation and Warehousing	48	193	0.62	0.31	0.89	0.67	0.66	0.51	0.19
Utilities	22	229	0.61	0.14	0.84	0.65	0.65	0.51	0.22
Wholesale Trade	42	125	0.52	0.22	0.84	0.56	0.51	0.49	0.19

Appendix 2: List of countries

Country	Membership	Ranking Robeco	ESG Score	BGD	Number of observations
Austria	EU	15	57.29	19.27	84
Belgium	EU	18	53.44	21.32	148
Cyprus	EU	N/A	75.39	33.33	3
Czech Republic	EU	22	52.12	10.36	28
Denmark	EU	2	55.91	22.33	161
Finland	EU	4	61.15	29.18	175
France	EU	17	66.80	32.28	512
Germany	EU	12	62.34	19.71	433
Greece	EU	41	52.63	11.31	95
Hungary	EU	35	63.24	9.95	28
Ireland	EU	9	57.60	17.08	163
Italy	EU	27	57.88	23.00	256
Luxemburg	EU	13	56.77	13.71	40
Malta	EU	N/A	34.02	3.17	7
Netherlands	EU	7	61.83	20.93	198
Norway	EFTA	5	61.57	42.47	109
Poland	EU	31	45.07	14.48	155
Portugal	EU	26	68.52	10.12	54
Spain	EU	24	65.52	16.00	271
Sweden	EU	1	63.05	32.12	304
Switzerland	EFTA	3	57.85	12.39	320
United Kingdom	EU	11	58.77	18.35	1810

Appendix 3: Results from tests in STATA

Variance inflator factor (VIF)

Variable	VIF	1/VIF
eps	1.53	0.651727
bvps	1.53	0.655228
bgd	1.13	0.881169
esg	1.13	0.882312
Mean VIF	1.33	

White and Breusch-Pagan test for heteroskedasticity

```
White's test for Ho: homoskedasticity
         against Ha: unrestricted heteroskedasticity

         chi2(35)      =    2147.94
         Prob > chi2   =     0.0000

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of p

         chi2(1)       = 11680.84
         Prob > chi2   =    0.0000
```

Hausman test

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
bvps	1.324606	1.166761	.1578453	.0236596
eps	2.938507	3.593861	-.6553534	.0208622
esg	.8155587	.7333974	.0821613	.1380488
bgd	2.630514	2.463506	.167008	.0729408

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 1002.25
Prob>chi2 = 0.0000

Scatter plot against residuals