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Impacts of board characteristics on ESG performance in the industrial sector

A quantitative study with evidence from Scandinavia

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Abstract

We examine the impacts of board characteristics like board size, board independence, board gender diversity, and audit committee expertise on the environmental, social and governance (ESG) performamces of industrial companies in the four Scandinavian countries. The data on board characteristics and reported ESG scores is retrieved from the LSEG Eikon database. The sample comprises data for 150 industrial companies from Denmark, Finland, Sweden and Norway over the time period 2019-2022. Results for fixed-effects panel data regressions show that board gender diversity and board independence have a positive and significant relationships with ESG performance, while we did not find any significant effects of board size and audit committee expertise on ESG performance.

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1. Introduction

The industrial sector plays an important role in the economic development of a country. However, this sector receives much criticism for its impacts on the environment and lack of corporate social responsibility. The industrial sector is one of the sectors with the highest carbon emissions, and the most energy usage (Energi og Klima, 2022). Environmental changes are being widely discussed, and researchers around the world agree that these changes are due to human-made carbon emissions (U.N. Cooperation, 2024). To deal with this issue and avoid criticism, companies are using sustainability reporting to show their commitment to environmental, social, and governance issues. Moreover, investors are using sustainability performance along with financial reporting to make their long-term investments in the industrial sector.

ESG, which stands for Environmental, Social, and Governance, is known as the three pillars of sustainability. ESG performance measures how well a business meets its set criteria of environmental, social, and governance values (KnowESG, 2023). Some claim that the businesses that perform strongly across all three factors of ESG, outperform the market and generate longer-term value (ICAEW, n.d). ESG reporting presents both pros and cons for businesses. For example, it creates long-term opportunities, minimizes risk, and guarantees sustainable returns and substantial growth. On the other hand, ESG reporting can sometimes be deceptive as businesses can report wrong information (Forlee, 2023). The Global Reporting Initiative has created the most widely used standard for sustainability reporting which contributes to more credible, comprehensive, transparent, and clear reporting (Englund, n.d.). ESG agencies having special competencies can be hired to calculate the overall ESG score of a company. The three elements are measured separately to form a total ESG score.

An increasing number of companies are incorporating ESG principles into their strategic planning and operative activities, leading to several benefits. Firstly, it makes it easier to set sustainability-related goals and measure the improvements later (Oprean-Stan et al., 2020). The implementation leads to transparency showing both good and bad aspects of the company, and improves the stakeholders' trust. Nowadays, investors prioritize a company with a better ESG performance because of its impact on return on investments (Amel-Zadeh

& Serafeim, 2018). They want to invest in businesses that have better ESG policies and strategies and avoid those involved in practices like huge carbon emissions, bad labor policies, and other litigations, etc. Therefore, a company with a high ESG score can attract several investors and have better access to capital (Chen & Xie, 2022; Bissoondoyal-Bheenick et al., 2023). This also leads to a competitive advantage as ESG scores can be used for comparing companies (Rabaya & Saleh, 2022; Dkhili, 2023). Various studies have been conducted to analyze the effects of ESG performance on firm performance. The majority have found a positive correlation (Pulino et al., 2022; Ahmad et al., 2021; Albitar et al., 2020; Cek & Eyupoglu, 2020). However, some researchers have also found a negative correlation (Sadiq et al., 2020; Buallay, 2019).

The practice of non-financial reporting has a long history. It was not legally binding earlier, and companies could voluntarily decide to include social and environmental information in their annual reports (Monciardini et al. 2020). The term ESG was first recognized in 2004 in a report called "*Who Cares Wins*" under the UN Global Compact (Sustainability in Business, 2024). Non-financial reporting became more popular after the Financial Crisis of 2008. The European Union has been working on regulations that require larger companies to disclose non-financial information. This involved the implementation of the Non-Financial Reporting Directive (NFRD) in 2014, and its replacement by the Corporate Sustainability Reporting Directive (CSRD) in 2023 (European Commission, n.d.). The implementation of CSRD has led to stricter reporting requirements compelling more companies to disclose their ESG policies.

Implementing ESG requires a lot of effort from the board of directors. On the one hand, they have a responsibility to make ESG strategies and policies that increase the business's financial value. On the other hand, they must provide good corporate governance to ensure that the business runs responsibly and efficiently. The importance of corporate governance is well illustrated by corporate scandals such as "*WorldCom*" (Lyke & Jickling, 2002) and "*Volkswagen emissions scandal*" (Crête, 2016). Several corporate scandals led to the creation of the Sox Act in 2002, contributing to better corporate governance, auditing practices, and confidence in financial information (Kenton, 2022).

Corporate governance has been extensively researched for many years and the focus has often been on the board of directors' composition. Various studies have been conducted to measure the impact of board characteristics on business aspects like financial performance,

quality of financial reporting, monitoring, etc. Tan and Taufiik (2022) discovered a positive impact of board size on Financial Reporting Quality (FRQ), while the results were the opposite for a study conducted by Rodríguez-Fernández (2015). Board independence positively affects earning management and FRQ (Alves, 2014; Porter & Sherwood, 2023). Campbell et al. (2008) and Agyemang-Mintah and Schadewitz (2019) argue that financial performance and firm value are affected positively by gender diversity.

Recently, there has been a greater focus on sustainability-related studies, exploring the effects of board characteristics on ESG performance. In their respective studies, Gurol and Lagasio (2023) and Khaireddine et al. (2020) have concluded that board size, gender diversity, and board independence influence ESG performance positively. Husted and Milton de Sausa-Filho (2019) support the positive effects of board size and independence but disagree with the positive impact of gender diversity.

We study the effects of board characteristics on ESG performance by looking at variables such as board size, board gender, board independence, and the audit committee's expertise. The study is limited to the industrial sector in Scandinavia, and will eventually benefit the companies which are already reporting on ESG as well as provide guidance for new ones. The importance of ESG is undoubtedly increasing, and improved ESG performance and higher scores can be advantageous for companies.

The study will contribute to the existing literature on the association between corporate governance and ESG performance. To date, there is a shortage of research conducted on this specific subject in Scandinavian countries. Two studies have been found exploring the effects of board characteristics on ESG performance; One in Norwegian listed companies (Solem & Islek, 2022), And the other in Scandinavian countries (Grannes, 2023). Other studies have explored the effects of individual board characteristics on ESG performance. For example, the effects of the audit committee's expertise on ESG (Dohnalova & Rozsolova, 2023) and the effect of female leadership on ESG (Yahya, 2023). A few studies have found a relationship between board characteristics/composition on ESG and financial performance (Kammen & Wikan, 2021; Johansen et al., 2021; Kao & Saari, 2019).

To examine the research question, fixed-effects regression analysis is conducted on a sample of 150 Scandinavian industrial companies. The dataset consists of 519 observations from the period 2019-2022.

The structure of the study is as follows: Institutional and theoretical background and examination of relevant literature is conducted in section 2; Section 3 elaborates on the research methodology; Section 4 deals with the presentation of results which are then analyzed in section 5; Finally, the article presents recommendations for further studies.

2. Background and Empirical literature

This section discusses the institutional and theoretical backgrounds as well as the empirical literature on the topic. The institutional background consists of the explanation of ESG policies in our sample countries, while the theoretical background explains the responsibilities of the board of directors to implement and disclose the ESG policies in the annual reports. The empirical literature review gives an insight into the results of the earlier research.

2.1 Institutional Background

The sample consists of industrial firms listed on stock exchanges in Denmark, Sweden, Norway, and Finland. These Nordic countries share the same environment, traditions, culture, law, corporate governance practices, etc. (Grannes, 2023) which leads to similarities in practices in different arenas.

Nordic countries stand out for their consistently high sustainability performance as compared to other countries (Khatri, 2023). These countries stand higher on the GSCI (Global Sustainable Competitiveness Index) and are famous for their welfare policies. Employees' well-being, social inclusion, and gender equality are some examples of welfare policies (Grannes, 2023). These four countries are among the countries having the highest female board participation. According to the BoardEx Gender Balance Report, Norway has 40%, Sweden and Finland 37%, and Denmark 36% women participation on boards (Goldberg, 2021).

While Denmark, Sweden, Finland and Norway may have differences in their corporate governance policies, they share similarities when it comes to sustainability, and ESG reporting (Grannes, 2023). These similarities of Nordic countries provide the basis for choosing a sample from these countries and analyzing the effects of board characteristics on ESG performance.

2.2 Theoretical Background

In previous studies, various organizational theories have been used to explain the impact of corporate governance on ESG performance e.g., agency theory, stewardship theory, resource dependence theory, stakeholder theory, legitimacy theory, and signaling theory (Bamahros et al., 2022; Younas, 2022; Del Gesso & Lodhi, 2024). Some theories are applied to explain the effects of board compositions, and gender diversity on financial and non-financial performance, while others explain the effects of board independence and the audit committee's expertise, CEO duality, etc. The theoretical foundation of this study is based on agency theory and stakeholder theory.

2.2.1 Agency theory

Agency theory is used to explain and resolve issues in the relationship between principals, who are the shareholders, and agents, who manage the company (Kopp, 2023). Due to the separation of ownership and control, there can arise information asymmetry, and moral hazards (Panda & Leepsa 2017). One example of an agency problem is executives' compensation (Bebchuk & Fried, 2003). The management (agents) may want to increase executive compensation which the shareholders (principals) can refuse to do. Moreover, the principals may want their organizations to pay out dividends in case of higher profits, while the agents may prefer to invest this profit in assets (Dohnalova & Rozsolova, 2023). These kinds of conflicts between principals and agents increase inefficiency and agency costs.

The board of directors plays an important role in mitigating the agency's problems (Miller 2002; Dalton et al., 2007; Dohnalova & Rozsolova, 2023). The board of directors, being the representative of the principals, formulates efficient policies and strategies, and monitors financial and non-financial performance of the executives, which in return reduces agency problems. In earlier empirical studies, board characteristics have been used to examine its effect on reducing agency problems and measuring the financial and non-financial performance of the businesses. Agency theory is, therefore, very relevant to measure board characteristics' impact on ESG performance.

2.2.2 Stakeholder theory

Stakeholder theory refers to management's responsibility to create value for every stakeholder, individual or group, affected by a business besides shareholders (Dmytriyev & Freeman, 2023; Freeman & Reed, 1983; Freeman, 2010). These stakeholders include employees, creditors, banks, customers, suppliers government etc. Since management enjoys much freedom, they may have either focus on expanding the business or ultimately creating value for only shareholders. They can ignore the interests of other parties. Stakeholder theory demands that board of directors coordinate the interests of all stakeholders and control the management (Freeman & Reed, 1983; Grannes, 2023).

Stakeholder theory has been used to evaluate different aspects of a business; firm performance, financial performance, and non-financial performance e.g ESG performance (Bosse et al., 2009; Wang & Sengupta, 2016; Van der Laan et al., 2008; Kumar, 2023). Since the board of directors has the responsibility to provide transparent information about ESG policies and performance to stakeholders, the stakeholder theory is relevant for this study to measure the effects of board characteristics on ESG performance.

2.3 Empirical literature

A detailed empirical literature review is conducted to choose appropriate board characteristics for this study. In the light of existing literature, characteristics like board size, board independence, gender diversity, and audit committee expertise are chosen. Following is the review of these factors.

2.3.1 Board Size (BRDSIZE)

A board of directors is elected by the shareholders, and its main duties involve formulating strategies, monitoring management activities, and protecting the interests of all stakeholders, especially in companies listed on the stock exchanges (Chen, 2023). Meanwhile, the number of board members can also affect the board's performance.

The relationship between board size and ESG performance has been examined in various studies. For example, a significant positive effect of board size on integrated reporting quality is reported by Chouaibi et al. (2021) in a panel data study of 253 European-listed companies

between 2010 and 2019. Similarly, Naseem et al. (2017) and Husted and Milton de Sousa-Filho (2019) found supporting evidence in their respective studies in Pakistan and Latin America. Birindelli et al. (2018) observed a positive relationship between board size and ESG in 108 European and U.S.-listed banks from 2011-2016, which is consistent with a more recent study conducted by Gurol and Lagasio (2023). Khaireddine et al (2020) have, on the other hand, discovered that board size only has a positive effect on environmental performance.

Other studies have discovered a negative relationship between board size and ESG. Githaiga and Kosgei (2023) examined 79 publicly listed firms from East Africa between 2011 and 2020 and confirmed the significant negative influence of board size on sustainability reporting. The claim is supported by Thirumagal et al. (2023). However, Nuhu and Alam (2023) have a neutral view, finding no relationship between board size and ESG in the energy sector. Popov and Makeeva (2022) suggest that larger boards represent the interest of a large proportion of stakeholders, but also lead to worse decision-making and controlling processes.

2.3.2 Board Gender diversity (BRDGEN)

Gender diversity is referred to as the percentage of female members on the board of directors. Despite the proportion of women on boards is growing, there are still only 19.3 percent of women who are board representatives in limited companies in Norway (Ziade & Fjærli, 2023). On the other hand, women in listed companies have been at least 40 percent since the implementation of the female quota in 2003 (Stranden, 2022). The study aims to find out if a higher percentage of women on the board affects ESG.

According to multiple studies, having gender diversity on boards has a positive impact on ESG (Nuhu & Alam, 2023; Gurol & Lagasio, 2023; Alkhawaja et al., 2023). More women on the board leads to diversity and variation in opinions (Bhatia & Marwaha, 2022). Khaireddine et al. (2020) suggest that this positive impact on ESG is because women behave more responsibly and are more concerned about the environment than men. Moreover, Arayssi et al. (2020) argue that women on the board have a positive effect on social responsibility. A study of 201 Norwegian firms has found that boards with women representation have higher effectiveness, lower levels of conflicts, and higher quality of board development activities (Nielsen & Huse, 2010). In addition, Githaiga and Kosgei (2023) and Chouaibi et al. (2021)

claim that board gender diversity has a positive and significant effect on sustainability reporting. This is supported by Baalouch et al (2019), who state that the presence of female members on the board has a positive and significant influence on the quality of environmental information. A study of 108 European and U.S.-listed banks from 2011-2016 conducted by Birindelli et al. (2018), found that board gender diversity is positively related to ESG, but only up to a certain degree. In contrast, Khatri (2023) argues that at least 30 percent of the board needs to be women to have a significant effect on sustainability performance.

Although having women on boards has been widely acknowledged to have a positive impact, there have been studies indicating potential negative effects. One example is the research conducted by Husted and Milton de Sausa-Filho (2019), which discovered a negative correlation between women on boards and ESG disclosure among companies based in Latin America. This may be due to the differences in corporate governance in this region compared to the rest of the world. Thirumagal et al. (2023) and Manita et al. (2018) have a more neutral perspective. Mantita et al. (2018) did not find any significant relationship between board gender and ESG disclosure, while Thirumagal et al. (2023) claim that women on boards do not affect environmental and social factors, but do have a significant positive impact on governance factors.

2.3.3 Board Independence (BRDIND)

Board independence is considered an important characteristic from a stakeholder's point of view. Agency problem makes it necessary that shareholders select non-executive directors to the governance body. These directors can act as representatives of all stakeholders and protect their interests (Fuzi et al., 2016).

A great deal of research has been done on how board independence affects various aspects of a company, such as firm performance, firm compliance with regulations, and ESG performance. Arayssi et al. (2020) examined publically listed companies in GCC countries between 2008 and 2017 and deduced that board independence has a positive impact on ESG disclosures. Thirumagal et al. (2023), Popov et al. (2022), Chouaibi et al. (2021) and Khaireddine et al. (2020) support the claim. However, the study conducted by Birindelli et al. (2018) disagrees with the claim in the banking industry. By looking at 108 European and U.S.-

listed banks from 2011 to 2016 they found that board independence has a negative relationship with ESG performance.

2.3.4 The audit committee's expertise (AUEXP)

The audit committee's expertise is referred to the firm-specific knowledge and skills of the committee members, and is measured by an indicator (dummy) variable: TRUE or FALSE. LSEG EIKON describes the eligibiltity criterias for the audit committee's expertise as follows: "*The committee must have minimum three members, and at least one member must be a financial expert within the meanings of Sarbanes-Oxley.*"

In early literature, this variable has been used to measure how audit committee expertise affects companies, like its relation with financial performance, financial reporting quality, audit quality, etc. For example, Chaudhry et al. (2020) examined the impact of the financial expertise of audit committees on financial performance in 50 non-financial firms in Pakistan, and the results showed that financial expertise influence positively on ROA, ROE, and profit margins.

As far as ESG performance is concerned, we could not find much evidence of the impact of audit committee expertise on ESG performance. Velte (2023) reviewed 68 archival studies of the impact of audit committee expertise on non-financial reporting performance in European firms. He stated that financial expertise has a significant effect on non-financial reporting. This result is supported by Pozzoli et al. (2022) and Waterstraat et al. (2021). Pozzoli et al. (2022) conducted a panel analysis of firms listed in 13 member states of the European Union and deduced a positive effect of board expertise on ESG disclosure. Weserstraat et al. (2021), in the same way, concluded in their study that there is a significant relationship between the sustainability expertise of the audit committee and ESG ratings of EURO STOXX Banks 30. These results are further supported by the studies of Dohnalova and Rozsolova (2023) and Solem and Islek (2022) in their respective studies of publicly listed firms in Scandinavian and Norwegian companies. Furthermore, audit committee attributes positively affect the quantity of ESG disclosure. However, Buallay and AlDhaen (2018) examined 59 listed banks during the period from 2013 to 2017 in GCC (gulf countries). The results showed that the financial expertise of the audit committee's expertise has a negative and significant impact on sustainability reports.

3. Research methodology

The following part explains the sample selection from LSEG Eikon, different research designs, and the choice of the research methodology in this study.

3.1 Sample selection and Data source

The sample consists of 150 listed companies from Norway, Sweden, Denmark, and Finland. The data is collected from LSEG Eikon Datastream. Eikon has been used extensively to collect data in previous studies. Both ESG scores and accounting data are collected from LSEG Eikon.

LSEG Eikon Datastream initially provides data for 343 listed industrial firms, but only 150 firms have available data on ESG scores. The collected data consists of 604 observations for these 150 firms between 2019-2022. After removing entries with missing data, the dataset is reduced to 519 observations, resulting in an unbalanced dataset.

3.2 Research design

When analyzing numerical data, a quantitative approach is used to identify patterns and trends through statistical methods (Therkildsen & Abdellaue, 2023). The regression model is the most commonly used statistical tool to find the causation between different variables. In this study, we will use the multivariate regression model to identify the effects of several different independent variables (board Size, board independence, board gender equality, and the audit committee's expertise) on the dependent variable ESG performance.

A panel-data regression is used to measure causation between variables. In this case, we have panel data since the dataset consists of the ESG score of the same industrial companies(i) over 4 years (t).

There are three common types of panel-regression models: Pooled ordinary least squares (POLS), Fixed-effects model, and Random-effects model.

Pooled OLS is a model that pools all the observations together into a simple regression model and uses OLS regression (Hasan et al., 2022). The model does not account for cross-sectional variation and time-series effects of the data which results in a single intercept for all

the companies. In other words, the model is perfect if the variables are homogeneous, and do not correlate with each other.

On the other hand, the fixed-effects model allows heterogeneity and considers cross-sectional variations. The model assumes that each entity has traits that can influence the dependents and/or independent variables (Shamim, 2018). Fixed-effects model has three different types: 1. Fixed-effects within groups (WG); 2. Fixed-effects first difference (FD); 3. Fixed-effects least squares dummy variables (LSVD). Within-group and first differences solve heterogeneity problems by excluding unobserved effects, while the least square dummy variables model handles the problem by adding dummy variables (Shamim, 2018).

Contrary to the fixed-effects model, the random-effects model considers that the unobserved effect is not correlated with any independent variables and the average of the unobserved effects is zero (Shamim, 2018). In addition, the sample is assumed randomly selected from the population.

3.2.1 Choice of method

To determine the appropriate model for the study, a Breusch-Pagan/Cook-Weisberg test is conducted (see appendix for results) after performing the Pooled regression model. The test shows that the p-value is less than 0.05, which demonstrates the presence of heteroscedasticity in the model. In this situation, both the fixed-effects model and random-effects models are better options than the Pooled regression model.

Autocorrelation is a common problem in time series studies. Durbin Watson is normally used to test this, but this test does not work with panel data (Mehmetoglu & Jakobsen 2017, p. 233). Instead, we use a program created by Drukker to test the serial correlation (see appendix for results). In this test, the null hypothesis of the model having no autocorrelation is rejected. It can, therefore, be concluded that POLS will not be a suitable option for this study.

The Hausman test is then applied to choose the appropriate model between the fixed-effects and the random-effects model (see appendix for results). The test assumes that if the p-value is less than 0.05 as in this case, the fixed-effects model would be appropriate.

The fixed-effects model has been selected for this study because it ensures that the chosen explanatory variables are the only ones that affect the results. In the fixed-effects model, the intercept absorbs time-invariant explanatory variables (Mehmetoglu & Jakobsen, 2017, p. 251). This implies that differences between companies that are constant over time are not taken into account. These differences may include unobservable variables such as culture, management style, strategy, and country. This model is appropriate if the individual differences between companies are not correlated with the factors that we are trying to explain (Wooldridge, 2016, p. 450). Additionally, the idiosyncratic errors must be serially uncorrelated (Wooldridge, 2016, p. 450). This means that an error in one year does not affect errors following years.

In the fixed-effects model, companies are compared with themselves over time, and it is possible to find correlations between the independent and dependent variables even if there are not the same number of observations for the different companies. We have an unbalanced panel, but estimating the fixed-effects model is not much more problematic with an unbalanced panel than with a balanced panel (Wooldridge, 2016, p.440).

3.3 Models' specification

The following model is created to find the causation between board characteristics and ESG performance based on the fixed-effects model:

$$ESG_{it} = \beta_0 + \beta_1 BRDSIZE_{it} + \beta_2 BRDGEN_{it} + \beta_3 BRDIND_{it} + \beta_4 ACEXP_{it} + \beta_5 SIZE_{it} + \beta_6 ROA_{it} + \beta_7 LEV_{it} + (c_i + e_{it})$$

ESG score (ESG) is the dependent variable, while Board Size (BRDSIZE), Board Independence (BRDIND), Board Gender Diversity (BRDGEN), and the Audit Committee's Expertise (ACEXP) are used as the independent variables. Firm Size (SIZE), Return on total assets (ROA), and Leverage (LEV) are used as control variables.

3.4 Variable Measurement

This section discusses the measurements of the dependent variables, the independent variables, and the control variables in this study.

3.4.1 Dependent Variable

ESG performance is the dependent variable and is measured by ESG scores collected from LSEG Eikon Datastream. The ESG scores are expressed between 0-100 percent. This is calculated by measuring the arithmetic means of the three dimensions of ESG; Environmental score, Social score, and Governance score (Birindelli et al., 2018). According to Grannes (2023), the environmental dimension measures how a company reduces its carbon emissions, uses natural resources efficiently, and researches and develops eco-efficient products and services. On the other hand, the social dimension is concerned with the company's ability to be a good citizen, respecting and protecting fundamental human rights, conduct good business practices, and create value by social norms and ethics. Furthermore, governance dimensions are described as the company's ability to structure and implement good corporate governance systems to ensure and maximize shareholders' benefits.

3.4.2 Independent Variables

Four board characteristics, i.e. board size, board gender diversity, board independence, and the audit committee's expertise are used as independent variables. Board size (BRDSIZE) is measured by the total number of board members and is a commonly used independent variable in corporate governance-related research (Birindelli et al., 2018; Bissoondoyal-Bheenick et al., 2023; Rossi et al., 2021; Popov & Makeeva, 2022). Board gender diversity (BRDGEN) is measured by the percentage of female board members. This is a widely used method for measuring the board's gender diversity in previous research (Shakil, 2021; Velte, 2016; Wasiuzzaman & Wan Mohammad, 2020). Board independence (BRDIND) is measured as the ratio of independent board members (Al Amosh & Khatib, 2022; Birindelli et al., 2018; Munoz, 2020). The audit committee's expertise (AUEXP) is measured as an indicator (dummy variable) of whether the board members possess firm-specific knowledge and skills based on LSEG EIKON criteria.

3.4.3 Control Variables

Besides the above-mentioned independent variables, ESG performance is affected by many other factors. Therefore, we have selected a few control variables to ensure that the analysis of the independent variables on ESG performance is correct. The selected control variables are Firm size, Return on assets, and Leverage.

Firm Size (SIZE) is measured as the natural logarithm of the total assets of the company. The natural logarithm is used due to the fact that as the size of a company increases, its effect on performance decreases. Larger firms get criticism for their ESG policies both morally and legally. Therefore, they need to improve and depict their performance by reporting the ESG scores. Leverage (LEV) is taken as total debt divided by total capital. Return on total assets (ROA) is represented as net income divided by total assets. These variables are taken to estimate the size of the company.

Variable	Type	Definition
ESG	Dependent	This is the arithmetic average of the three scores: social, environmental, and corporate governance. The overall score is expressed as a percentage ranging from 0 to 100, collected from LSEG Eikon (Grannes, 2023).
BRDSIZE	Independent	The total number of board members.
BRDGEN	Independent	The percentage of female board members
BRDIND	Independent	The percentage of independent board members
ACEXP	Independent	The dummy variable if the audit committee has ESG expertise. Value 1 (TRUE) 0 (FALSE)
SIZE	Control	The natural logarithm of total assets
ROA	Control	Net income divided by total assets
LEV	Control	The ratio of total debt to total capital

Table 1: Variable definition

4. Results

This section discusses the results from the descriptive statistics, correlation matrix, variance inflation factors, the Granger causality test, and the fixed-effects model.

4.1 Descriptive statistics

Table 2 depicts the descriptive statistics for all variables, showing the mean, standard deviation, minimum and maximum scores. The average ESG score is 46.80 with a standard deviation of 20.53. The dataset has large variations and ranges from a minimum score of 2 to a maximum score of 93. These results are in accord with previous studies. For example, a study conducted by Peltonen (2022) on 192 public companies in the Nordic countries between 1999-2021 had an average ESG score of 55.9 with a standard deviation of 19.5. The minimum and maximum scores were 2.2 and 95.1 respectively. Similarly, another study in Scandinavian countries shows an average ESG score of 63.4 with a standard deviation of 19.9 (minimum = 4.1 and maximum = 92.8) (Grannes, 2023). We can see the mean value is higher in these previous studies, but the standard deviation is approximately the same, around 20. The minimum and maximum scores are relatively similar.

Board size (BRDSIZE) in this dataset is between 3 and 15 directors, with an average of about 8 directors (7.90). The standard derivation is approximately 2 which shows that most companies have between 6 and 10 board members. The results align with previous studies, where Grannes (2023) found an average of 9 directors with a range of 3 to 28.

Gender diversity (BRDGEN) is presented as a percentage of female board members. The average is 0.32. This depicts that on average the companies have 32% female participation on the board of directors in the Scandinavian countries. Some companies do not have any females on the board (minimum = 0), while the maximum participation is 67%. The results are consistent with the findings of Khatri (2023) and Grannes (2023).

Board independence (BRDIND) is presented as a percentage of independent board members. A large variation, ranging from a minimum of 0% independent members to a maximum of 100% independent board members, can be seen in the dataset. On average, the companies

have 64% independent board members. These results are in accord with the research of Solem and Islek (2022).

The level of audit committee's expertise (AUEXP) is represented by a dummy variable. The maximum indicates that the members of the audit committee have expertise, while the minimum shows that they do not have members with relevant expertise. The average is 0.57. This result is consistent with the study conducted by Dohnalova and Rozsolova (2023).

Variable	Observation	Mean	Standard Devation	Minimum	Maximum
ESG	527	46.80	20.53	2.00	93.00
BRDSIZE	527	7.90	2.11	3.00	15.00
BRDGEN	526	0.32	0.12	0.00	0.67
BRDIND	527	0.64	0.22	0.00	1.00
ACEXP	527	0.57	0.50	0.00	1.00
SIZE	602	20.28	1.89	14.83	25.20
ROA	596	0.02	0.16	-1.73	0.97
LEV	598	0.40	0.32	0.00	6.31

Table 2: Descriptive statistics

4.2 Correlation results

Table 3 illustrates the correlation between the dependent, independent, and control variables in this study. According to Choen (1988), coefficients between 0.10 and 0.29 show a weak degree of correlation, while coefficients between 0.50 and 1.00 show a strong correlation. However, coefficients between 0.30 and 0.49 depict moderate correlations.

The first task is to determine if there is any multicollinearity problem in the dataset. The critical factor is whether there are a strong correlations in the set of independent variables and control variables. The highest correlation coefficient (0.61) of the independent and control variables is between board size and firm size. According to Choen (1988) this is defined as a strong correlation. This indicates that we may have a problem with multicollinearity and we therefore conduct a Variance-Inflation-Factor test to evaluate this correlation.

We can also use the correlation matrix to see if there is a pattern or relationship between the variables. ESG scores are positively correlated with board size, gender diversity, board independence, audit committee expertise, and firm size. This shows that the larger companies have more board members, higher gender diversity, independence, and audit committee expertise than the smaller companies.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) ESG	1.00							
(2) BRDSIZE	0.53	1.00						
(3) BRDGEN	0.29	0.04	1.00					
(4) BRDIND	0.14	-0.29	0.13	1.00				
(5) AUEXP	0.28	0.20	0.06	0.12	1.00			
(6) SIZE	0.72	0.61	0.23	-0.05	0.26	1.00		
(7) ROA	0.24	0.15	0.18	-0.06	0.09	0.29	1.00	
(8) LEV	-0.01	0.09	0.12	0.05	0.02	0.16	-0.15	1.00

Table 3: Correlation matrix

4.3 Variance Inflation Factor test

The Variance Inflation Factor (VIF) test is used to evaluate for multicollinearity. This test can only be run after a linear regression (Mehmetoglu & Jakobsen, 2017, p. 147), so it is based on OLS. When the value of VIF is high, it indicates that the independent variable is strongly correlated with other independent variables in the model. Some researchers suggest that a value above 5 is problematic (Mehmetoglu & Jakobsen, 2017, p. 147), while others believe that a value above 10 is problematic (Wooldridge, 2016). As we can see in Table 4, there are no values above 5 and we find no indication that we have a problem with multicollinearity.

	VIF	1/VIF
SIZE	1.88	0.53
BRDSIZE	1.79	0.56
BRDIND	1.17	0.85
ROA	1.16	0.86
BRDGEN	1.12	0.90
AUEXP	1.11	0.90
LEV	1.08	0.92
Mean VIF	1.33	.

Table 4: Variance Inflation Factor test

4.4 Granger Causality Test

Granger causality tests are conducted to determine the cause- effect relationships between board charactertistics and ESG performance. The statistical program “EViews” is used for this purpose. The Granger Causality test is a statistical hypothesis test for determining whether one time series is useful in forecasting another (Li, 2020). The null hypothesis is that one variable does not granger cause (-->) another variable.

Table 5 shows the results of the Granger causality test between ESG and the independent and control variables. The p-values are above 0.05, and we can accept the null hypotheses in all the tests. At the 5% significance level, we do not find any significant evidence of Granger causality between the variables. Changes in individual variables alone do not decisively indicate changes in the ESG score.

The variable BRDGEN has a lower p-value than the other variables which may point in the direction of causality, but the evidence is not strong enough to conclude at a 5% significant level.

	Null Hypothesis	**F-Statistics**	**Prob.**
ESG and BRDSIZE	BRDSIZE does not Granger Cause ESG	0.02	0.98
	ESG does not Granger Cause BRDSIZE	1.42	0.25
ESG and BRDIND	BRDIND does not Granger Cause ESG	0.46	0.63
	ESG does not Granger Cause BRDIND	1.91	0.15
ESG and BRDGEN	BRDGEN does not Granger Cause ESG	2.92	0.06
	ESG does not Granger Cause BRDGEN	2.51	0.08
ESG and AUEXP	AUEXP does not Granger cause ESG	0.90	0.41
	ESG does not Granger cause AUEXP	1.33	0.27
ESG and LEV	LEV does not Granger Cause ESG	2.39	0.10
	ESG does not Granger Cause LEV	0.66	0.52
ESG and ROA	ROA does not Granger Cause ESG	0.89	0.41
	ESG does not Granger Cause ROA	2.20	0.11
ESG and SIZE	SIZE does not Granger Cause ESG	0.01	0.99
	ESG does not Granger Cause SIZE	0.03	0.97

Table 5: Granger Causality Test

4.5 Result of the fixed-effects regression model

Table 6 illustrates the results of the fixed-effects regression model which can be interpreted to measure the effects of board characteristics on ESG performance in the industrial sector of Scandinavian countries. The overall value of R-squared is 0.56 which means that the model explains about 56% of the variance in the dependent variable.

The model shows that board characteristics like board size, board gender diversity, board independence, and audit committee expertise have positive effects on ESG performance. The board independence and board gender diversity have coefficients of 9.56 and 15.94, respectively, and the associations are statistically significant at a 5 % significant level. The board size and audit committee expertise also have a positive association with ESG performance with coefficients of 0.07 and 0.57 respectively, but the results are not statistically significant.

The control variables return on assets (ROA) and leverage (LEV) have negative associations with ESG performance and have coefficients –8.04 and –1.76 respectively. The results of ROA are statistically significant at a 5 % significance level, but LEV is not significant. However, the firm size (total assets) has a positive and significant effect on ESG performance.

ESG	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
BRDSIZE	0.07	0.34	0.20	0.84	-0.60	0.74	
BRDGEN	15.94	4.57	3.49	0.00	6.96	24.92	***
BRDIND	9.56	2.77	3.46	0.00	4.12	15.00	***
AUEXP	0.57	1.15	0.49	0.62	-1.70	2.84	
ROA	-8.04	3.75	-2.14	0.03	-15.42	-0.66	**
LEV	-1.76	1.10	-1.59	0.11	-3.93	0.42	
SIZE	5.23	1.18	4.44	0.00	2.91	7.54	***

Mean dependent var	46.85	SD dependent var	20.60
R-squared	0.13	Number of obs	519
F-test	8.02	Prob > F	0.00
Akaike crit. (AIC)	3018.44	Bayesian crit. (BIC)	3052.46

**** p<.01, ** p<.05, * p<.1*

Table 6: Fixed-effects regression model

5. Discussion

In this section, we will discuss the findings in light of previous research and the relevant theory.

Firstly, the effect of the board size on ESG was tested. The regression analysis of the sample shows a positive correlation between the board size and ESG score, but the result is insignificant at a 5% level. The result is consistent with the Granger causality test, which also finds no statistical causal relationship between the board size and ESG score. The p-value (BRDSIZE --> ESG) of 0.98 shows a strong indication that board size does not impact ESG scores. However, the p-value (ESG --> BRDSIZE) of 0.25 implies a weak prediction of ESG impact on board size. The insignificant results may be due to the weak correlation and insufficient data to prove it. However, previous studies have claimed a positive and significant correlation between the two variables (Chouaibi et al., 2021; Naseem et al., 2017; Hused & Milton de Sousa-Filho, 2019; Birindelli et al., 2018; Gurol & Lagasio, 2023). The result of this study does not match with the previous studies due to the differences in the number of observations, different countries as well as different industries.

Theoretically, smaller boards are more effective (Naseem et al., 2017: Hused & Milton de Sousa-Filho, 2019), making it easier and quicker to make decisions about ESG policies and their implementation. The members of smaller boards often feel more accountability and commitment, as well as smaller boards, can lead to good cohesion, coordination, and communication between board members (Birindelli et al., 2018). However, larger boards allow better monitoring (Chouaibi et al., 2021) and greater diversity with people from different backgrounds and expertise (Gurol & Lagasio, 2023; Birindelli et al., 2018: Githaiga & Kosgei, 2023). A large board represents the interest of a large portion of stakeholders but can also lead to worse decision-making and controlling processes (Popov & Makeeva, 2022).

Secondly, the impact of gender diversity was examined. The Granger test shows the existence of causality between ESG and Board gender diversity though the evidence is not strong enough to reach a 5% level of significance. The P-values (BRDGEN --> ESG = 0.06) and (ESG --> BRDGEN = 0.08) are close enough to indicate that both ESG score and board diversity have impacts on each other. In other words, an increase in the number of women

on the board is likely to improve the ESG score and vice versa. This granger causality is supported by the results from the regression model.

Gender diversity has a positive significant effect on ESG performance. The findings of this study are consistent with many other recent studies (Nuhu & Alam, 2023; Gurol & Lagasio, 2023; Alkhawaja et al., 2023; Khaireddine et al., 2020). The stakeholder theory implies that the board must ensure that the interests of all shareholders are taken into account (Freeman & Reed, 1983; Grannes, 2023). It is, therefore, very important to include women on the boards. Women behave more responsibly and are more concerned about the environment (Khaireddine et al., 2020). Inclusions of women on boards lead to board diversity, which in return attracts a wider range of experience and skills. This would result in different perspectives that contribute to improved strategic decision-making (Khaireddine et al., 2020). In addition, women representation has higher effectiveness, lower levels of conflicts, and higher quality of board development activities (Nielsen & Huse, 2010).

Thirdly, the impact of board independence was examined. According to the Granger test, there is no statistically significant causality between board independence and ESG performance. However, based on the p-values (BRDIND --> ESG = 0.63 and ESG --> BRDIND = 0.15), there is some indication of ESG score having a predictive power on board independence. We do see a statistically and positive effect in the regression model. This corresponds to other previous studies (Arayssi et al., 2020; Thirumagal et al., 2023; Popov et al., 2022; Chouaibi et al., 2021; Khaireddine et al., 2020). According to the agency theory, the independent board members have fewer conflicts with the agents, and this can lead to decisions being made in the interests of the principal. The individual agents do not have much power, and they are not able to make decisions that only benefit themselves. The agency theory is also supported by the stakeholder theory. The independent board members look after the interests of all the stakeholders, and not just the shareholders. The board independence also ensures effective monitoring from the board as they can make more objective assessments of management's performance (Birindelli et al., 2018), and reduce agency costs (Naseem et al., 2017). In addition, independent board members put pressure on management to disclose more information (Naseem et al., 2017), which leads to more transparency.

Finally, we looked into the impact of the audit committee's expertise. Neither the Granger test nor the regression model provide enough evidence to determine whether there is a relationship between the audit committee's expertise and ESG performance. The results from the Granger causality test show no apparent or predictive relationship between the two variables. However, the p-value of ESG --> AUEXP (0.27) is somewhat low which may indicate an impact of audit committee expertise on ESG scores. Not all the companies in this study had reported audit committee expertise for all four years, and few companies varied over time. This suggest that we do not have enough observations to obtain significant results in this study. One of the earlier studies found a positive and significant effect of board expertise on ESG performance in Norway (Solem & Islek, 2022). In the study the companies are ranked between 0 to 3 based on how many board members have relevant education and experience which is directly related to environmental and social dimensions of ESG and industry education (Solem & Islek, 2022). Audit committee expertise can lead to accurate and reliable reporting on ESG, identifying risks and opportunities related to ESG, and leading to companies complying with laws and regulations that apply to ESG.

6. Conclusion

This study provide mixed results, with some variables achieving statistical significance, while others did not reach the level of significance. We do not have enough evidence to determine the relationship between board size and ESG scores. However, the Granger test suggests a weak prediction of ESG score on Board size, but the result was not statistically significant at the 5% level. In contrast, we find a positive and significant effect of the relationship between board diversity and ESG score. Based on the Granger test, we see an indication that ESG score and board diversity have impacts on each other. Board independence has a positive and significant effect on ESG scores according to the regression model. Nevertheless, there was no statistically significant relationship between the audit committee's expertise and ESG score.

There are several limitations to this study including the fact that the sample is based only on the companies that have registered their ESG scores. In addition, we have only looked at four years since only a few companies have published their ESG scores earlier than 2019. Some of these companies also have missing data which results in the dataset is not large enough to obtain accurate results.

Based on these limitations, it is recommended that further studies be conducted on a more extensive sample, consisting of data from more industries and companies, over a longer period. This will help in understanding the phenomenon “the impact of these board characteristics on ESG performance” better. In addition, it can be recommended to include other board characteristics in the study and eventually explore their impacts on ESG performance. Such board characteristics may include the education level of board members, independence of audit committee members, number of board meetings held in years, etc. Moreover, further studies may include other American, European, and Asian companies to draw a comparison of ESG performances based on the institutional differences (ESG policies, etc.) among these countries.

References

Agyemang-Mintah, P. & Schadewitz, H. (2019). Gender diversity and firm value: evidence from UK financial institutions. *International Journal of Accounting & Information Management*, 27(1), 2-26. https://doi.org/10.1108/IJAIM-06-2017-0073

Ahmad, N., Mobarek, A. & Roni, N. N. (2021). Revisiting of ESG on the financial performance of FTSE350 UK-firms: Static and dynamic panel data analysis. *Cogent Business & Management*, 8:1. https://doi.org/10.1080/23311975.2021.1900500

Al Amosh, H. & Khatib, S. F. (2022). Ownership structure and environmental, social and governance performance disclosure: the moderating role of the board independence. *Journal of Business and Socio-Economic Development*, 2(1), 49-66. https://doi.org/10.1108/JBSED-07-2021-0094

Albitar, K., Hussainey, K., Kolade, N. & Gerged, A. M. (2020). ESG disclosure and firm performance before and after IR: The moderating role of governance mechanisms. *International Journal of Accounting & Information Management*, 28(3), 429-444. https://doi.org/10.1108/IJAIM-09-2019-0108

Alkhawaja, A., Hu, F., Johl, S. & Nadarajah, S. (2023). Board gender diversity, quotas, and ESG disclosure: Global evidence. International Review of Financial Analysis, 90. https://doi.org/10.1016/j.irfa.2023.102823

Alves, S. (2014). The Effect of Board Independence on the Earnings Quality: Evidence from Portuguese Listed Companies. *Australasian Accounting, Business and Finance Journal*, 8(3), 23-44. http://dx.doi.org/10.14453/aabfj.v8i3.3

Amel-Zadeh, A. & Serafeim, G. (2018). Why and How Investors Use ESG Information: Evidence from a Global Survey. *Financial Analysts Journal*, 74:3, 87 103, https://doi.org/10.2469/faj.v74.n3.2

Arayssi, M., Jizi, M. & Tabaja, H. H. (2020). The impact of board composition on the level of ESG disclosures in GCC countries. *Sustainability Accounting, Management and Policy Journal*, 11(1), 137-161. https://doi.org/10.1108/SAMPJ-05-2018-0136

Baalouch, F., Ayadi, S, D. & Hussainey, K. (2019). A study of the determinants of environmental disclosure quality: evidence from French listed companies. *Journal of Management and Governance*, Volume 23, 939–971. https://doi.org/10.1007/s10997-019-09474-0

Bamahros, H.M., Alquhaif, A., Qasem, A., Wan-Hussin, W.N., Thomran, M., Al-Duais, S.D., Shukeri, S.N. & Khojally, H.M.A. Corporate Governance Mechanisms and ESG Reporting: Evidence from the Saudi Stock Market. *Sustainability*, 14, 6202. https://doi.org/10.3390/su14106202

Bebchuk, L. A. & Fried, J. M. (2003). Executive compensation as an agency problem. *Journal of economic perspectives*, 17(3), 71-92. https://doi.org/10.1257/089533003769204362

Bhatia, S. & Marwaha, D. (2022). The Influence of Board Factors and Gender Diversity on the ESG Disclosure Score: A Study on Indian Companies. *Global Business Review*, 23(6), 1544-1557. https://doi.org/10.1177/09721509221132067

Birindelli, G., Dell'Atti, S., Iannuzzi, A. P. & Savioli, M. (2018). Composition and activity of the board of directors: Impact on ESG performance in the banking system. *Sustainability*, 10(12), 4699. https://doi.org/10.3390/su10124699

Bissoondoyal-Bheenick, E., Brooks, R. & Do, H. X. (2023). ESG and firm performance: The role of size and media channels. *Economic Modelling*, *121*, 106203. https://doi.org/10.1016/j.econmod.2023.106203

Bosse, D. A., Phillips, R. A. & Harrison, J. S. (2009). Stakeholders, reciprocity, and firm performance. *Strategic Management Journal*, 30(4), 447-456. https://doi.org/10.1002/smj.743

Buallay, A. (2019). Between cost and value: Investigating the effects of sustainability reporting on a firm's performance. *Journal of Applied Accounting Research*, Vol. 20 No.4, pp. 481-496. https://doi.org/10.1108/JAAR-12-2017-0137

Buallay, A. M. & AlDhaen, E. S. (2018). The relationship between audit committee characteristics and the level of sustainability report disclosure. In Challenges and Opportunities in the Digital Era: 17th IFIP WG 6.11 Conference on e-Business, e-Services, and e-Society, I3E 2018, Kuwait City, Kuwait, October 30–November 1, 2018, Proceedings 17 (pp. 492-503). *Springer International Publishing*. https://doi.org/10.1007/978-3-030-02131-3_44

Campbell, K. & Mínguez-Vera, A. (2008). Gender Diversity in the Boardroom and Firm Financial Performance. *Journal of Business Ethics,* 83(3), 435-451 https://doi.org/10.1007/s10551-007-9630-y

Cek, K. & Eyupoglu, S. (2020). Does environmental, social and governance performance influence economic performance?. *Journal of Business Economics and Management*, 21(4), 1165-1184. https://doi.org/10.3846/jbem.2020.12725

Chaudhry, N. I., Roomi, M. A. & Aftab, I. (2020). Impact of expertise of audit committee chair and nomination committee chair on the financial performance of the firm. *Corporate Governance: The International Journal of Business in Society*, 20(4), 621-638. https://doi.org/10.1108/CG-01-2020-0017

Chen, J. (2023, 19. February). *Board of Directors: What It Is, What Its Role Is.* Investopedia. https://www.investopedia.com/terms/b/boardofdirectors.asp

Chen, Z. & Xie, G. (2022). ESG disclosure and financial performance: Moderating role of ESG investors. *International Review of Financial Analysis*, 83, 102291. https://doi.org/10.1016/j.irfa.2022.102291

Choen, J. W. (1988). *Statistical power analysis for the behavioral scienes* (2.utg). Hillsdale, NJ: Lawrence Erlbaum Associates.

Chouaibi, S., Chouaibi, Y. & Zouari, G. (2021). Board characteristics and integrated reporting quality: evidence from ESG European companies. *EuroMed Journal of Business*, 17(4), 425-447. https://doi.org/10.1108/EMJB-11-2020-0121

Crête, R. (2016). The Volkswagen scandal from the viewpoint of corporate governance. *European Journal of Risk Regulation*, 7(1), 25-31. https://doi.org/10.1017/S1867299X0000533X

Dalton, D. R., Hitt, M. A., Certo, S. T. & Dalton, C. M. (2007). The fundamental agency problem and its mitigation: independence, equity, and the market for corporate control. *Academy of Management annals*, 1(1), 1-64. https://doi.org/10.5465/078559806

Del Gesso, C. & Lodhi, R. N. (2024). Theories underlying environmental, social and governance (ESG) disclosure: a systematic review of accounting studies. *Journal of Accounting Literature*, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/JAL-08-2023-0143

Dkhili, H. (2023). Does environmental, social and governance (ESG) affect market performance? The moderating role of competitive advantage. *Competitiveness Review*, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/CR-10-2022-0149

Dmytriyev, S. D. & Freeman, R. E. (2023*). R. Edward Freeman's Selected Works on Stakeholder Theory and Business Ethics* (First edition. ed., Vol. Volume 53). Springer.

Dohnalova, K. & Rozsolova, L. (2023). *Audit Committe characteristics and ESG performance of Scandinavian firms* [Master thesis, University of Stavanger]. UiS Brage. https://hdl.handle.net/11250/3083656

Energi og Klima. (2022, 23. September). *Utslipp: Sektorer.* https://www.energiogklima.no/klimavakten/utslipp-sektorer

Englund, E. (N.d.). *Hva er GRI? 3 raske fakta om GRIs standard for bærekraftsrapportering*. Retrieved on 9. February 2024 from https://www.stratsys.com/no/knowledge-hub/hva-er-gri?psafe_param=1&utm_campaign=p-search-dsa kunskapshub&utm_medium=ppc&utm_source=adwords&utm_term=&hsa_mt=&hsa_net=adwords&hsa_ver=3&hsa_kw=&hsa_acc=5195892202&hsa_grp=135609548555&hsa_tgt=dsa1644320132760&hsa_src=g&hsa_ad=589179111520&hsa_cam=16638311985&gad_source=1&gclid=EAIaIQobChMI9ND7__adhAMV62KRBR0E4wRpEAAYAiAAEgLqXPD_BwE

European Commission. (n.d.). *Corporate sustainability reporting*. Retrived at 18. January 2024 from https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en

Forlee, R. (2023, 6. January). *The Pros and Cons of ESG*. AYR International. https://medium.com/@ronaldforlee/the-pros-and-cons-of-esg-for-businesses-and-investors-f5fb453a03f9

Freeman, R. E. (2010). *Strategic management: A stakeholder approach*. Cambridge University Press.

Freeman, R. & Reed, D. (1983). Stockholders and Stakeholders: A New Perspective on Corporate Governance. *California Management Review*, 25. https://doi.org/10.2307/41165018

Fuzi, S. F. S., Halim, S. A. A. & Julizaerma, M. K. (2016). Board Independence and Firm Performance. *Procedia Economics and Finance*, 37, 460-465. https://doi.org/10.1016/S2212-5671(16)30152-6

Githaiga, P. N. & Kosgei, J.K. (2023), Board characteristics and sustainability reporting: a case of listed firms in East Africa. *Corporate Governance*, Vol. 23 No. 1, pp. 3-17. https://doi.org/10.1108/CG-12-2021-0449

Goldberg, R. (2021, 16. February). *BoardEX Global Gender Balance Report 2021*. BoardEx. https://boardex.com/reports/2020-global-gender-diversity-analysis-women-on-boards

Grannes, W. L. (2023*). The Effect of Board Characteristics on ESG Performance: Evidence from Scandinavia* [Master Thesis, University of Stavanger]. UiS Brage. https://uis.brage.unit.no/uis-xmlui/bitstream/handle/11250/3083659/no.uis:inspera:152008218:101239792.pdf?sequence=1

Gurol, B. & Lagasio, V. (2023). Women board members' impact on ESG disclosure with environment and social dimensions: evidence from the European banking sector. *Social Responsibility Journal*, Vol. 19 No. 1, pp. 211-228. https://doi.org/10.1108/SRJ-08-2020-0308

Hasan, I., Singh, S. & Kashiramka, S. (2022). Does corporate social responsibility disclosure impact firm performance? An industry-wise analysis of Indian firms. *Environment, Development and Sustainability*, 24(8), 10141-10181. https://doi.org/10.1007/s10668-021-01859-2

Husted, B. W. & Milton de Sousa-Filho, J. (2019). Board structure and environmental, social, and governance disclosure in Latin America. *Journal of Business Research*, Volume 102, 220-227. https://doi.org/10.1016/j.jbusres.2018.01.017

ICAEW. (n.d.). *What is ESG and why does it matter?* Retrieved 22.02.2024 from https://www.icaew.com/technical/financial-services/esg-assurance/what-is-esg-and-why-does-it-matter

Johansen, K. R., Grindheim, S. J. & Plesner, S. U. (2021). *The Relationship Between ESG and Financial Performance in the Nordics* [Master Thesis, Copenhagen Business School]. https://research-api.cbs.dk/ws/portalfiles/portal/68332264/1188379_Master_Thesis_133204_124629.pdf

Kammen, F. B., & Wikan, H. A. (2021). *Investigating ESG: A Scandinavian evidence: A study on corporate financial performance, the moderating role of assurance, and ESG integration* [Master Thesis, Norwegian University of Science and Technology]. NTNU Open. https://hdl.handle.net/11250/2823947

Kao, M. S. & Saari, V. (2019). *Board Composition, Sustainability, and Fim Performance: A Nordics-Oriented Quantitative Study on a Global Trend* [Master Thesis, Handelshögskolan vid Umeå universitet]. Digitala Vetenskapliga Arkivet. https://urn.kb.se/resolve?urn=urn%3Anbn%3Ase%3Aumu%3Adiva-161284

Kenton, W. (2022, 8. May). *Sarbanes-Oxley Act: What It Does to Protect Investors.* Investopedia. https://www.investopedia.com/terms/s/sarbanesoxleyact.asp

Khaireddine, H., Salhi, B., Aljabr, J. & Jarboui, A. (2020). Impact of board characteristics on governance, environmental and ethical disclosure. *Society and Business Review*, 15(3), 273-295. https://doi.org/10.1108/SBR-05-2019-0067

Khatri, I. (2023). Board gender diversity and sustainability performance: Nordic evidence. *Corporate Social Responsibility and Environmental Management*, 30(3), 1495-1507. https://doi.org/10.1002/csr.2432

KnowESG. (2023, 14. April). *What Is ESG Performance And How To Measure It?* https://www.knowesg.com/featured-article/what-is-esg-performance-and-how-to-measure-it

Kopp, C. M. (2023, 17. July). *Agency Theory: Definition, Examples of Relationships, and Disputes.* Investopedia. https://www.investopedia.com/terms/a/agencytheory.asp.

Kumar, S. (2023). A Review ESG Performance as a Measure of Stakeholders Theory. *Academy of Marketing Studies Journal*, 27(S3). https://www.proquest.com/openview/03f42f385e4d315fc7c4c141790ba7a3/1?pq-origsite=gscholar&cbl=38744

Li, S. (2020, 23. December). *A Quick Introduction On Granger Causality Testing For Time Series Analysis.* Medium. https://towardsdatascience.com/a-quick-introduction-on-granger-causality-testing-for-time-series-analysis-7113dc9420d2

Lyke, B. & Jickling, M. (2002). WorldCom: The accounting scandal. *In Congressional Research Service Report for Congress*, August (Vol. 29, pp. 1-6). https://www.everycrsreport.com/files/20020829_RS21253_e7ed921fa695fd4b8a0986316b6cd894a557e163.pdf

Manita, R., Bruna, M. G., Dang, R. & Houanti, L. H. (2018). Board gender diversity and ESG disclosure: evidence from the USA. *Journal of Applied Accounting Research*, 19(2), 206-224. https://doi.org/10.1108/JAAR-01-2017-0024

Mehmetoglu, M. & Jakobsen, T. G. (2017). *Applied Statistics Using Stata: A guide for the Social Sciences*. Sage Publications Ltd.

Miller, J. L. (2002). The board as a monitor of organizational activity: The applicability of agency theory to nonprofit boards. *Nonprofit management and leadership*, 12(4), 429-450. https://doi.org/10.1002/nml.12407

Monciardini, D., Mähönen, J. T. & Tsagas, G. (2020). Rethinking Non-Financial Reporting: A Blueprint for Structural Regulatory Changes. *Accounting, Economics, and Law: A Convivium*, 10(2). https://doi.org/10.1515/ael-2020-0092

Munoz, F. (2020). How do the size and independence of the board of trustees affect the financial and sustainable performance of socially responsible mutual funds? *Corporate Social Responsibility and Environmental Management*, 27(4), 1834-1850. https://doi.org/10.1002/csr.1930

Naseem, M. A., Rehman, R. U., Ikram, A. & Malik, F. (2017). Impact Of Board Characteristics On Corporate Social Responsibility Disclosure. *Journal of Applied Business Research (JABR)*, 33(4), 801–810. https://doi.org/10.19030/jabr.v33i4.10001

Nielsen, S. & Huse, M. (2010). The Contribution of Women on Boards of Directors: Going beyond the Surface. *Corporate Governance: An International Review*, 18(2), 136-148.. https://doi.org/10.1111/j.1467-8683.2010.00784.x

Nuhu, Y. & Alam, A. (2023). Board characteristics and ESG disclosure in energy industry: evidence from emerging economies. *Journal of Financial Reporting and Accounting*, 22(1), 7-28. https://doi.org/10.1108/JFRA-02-2023-0107

Oprean-Stan, C., Oncioiu, I., Iuga, I. C. & Stan, S. (2020). Impact of Sustainability Reporting and Inadequate Management of ESG Factors on Corporate Performance and Sustainable Growth. *Sustainability*, *12*(20), 8536. https://doi.org/10.3390/su12208536

Panda, B. & Leepsa, N. M. (2017). Agency theory: Review of theory and evidence on problems and perspectives. *Indian journal of corporate governance*, 10(1), 74-95. https://doi.org/10.1177/0974686217701467

Peltonen, S. (2022). *ESG considerations, stock returns, and firm performance in Nordic countries* [Master Thesis, UNIVERSITY OF VAASA]. https://osuva.uwasa.fi/bitstream/handle/10024/14675/Master's%20Thesis%20(Final).pdf?sequence=2

Popov, K. & Makeeva, E. (2022). Relationship between Board Characteristics, ESG and Corporate Performance: A Systematic Review. *Journal of Corporate Finance Research*, 16(4), 119-134. https://www.researchgate.net/profile/Elena-Makeeva-2/publication/374477165_No_4_2022_Systematic_Re-view/links/651fbe45b0df2f20a213d6ea/No-4-2022-Systematic-Re-view.pdf

Porter, C. & Sherwood, M. (2023). The effect of increases in board independence on financial reporting quality. *Accounting Research Journal*, 36(2/3), 109-128. https://doi.org/10.1108/ARJ-12-2021-0344

Pozzoli, M., Pagani, A. & Paolone, F. (2022). The impact of audit committee characteristics on ESG performance in the European Union member states: Empirical evidence before and during the COVID-19 pandemic. *Journal of Cleaner Production*, 371, 133411. https://doi.org/10.1016/j.jclepro.2022.133411

Pulino, S. C., Ciaburri, M., Magnanelli, B, S. & Nasta L. (2022). Does ESG Disclosure Influence Firm Performance? *Sustainability*. 2022; 14(13):7595. https://doi.org/10.3390/su14137595

PWC. (n.d.). *CSRD - EUs bærekraftsdirektiv.* Retrieved on 18. january 2024 from https://www.pwc.no/no/pwc-aktuelt/baerekraftsrapportering/eus-baerekraftsdirektiv-csrd.html

Rabaya, A. J. & Saleh, N. M. (2022). The moderating effect of IR framework adoption on the relationship between environmental, social, and governance (ESG) disclosure and a firm's competitive advantage*. Environment, Development and Sustainability*, 24(2), 2037-2055. https://doi.org/10.1007/s10668-021-01519-5

Rodríguez-Fernández, M. (2015). Company financial performance: Does board size matter? Case of the EUROSTOXX50 index. *Cuadernos de Gestión*, 15(2), 15-38. https://www.redalyc.org/pdf/2743/274341783001.pdf

Rossi, M., Chouaibi, J., Chouaibi, S., Jilani, W. & Chouaibi, Y. (2021). Does a board characteristic moderate the relationship between CSR practices and financial performance? Evidence from European ESG firms. *Journal of Risk and Financial Management*, 14(8), 354. https://doi.org/10.3390/jrfm14080354

Sadiq, M., Singh, J., Raza, M. & Mohamad, S. (2020). The Impact of Environmental, Social and Governance Index on Firm Value: Evidence from Malaysia. *International Journal of Energy Economics and Policy*, 10(5), 555–562. https://doi.org/10.32479/ijeep.10217

Shakil, M. H. (2021). Environmental, social and governance performance and financial risk: Moderating role of ESG controversies and board gender diversity. *Resources Policy*, 72, 102144. https://doi.org/10.1016/j.resourpol.2021.102144

Shamim, A. (2018*). Hvordan ulike faktorer påvirker kapitalstrukturen på børsnoterte selskaper på Oslo børs: En empirisk studie i perioden 2002-2016* [Masteroppgave, Høgskolen i Molde]. Brage HiM. http://hdl.handle.net/11250/2570776

Siew, R. Y., Balatbat, M. C. & Carmichael, D. G. (2013). The relationship between sustainability practices and financial performance of construction companies. *Smart and Sustainable Built Environment*, 2(1), 6-27. https://doi.org/10.1108/20466091311325827

Solem, A. & Islek, K. (2022). *The effect of corporate governance characteristics on ESG ratings: An exploratory study of Norwegian listed companies* [Master Thesis, Norwegian University of Science and Technology]. NTNU Open. https://hdl.handle.net/11250/3017624

Stranden, A, L. (25. mars 2022). *Lønner det seg å kvotere inn kvinner i styrer?* Forskning.no. https://www.forskning.no/finans-okonomi/lonner-det-seg-a-kvotere-inn-kvinner-i-styrer/1999042

Sustainability in Business. (2024, 5. January). *"Who Cares Wins": transforming finance and economics through ESG*. https://www.sustainabilityinbusiness.org/blogs/who-cares-wins-the-report-that-started-esg

Tan, C. & Taufiik, M. (2022). Board diversity and financial reporting quality: does firm size matter? *Journal of Contemporary Accounting*, 4(2), 80-94. https://doi.org/10.20885/jca.vol4.iss2.art2

Therkildsen, M. F. & Abdellaue, L. (2023). *Board Composition and Financial Reporting Quality of Sports Organizations An empirical study of Norwegian sports organizations* (Master's thesis, OsloMet-Storbyuniversitetet). Open Digital Archive. https://hdl.handle.net/11250/3107131

Thirumagal, P. G., Tirkey, A. & Suresh, S. (2023). Moderating effect of board size and board independence between women on board and ESG. *In International Conference on Economics, Business and Sustainability* (pp. 16-25). Singapore: Springer Nature Singapore. https://doi.org/10.1007/978-981-99-3366-2_3

U.N. Cooperation. (2024, 17. january). *Klimaendringer*. https://fn.no/tema/klima-og-miljoe/klimaendringer#Hvordankanvistoppeklimaendringene?-2

Van der Laan, G., Van Ees, H. & Van Witteloostuijn, A. (2008). Corporate social and financial performance: An extended stakeholder theory, and empirical test with accounting measures. *Journal of business ethics*, 79, 299-310. https://doi.org/10.1007/s10551-007-9398-0

Velte, P. (2016). Women on management board and ESG performance. *Journal of Global Responsibility*, 7(1), 98-109. https://doi.org/10.1108/JGR-01-2016-0001

Velte, P. (2023). Which attributes of audit committees are most beneficial for European companies? Literature review and research recommendations. *Journal of Global Responsibility*, 14(4), 403-430. https://doi.org/10.1108/JGR-07-2022-0063

Wang, H. M. D. & Sengupta, S. (2016). Stakeholder relationships, brand equity, firm performance: A resource-based perspective. *Journal of Business Research*, 69(12), 5561-5568. https://doi.org/10.1016/j.jbusres.2016.05.009

Wasiuzzaman, S. & Wan Mohammad, W. M. (2020). Board gender diversity and transparency of environmental, social and governance disclosure: Evidence from Malaysia. *Managerial and Decision Economics*, 41(1), 145-156. https://doi.org/10.1002/mde.3099

Waterstraat, S., Kustner, C. & Koch, M. (2021). Does Board Composition Taking Account of sustainability Expertise Influence ESG Ratings? An Exploratory Study of European Banks. In: Gerber, A., Hinkelmann, K. (eds) Society 5.0. Society 5.0 2021. *Communications in Computer and Information Science*, vol 1477. Springer, Cham. https://doi.org/10.1007/978-3-030-86761-4_11

Wooldridge, J. M. (2016). Introductory Econometrics: A Modern Approach (6.utg). Mason, OH, Thomson/South-Western

Yahya, H. (2023). Female leadership and ESG performance of firms: Nordic evidence. *Corporate Governance: The International Journal of Business in Society*. https://doi.org/10.1108/CG-03-2023-0129

Younas, A. (2022). Review of Corporate Governance Theories. *European Journal of Business and Management Research*, 7(6), 79-83. https://doi.org/10.24018/ejbmr.2022.7.6.1668

Ziade, S, E. & Fjærli, E. (2023, 8. March). *Stadig flere kvinnelige styrerepresentanter*. Statistisk Sentralbyrå. https://www.ssb.no/virksomheter-foretak-og-regnskap/eierskap-og-roller/statistikk/styre-og-leiing-i-aksjeselskap/artikler/stadig-flere-kvinnelige-styreledere

Appendix

Breusch-Pagan/Cook-Weisberg test for heteroskedasticity

Assumption: Normal error terms

Variables: BRDSIZE BRDGEN BRDIND AUEXP ROA LEV SIZE ib1.COUNTRY

H0: Constant variance

chi2(10) = 30.04

Prob > chi2 = 0.0008

Wooldridge test for autocorrelation in panel data

H0: no first-order autocorrelation

F(1, 136) = 81.768

Prob > F = 0.0000

Hausman test

	Coef.
Chi-square test value	1144.457
P-value	0