Female leadership and ESG performance of firms: Nordic evidence

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Abstract

Purpose – *This paper aims to focus on the relationship between female leadership and the environmental, social and governance (ESG) performance of firms. Specifically, the study examines if firms with women as chief executive officers (CEOs) and/or board chairpersons have higher environmental and social scores.*

Design/methodology/approach – *The study uses data on publicly listed Nordic firms in a panel regression approach to establish the relationship between female leadership and the environmental and social performance of firms.*

Findings – *The result of this study shows that women have a leadership characteristic that increases the weighted average of environmental (E) and social (S) performance of a firm. In particular, pillar score results indicate a positive relationship between female CEOs and the social scores of a firm but no relationship between a female board chairperson and the environmental or social scores of a firm. This implies that gender-based differences affect the CEO's success, especially in a firm's social performance. Further analyses show a more significant impact on the E and S performance when a woman replaces a man as CEO of a firm.*

Originality/value – *While prior research has explored various aspects of gender diversity in corporate leadership and its potential impact, the focus on the Nordic context in this study provides a unique perspective, given the region's distinct business environment and societal factors. In addition, by examining the collective influence of female leaders and both female CEOs and board chairpersons separately, this study provides a nuanced understanding of how different leadership roles may impact a firm's ESG performance.*

Keywords *Female leadership, CEO, Board chair, ESG, Corporate governance, Nordic Countries*

Paper type *Research paper*

1. Introduction

The increasing awareness of environmental, social and governance (ESG) concerns has changed business practices (Kolk and Van Tulder, 2010). This has led to studies explaining the role of different actors such as managers, boards of directors and owners in the performance of firms in corporate social responsibility (CSR) or ESG. In addition, the gender of senior executives has been identified as an important factor in the degree and effect of CSR (Landry *et al.*, 2016). Although recent studies have been conducted on the influence of female leaders (i.e. executive or board chair) on firm CSR or ESG (Glass *et al.*, 2016; Di Giuli *et al.*, 2022; Zou *et al.*, 2018; Lim and Chung, 2021; Liu, 2018), earlier studies have focused on female gender involvement in management or board on gender diversity, or quotas in corporate affairs since Norway first proposed and later implemented it in 2006 (Ahern and Dittmar, 2012; Brammer *et al.*, 2007; Teigen, 2012; Seierstad and Huse, 2017; Cook *et al.*, 2019).

However, a common characteristic of the recent studies on the role of female leadership in CSR or ESG performance is first, most of the studies focus on a particular group of female leaders, i.e. chief executive officers (CEOs) or board chairs at a time (Lim and Chung, 2021;

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Larrieta-Rubín de Celis *et al.*, 2015) or a combination of both in a single analysis (Glass *et al.*, 2016; Liu, 2018). The challenge with the first category of studies is that the number of publicly listed firms with female CEOs or board chairs is generally low compared with firms with male counterparts in similar roles. Similarly, the studies combining both female CEOs and board chairs ignore the fact that both roles are not the same in most firms and countries. Second, most of the studies are done on the immediate impact of female leadership on CSR or ESG reporting or ESG performance of firms (Zou *et al.*, 2018; Di Giuli *et al.*, 2022). This ignores the fact that most of the firms had a man in office, and the change may be too quick or too slow to materialize because ESG activities involve planning and design that may require changes to meet the aggressive or conservative approach of the new appointee. Third, a few studies (Liu, 2018) have considered one of environmental or social sustainability at a time. Though this is not a limitation in itself, the conclusion of significant impact may not be established especially for studies focusing on environmental sustainability. This is due to established principles, policies and legislation regulating firms' environmental activities in most parts of the world.

Similarly, despite the role of the Nordic region as shown by Norway when the country first introduced gender quota law in 2006, there is a vacuum still to be filled in the relevance of this significant effort almost two decades later. The impact of women leaders (i.e. CEOs or board chair) on important firm activities like CSR is missing. Studies have only concentrated on the relevance of gender quota, diversity and involvement in boards on firms' CSR (Khatri, 2022). This may be due to the reason that the number of women in executive or board chair positions is relatively small for publicly listed companies and the challenge of obtaining comprehensive data on management and boards in these firms.

For the aforementioned reasons, this study seeks to explain whether gender differences in company leadership affect their future performance in ESG. This is built on documented evidence of differences in the style of leadership of men and women (Francis *et al.*, 2021; Matsa and Miller, 2013), that women value more social issues like benevolence (Adams and Funk, 2012), are less likely to lay off workers (Matsa and Miller, 2013) and overall, more likely to implement CSR policies than men in the same position (Braun, 2010; Galbreath, 2011). In addition, this study sets out to bridge the gap in the literature by examining the role of women leaders in firm sustainability in the Nordic countries by looking at all offices of leadership including the CEO, board chairperson and chief financial officer (CFO) positions together and separately in different analyses. Specifically, the study explores the impact women in leadership positions of companies have years after their appointment into office in a region that has seen the inclusion of women on boards mandated almost two decades ago. This means there should be a reasonably significant presence of women in leadership positions even if they have to grow through the ranks or if the increase in the ratio of females on board would have an impact on the choices of leaders.

The result of this study shows that firms with a woman in leadership positions have significantly higher environmental and social (ES) [1] performance. The pillar scores analysis shows that the presence of a female leader only significantly increases the social but not environmental performance of the firm. The result of analysis considering the female CEO and chairperson separately shows that only the social performance of firms is enhanced with a female CEO and no significant effect with a woman as chairperson. The result of the text of robustness of the findings in this study shows that there is a significantly higher ES performance where a firm has had a change in CEO position chairperson from male to female. Contrarily, the change from male to female in the board chair position in a firm is not significantly improving the ES performance of a firm. However, no significant increase is seen in the ES performance of the firm when there has been a change in the position of the board chair from one man to another. Interestingly, changes in CEO positions where a man replaces another man are associated with decreasing ES and social performance of firms.

The findings in this study contribute to the literature in a number of ways. First, it breaches the gap in the literature of corporate women leadership in a region with not just a leading position in ESG issues but also set the pace for others in the inclusion of women in board and management positions of firms. The importance of a study on this region in this regard is motivated by earlier suggestions that the gender quota law first implemented by Norway in 2006 is a window dressing that is not positively affecting firm performance (Ahern and Dittmar, 2012). Though studies (Teigen, 2012; Seierstad and Huse, 2017) have since scrutinized this conclusion by considering the impact of gender diversity in boards on firm performance, this study is the first to examine the influence of women in leadership positions of firms on ESG in the Nordic region. Prior studies (Zou *et al.*, 2018; Lim and Chung, 2021) on women's leadership influence on CSR or ESG have been done on the US market and other parts of Europe.

Second, this study adds a new dimension to the understanding of the roles of women leadership in firm ESG performance by considering women in leadership roles as a whole and women in different leadership roles separately. These two analyses have significant importance in the quest to understand how women affect firm ESG performance. On one hand, the consideration of women in leadership positions together in a company ensures adequate observation for a reasonable examination in relation to the obvious higher number of male counterparts in similar positions in other companies. On the other hand, the separate analysis helps in understanding the significance of women in particular roles especially because the roles have different responsibilities and can have, for example, more influence on corporate decisions than the other as is the case with board chairpersons and CEOs. No other study of note has considered the topic in this light. Third, a small number of studies have examined the effect of the change from male to female in a leadership position on CSR or ESG (Zou *et al.*, 2018). This study adds to the literature on the effect of such change and compares it with changes in similar positions with no gender difference. This allows for a relative analysis of the effect of change in leadership positions with respect to firms' ESG performance.

The rest of this paper is organized as follows. First, in Section 2, previous literature around this topic is discussed while testable hypotheses are developed, and Section 3 presents the data and research design. Empirical results, discussions and implications are discussed in Section 4. Section 5 sets out the conclusion and limitations and offers suggestions for further research.

2. Previous research and hypotheses development

2.1 Female leadership impact on environmental, social and governance performance of firms

Earlier studies show documented survey evidence of risk aversion preference peculiar to women (Croson and Gneezy, 2009), which not only includes being aware of climate change risk but also being very active in pursuing risk reduction (Altunbas *et al.*, 2022). However, Zou *et al.* (2018) pinned the conclusion that female leaders are more likely to implement CSR or do better in their firm's ESG performance on two hypotheses. The first hypothesis is based on the premise that women exhibit higher risk-averse preference and tend to avoid risk more when compared with men in a similar position (Booth and Nolen, 2012; Eckel and Grossman, 2008). This hypothesis has been supported by a number of findings in the literature. For example, Barber and Odean (2001) argued that female executives are less likely to finance high-risk projects as opposed to their male counterparts based on their risk aversion preference, and Faccio *et al.* (2016) found that female executives reduce leverage, take less volatile earnings and are likelier to take less risk than male executives. Thus, the conclusions that CSR or firm ESG reporting and performance is a firm risk management channel (Lueg *et al.*, 2015; Zhou *et al.*, 2017) and better ESG performance guaranteeing low capital constraints for the firm (Cheng *et al.*, 2014) is an indication that female risk

aversion would explain the engagement of female leaders in CSR or ESG because it reduces information asymmetry, increases goodwill and decreases financial constraints (Zou *et al.*, 2018). The second hypothesis is drawn from the altruistic literature perspective. Specifically, there is an argument in favor of women leadership improving firms' activities in CSR and ESG. Earlier studies in sociology and psychology show that in comparison with men, women are more concerned about others (Gilligan and Attanucci, 1988) through e.g. avoidance of harmful actions to communities (Adams *et al.*, 2011) and have greater consideration for fairness in events of alternative perspectives (Eagly and Carli, 2007).

Based on the established evidence above, this study argues that female leadership is likely to affect only the social performance of firm sustainability. The premise for this is due to the fact that there is significant environmental legislation around Europe and Nordic countries that defines the activities of firms in and around the environment. Such legislation and regulations mean the conclusion of Smith and Rogers (2000) that women act more ethically than men in "undefined" situations is only applicable to the social performance of firms which has relatively low regulations and relies largely on discretionary behavior of the management and boards of firms. Examples of such discretionary decisions would include employee welfare packages and community interactions. Thus, the first hypothesis of this study is stated below:

H1. Female leadership is positively enhancing the social performance of firms.

To examine the above hypothesis, the impact of women in all leadership positions on the ES performance of the firm is considered. This means that regardless of the position, a firm is deemed to have a women leader if a woman occupies the position of board chairperson, CEO or CFO. The intuition is to capture the overall relevance of women in top management or board positions in relation to a firm's ES performance. In addition, the presence of women in these top positions is expected to influence companies' decisions in CSR or ESG issues, as earlier studies suggest that women pay attention to social issues (Cronqvist and Yu, 2017; Adams and Funk, 2012) and do not take for granted climate change consequences and the need to mitigate it (Davidson and Haan, 2012). Thus, we expect that the presence of female leader(s) should not be negatively associated with environmental performance even if no significant difference exists in comparison with firms where men occupy similar positions.

2.2 The difference in corporate leadership role impacts environmental, social and governance performance of firms

Earlier studies on corporate management and control have suggested that the combination of CEO and board chair roles for the same person is seen as dangerous and can potentially reduce the quality of work performance because of the possibilities for dysfunctional or self-beneficial behavior which could easily lead to lower quality in corporate governance. This is explained in earlier findings (Duru *et al.*, 2016), showing that CEO duality has a negative impact on firm performance through managerial entrenchment. Bernstein *et al.* (2016) showed that differing interests of board chair and CEOs have a significant effect on issues of governance and diversity among other things. This is a fact suggesting that the separation of such role has a significant impact on corporate policies and implementation like the ESG activities of a firm. Despite their conclusion allaying the concern of CEO-chair duality, Daily and Dalton (1997) agreed that it could lead to financial distress or a weak board of directors. To this end, this study argues that a significant difference still exists in the influence of the different leaders of firms (i.e. CEO and board chairperson) especially, where such roles are held by separate individuals and thus state the second hypothesis as below:

H2. A significant difference exists in the influence of female CEOs or board chairpersons on the ESG performance of firms.

The motivation for this second hypothesis is also justified by the fact that the number of female leadership observations relative to the total sample can significantly affect the result of the analysis. Thus, a test of this hypothesis would adequately address the question of where or from which position of leadership the impact is coming rather than assuming an overall influence regardless of role.

Meanwhile, as concerns of endogeneity are usually the debate around issues of ESG and can even be stronger in analysis considering gender roles in performance, this study uses the governance score of ESG which consists of components like management, shareholders and CSR strategy to check whether female leadership is associated with an increase in governance in a firm (Di Giuli *et al.*, 2022). This is in addition to our control of women's quota on boards. This is to ensure that favorable views that have been said to be extended toward in-group members according to social psychology studies (Hewstone *et al.*, 2002), which may be the case in firms with a higher percentage of women as board members is not at play in the influence of women leaders on the ES performance of the firm. This bias has also been substantiated in finance literature in a recent study (Jannati *et al.*, 2020) that documents evidence of in-group favoritism among equity analysts.

3. Research design

3.1 Data

To analyze the impact of women's leadership on firms' ES performance, this study relies on a comprehensive sample of board data on publicly listed Nordic firms. The data includes corporate board and management data of publicly listed firms on a Nordic (Finland, Sweden, Norway, Denmark and Iceland) stock exchange with all appointment that is available to the company including changes that have happened over the years until 2020 captured. The data is obtained from the Center for Corporate Governance – Copenhagen Business School. According to the Center, the data was collected through various data sources and methods, harmonized and quality checked [2]. As a measure of CSR performance of firms, it uses the ESG scores of the firms in the sample for the period 2010–2021. ESG data is downloaded from the Thomson Reuters Eikon's database on June 2022. The financial data of the companies are used as controls in the analyses. Because corporate executives, for example, can be in office for a long time which means appointment into the position could be before the years in this study, board data and ESG data is merged based on annual years.

This study ensures that all publicly listed firms during the sample period in the region are covered by including main stock exchanges (Nasdaq Helsinki Ltd, Nasdaq Stockholm AB, Nasdaq Copenhagen A/S operated exchanges in Finland, Sweden and Denmark, respectively, and the Oslo Børs ASA in Norway) as well the multilateral trading facilities (MTF) [3]. The inclusion of small exchanges is motivated by the significance of CSR in company practices which goes beyond the size and status of a firm. Overall, 268 firms from four Nordic countries are in the sample (of which Finland 46 firms, Norway 76, Denmark 59 and Sweden 87) for the period.

3.2 Empirical design

3.2.1 Variables. This study focuses on the environmental (E) and social (S) pillar scores of ESG and derives a combined score *ES* – the equally-weighted average score for the ES pillars. This is in line with previous studies (Di Giuli *et al.*, 2022) that have considered the topic. The exclusion of the governance score of ESG is motivated by the high likelihood of correlation and reverse causality between the score and female leadership, i.e. high governance score may be influencing companies' choice of leadership. However, this study

tests the possibility that governance score is influencing the choice of gender in companies' leadership in separate models.

To study the influence of women in leadership positions on the firm's ESG performance, a dummy variable is created where 1 is assigned to CEOs, board chairpersons and CFOs that are women [4] in companies and zero otherwise. Hence, the *Female Leader* is a dummy which is an aggregate of the above three different leadership positions occupied by women, i.e. the dummy is 1 if there is a woman occupying any or all of the CEO, board chair or CFO in a company at a given time and zero otherwise. The years in office can have a significant effect on the influence of executives or corporate boards on firm performance (Dikolli *et al.*, 2014; Tiwari and Ahamed, 2018). Thus, a variable *Tenure*, i.e. the natural logarithm of years to the ESG year, is introduced to control for this significant effect. Similarly, gender diversity has been documented to affect firm CSR (Yarram and Adapa, 2021; Al Fadli *et al.*, 2019; Landry *et al.*, 2016). This study controls for the significant effect of board gender diversity using a *Gender diversity ratio* variable calculated from the data as the percentage of females on a company's board relative to male board members. Similar to previous studies (Zou *et al.*, 2018), this study controls for the size of the board by including the natural logarithm of the total number of directors in a company as the *Board Size* variable.

In addition to controlling for board characteristics, financial variables are used to control for the effect of firm financial characteristics on ESG performance. Thus this study uses the natural logarithm of firm sales (Buallay, 2018) as the measure of *Firm Size*, the natural logarithm debt-to-equity ratio as the measure of firm *Leverage* (Grewal *et al.*, 2008) and the ratio of market to book value of equity, i.e. *Market-to-Book* (as in e.g. Zou *et al.*, 2018). Similarly, a *Financial Slack* variable measured as the ratio of current liabilities to current assets of the firm is introduced. Financial slack represents the availability of financial resources which can influence a firm's capacity to invest in ESG practices (Aguilera-Caracuel *et al.*, 2015; Surroca *et al.*, 2010). In addition, this study controls for the tendency of financial performance influencing ESG performance as some studies (Alshorman *et al.*, 2022; Vitezić *et al.*, 2012) have shown and includes return on assets *ROA* calculated as the earnings before interest and taxes over the total assets of the firm. Finally, the empirical analysis uses robust approaches including year and firm fixed effect as well as country control. The firm fixed effects capture what is specific to each firm and so control away characteristics such as ownership structure and corporate governance that are not captured by control variables. The country control helps control for country characteristics especially those related to the inclusion of women in executive and nonexecutive boards and the time-varying effects of the implementation. Thus, the identification is so that women's leadership is correctly attributed to the ES performance of firms.

3.2.2 Model specification. In a linear panel regression, the equation below is estimated to examine the influence of female leaders on firms' ES performance:

$$ES\ Score_{it} = \beta + \beta_1 FemaleLeader_i + \gamma Controls_{it} + \delta_{it} + \epsilon_{it}$$

where $ES\ Score_{it}$ is the equally weighted average score for the ES pillars for firm i in the year t. Pillar scores analysis is done using the ESG's subcategory scores by replacing the ES score with a pillar score for environmental E_{it} and social S_{it}. β is the common constant, $FemaleLeader_{it}$ is a dummy that equals one if there's a woman occupying any or all of the CEO, board chair or CFO positions in firm i at time t and zero otherwise. Controls are *Tenure*, i.e. the natural logarithm of the number of years since the executive of the board chair has been appointed to the present year in analysis; *Gender diversity ratio*, i.e. the percentage of females on firm i board relative to male board members at time t; *Board Size*, i.e. the natural logarithm of a number of board members in firm i at time t; *Firm Size*, i.e. the natural logarithm of the total sales of firm i at time t; *Leverage* is the total debt divided by

total equity in percentage *i* at time *t*; *MarketToBook* ratio is the market value of equity over the book value of firm *i* at time *t*; *Financial Slack*, i.e. current liabilities of firm *i* at time *t* divided by its current asset in the same period; *ROA*, i.e. firm *i* earnings before interest and taxes over its total assets at time *t*. All regressions include country control, δ_{it} firm and year-fixed effects.

Next, this study considers separately the influence of women in CEO or board chairperson positions on the ES performance of the firm. The regressions are similar to equation (1) with *FemaleLeader* variable replaced with the *FemaleCEO*, i.e. a dummy variable that equals one if the CEO of firm *i* at time *t* is a woman and zeros otherwise, and in other models, *FemaleLeader* is replaced with *FemaleChair*, i.e. dummy variable that equals one if the board chairperson of firm *i* at time *t* is a woman and zeros otherwise. Other variables in the models are defined as earlier.

To further understand the effect of women's leadership on firm ES performance, this study examines the effect of changes from male to female in leadership positions on the ESG performance of firms. This is done by replacing the *FemaleLeader* variable with *MaleToFemaleCEO*, i.e. a dummy that equals one if the new appointee replacing a man in the CEO position in firm *i* at time *t* is a woman and zeroes otherwise. The model is reestimated to replace *MaleToFemaleCEO* with *MaleToFemaleChair*, i.e. a dummy that equals one if the new appointee replacing a man in the board Chair position in firm *i* at time *t* is a woman and zeroes otherwise. The control variables are similar to equation (1). To isolate the effect of women coming into positions in place of men on E and S performance, the study considers in other regressions the effect of changes in leadership positions, i.e. CEO and board chair, when the new appointee is another male replacing a male ex-appointee.

4. Empirical results

4.1 Descriptive statistics

Table 1 shows the summary statistics and the covariance matrix for the variables in this study. As shown in Panel A, the ES score is 54.00 on average with the ES pillar scores having an average of 52.38 and 56.43, respectively. The governance score mean is 50.37. The standard deviation of ES and pillar scores are between 21 and 26. This widespread as a result of the cross-sectional dispersion in the data suggests that the ratings cover a wide range and as such provides an interesting starting point for the analysis in this study. Female dummies show low averages because the representation in corporate leadership is still low with about 8% of leaders of companies being females in the sample of this study. However, the standard deviation shows a fair dispersion relative to the average. The average of the natural logarithm of the number of years since appointment, i.e. tenure of executives and board chairs of years, shows good experience with years in the office as appointees. The board size average is sizeable across firms, showing that most of the firms in the sample are large. The percentage of females on boards of the companies in this study is 31% on average. The number is still relatively low. The average and spread of the financial variables show a good representative sample for this study.

In Panel B, the correlation coefficients of variables are presented. The ES and individual pillar scores' correlation with the female leader dummy is positive. A similar relationship exists between the female CEO, and female chair dummy and the scores with the exemption of the ES scores that are negatively correlated with the female CEO and female chair, respectively. Most variables have less than a 0.90 Pearson correlation coefficient except for the correlation of the ES scores with the weighted average ES scores. This shows that no multicollinearity exists between variables (Hair *et al.*, 2006).

Table 1 Sample descriptive statistics and correlation matrix

	N	*Mean*	*SD*	*Min*	*Median*	*Max*	*Skewness*	*Kurtosis*
Panel A: Descriptive statistics								
ES	4,989	54.00	22.00	0.01	57.00	92.00	−0.36	−0.81
Env	4,959	52.38	26.13	0.00	55.39	97.25	−0.26	−1.12
Soc	5,043	56.43	21.74	1.15	58.32	96.41	−0.43	−0.50
Gov	5,003	50.37	21.38	1.24	51.52	94.82	−0.09	−0.82
FLeader	4,931	0.07	0.25	0.00	0.000	1.00	3.41	9.66
FCEO	4,931	0.05	0.21	0.00	0.00	1.00	4.38	17.15
FChair	5,043	0.02	0.14	0.00	0.00	1.00	6.92	45.94
Tenure	2,809	1.27	0.91	0.00	1.39	4.61	0.15	−0.70
BoardSize	4,993	4.44	0.56	2.48	4.75	5.63	−1.11	0.46
GenderDiv	4,993	0.31	0.14	0.00	0.31	0.75	−0.23	−0.19
FirmSize	5,043	22.00	1.92	15.80	21.85	27.04	0.37	0.64
Leverage	5,043	0.01	0.05	−0.04	0.01	2.18	32.52	8.57
M-to-B	5,043	4.19	4.98	−3.29	2.60	102.90	5.09	66.96
Slack	4,123	1.76	1.89	0.02	1.35	20.38	5.65	38.79
ROA	5,041	0.07	0.14	−2.03	0.05	0.97	−2.03	33.66

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Panel B: Correlation matrix															
(1) ES															
(2) Env	0.928***	1													
(3) Soc	0.892***	0.657**	1												
(4) Gov	0.444**	0.400**	0.410***	1											
(5) FLeaders	0.034***	0.015	0.048***	0.045	1										
(6) FCEO	0.007***	−0.015	0.030***	−0.017	0.802***	1									
(7) FChair	0.033*	0.029**	0.032	0.085***	0.528	−0.031	1								
(8) Tenure	−0.087**	−0.116	−0.039	−0.066*	−0.007	0.006**	−0.046***	1							
(9) Board_Size	0.406***	0.406*	0.334***	0.260**	0.029***	0.058	−0.030	−0.036***	1						
(10) GenderDiv	0.071***	0.061*	0.065***	0.044***	0.057	0.032***	0.053*	0.022	0.069**	1					
(11) FirmSize	0.422***	0.463	0.297***	0.294*	0.047**	0.055	−0.015***	0.019***	0.530**	0.118	1				
(12) Leverage	0.003	0.027***	−0.026**	0.076***	−0.017	−0.010	−0.012**	0.030***	0.059	0.016**	0.274*	1			
(13) M-to-B	0.014***	−0.075	0.111***	−0.033	0.003***	0.022***	−0.027	0.071***	0.004	−0.071***	−0.323**	0.234	1		
(14) Slack	−0.113	−0.148***	−0.059*	0.047***	0.058**	0.081*	−0.004***	0.070	−0.086	−0.110***	−0.242*	−0.043***	0.148***	1	
(15) ROA	0.133***	0.049	0.208***	−0.047	0.036***	0.055*	−0.018	0.097**	0.132***	0.018	−0.037	−0.147***	0.416***	0.101***	1

Notes: This table shows the descriptive statistics (number of observations, mean, standard deviation minimum, median, maximum, skewness and kurtosis), and the Pearson correlation matrix of ES variables: environmental, social, as well as the average of the ES scores combined, board variables: FLeader is female leader dummy that equals one if a woman is in one or all of the CEO, board chair and CFO positions of firm *i* at time *t* or zeros otherwise, FCEO is a dummy that equals one if a woman is in the CEO position of firm *i* at time *t* or zeros otherwise, FChair is a dummy that equals one if a woman is in the board chairperson position of firm *i* at time *t* or zeros otherwise, Tenure is the natural logarithm of the number of years since the official's appointment to the current year of observation, BoardSize is the natural logarithm of the number of board members in firm *i* at time *t*, GenderDiv is the percentage of women firm *i* board at time *t* and the financial variables: FirmSize (natural log of firm total sales), Leverage is the natural logarithm of total debt over total equity of firm *i* at time *t*, M-to-B is ratio of firm *i* market value of equity to its the book value of equity at time *t*, Slack i.e. current liabilities of firm *i* at time *t* divided by its current asset in the same period, ROA is firm *i* earnings before interest and taxes over its total assets at time *t*; ***, **, * denotes significance at the 1, 5 and 10% level (two-sided test)

Source: Authors' own work

4.2 The influence of female leaders on environmental and social performance of firms

In the empirical analysis, this study focuses on the impact of women leaders in all executive positions and the board as a variable signifying women's leadership presence in the company and isolates the executive (as in e.g. Glass *et al.*, 2016; Lim and Chung, 2021; Larrieta-Rubín de Celis *et al.*, 2015) and board chair (as in e.g. Furlotti *et al.*, 2019) in other analyses. Though a few studies have captured women in leadership by considering both the CEO and board chairperson positions together (Zou *et al.*, 2018), none of note has included the CFOs as in this study. The inclusion of CFOs is motivated by the role they play in the firm and the most recent recognition that has been given to them in the efforts of companies to improve ESG performance. This was well captured in a partner content of financial times [5] that highlighted the need to involve CFOs in the efforts by companies to decarbonize because the actions will remake balance sheets. The data on board and executives of companies used in this study follow a common approach in the literature examining gender differences in corporate positions (Niessen-Ruenzi and Ruenzi, 2019; Jannati *et al.*, 2020; Adams and Kim, 2020; Di Giuli *et al.*, 2022) by identifying the gender of persons based on the first names.

Thus, this study considers first how the presence of female leader(s) in a firm affects the ES performance of the firm. The assumption is that women in CEO, CFO and board chairperson positions all have a significant impact on the direction and activities of the firm in ES issues. Hence, the study identifies and combines women in this group as leaders in evaluating their influence.

The results in Table 2 show that there's a significant increase in the ES scores of firms where there's been at least one position of leadership occupied by a woman. This implies that women on average value the performance of the firm in sustainability issues. This aligns with Adams *et al.*'s (2011) suggestion that women are particular about avoidance of harmful actions to stakeholders. The analysis of pillar scores as shown in Models 3 to 4 indicates that the environmental performance of firms is not significantly improved with women's presence in leadership positions of a firm. A result that is contrary to earlier findings that firms' environmental performance is enhanced with women in a leadership position (Glass *et al.*, 2016) and that firms with more women in top management positions show superior environmental performance (Burkhardt *et al.*, 2020; Kimball *et al.*, 2012). However, social performance increases with the presence of women in at least one leadership position in a firm. This is consistent with earlier findings, documenting evidence of significant commitment by women toward CSR (Lim and Chung, 2021) and improvement in CSR with increased female top executive participation (Hyun *et al.*, 2022; Larrieta-Rubín de Celis *et al.*, 2015).

The altruistic characteristics of women as confirmed in the psychology literature (Gilligan and Attanucci, 1988) would explain female leaders' influence on the social performance of the firm (Zou *et al.*, 2018). This result also supports the conclusion that in comparison with men, women have greater consideration for fairness in the event of alternative perspectives (Eagly and Carli, 2007). This is because the component of the social score centered around others, i.e. employees, product responsibility, human rights and community. The test of bias that may run from female leadership toward the ES performance of firms through corporate governance is done using the governance score in Model 4. It is assumed that the performance of firms in the ES can be influenced by the selection bias of having a woman leader. However, the result shows that the presence of a female leader is not influencing the relationship with firm ES, as female leadership shows no significant relationship with the governance performance of firms.

Next, to ensure that the difference in leadership roles which can be significant, especially in firm decision-making which includes the direction of a firm in CSR is properly identified, this study assesses the impact of women as CEO and board chairpersons on ES performance

Table 2 Female leadership and ES performance of firms

Explanatory variables	*ES* (1)	*Env* (2)	*Soc* (3)	*Gov* (4)
Female_Leaders	0.033	0.031	0.035	−0.086
	2.466**	0.017	2.304**	−0.050
Tenure	0.009	0.009	0.008	−0.703
	2.559**	0.022	2.105**	−1.597
Board_Size	0.029	0.005	0.053	15.913
	3.937***	0.005	6.391***	16.903***
Gender_Diversity	0.067	0.037	0.097	35.938
	2.394**	0.009	3.075***	9.943***
Firm_Size	0.074	0.083	0.065	3.634
	29.134***	0.229	22.635***	10.924***
Leverage	−0.227	−0.317	−0.145	−1.889
	−3.160***	−0.051	−1.794*	−0.204
M-to-B	0.005	0.005	0.004	−0.106
	5.575***	0.042	4.730***	−1.017
Slack	0.001	−0.002	0.005	2.102
	0.783	−0.013	2.768***	11.037***
ROA	0.009	−0.108	0.119	−31.749
	0.304	−0.026	3.446***	−8.060***
Country control	Yes	Yes	Yes	Yes
Year and firm fixed-effects	Yes	Yes	Yes	Yes
Observations	2,129	2,129	2,130	2,122
Adjusted R^2	0.430	0.407	0.286	0.240

Notes: This table shows the results of the impact of female leaders on the average of the environmental and social combined (*ES*) scores and the individual environmental (Env), social (Soc) and governance (Gov)scores. Female_Leader is a dummy that equals one if a woman is in one or all of the CEO, board Chair and CFO positions of firm *i* at time *t* or zeros otherwise, Tenure is the natural logarithm of the number of years since the official's appointment to the current year of observation, Board_Size is the natural logarithm of the number of board members in firm *i* at time *t*, Gender_Diversity is the percentage of women in firm *i* board at time *t*. Firm_Size (natural log of total firm sales), Leverage is the natural logarithm of total debt over total equity of firm *i* at time *t*, MB is the ratio of firm *i* market value of equity to its the book value of equity at time *t*, Slack i.e. current liabilities of firm *i* at time *t* divided by its current asset in the same period, ROA is firm *i* earnings before interest and taxes over its total assets at time *t*. The last rows include the country control, year and firm fixed-effects, the number of observations in the models estimated and adjusted R^2. Firm-level standard error clustering is applied, and *t*-statistics are reported in parentheses. *** (**, *) denotes significance at the 1% (5%, 10%) level (two-sided test)
Source: Authors' own work

of firms separately. This study considers the two major leadership positions (CEO and board chair) widely researched and established in the literature to have a significant impact on firm performance, separately in relation to women's leadership and their influence on the ES performance of firms.

The results in Table 3 show that the presence of a female CEO increases the ES performance of the firm. The result is similar to Meng and Zhu (2023), revealing ES performance of firms improves when female executives play significant roles in top management. The environmental score analysis shows that female CEO presence is not affecting the performance of firms in environmental issues. Glass *et al.* (2016) document similar evidence when considering the relationship between female CEO and firms' environmental strengths and concerns. Meanwhile, the social scores of firms are increasing with the presence of female CEO in firms. This result is in line with the findings of Lim and Chung (2021), revealing that female CEOs have a significant effect on firm CSR in an empirical analysis carried out on over 2,000 US companies. The governance performance of firms is not influenced by the presence of a female CEO. A further confirmation that the result of ES relationship with the female CEO is not biased by sample selection.

Table 3 Female CEOs and ES performance of firms

	ES (1)	*Env* (2)	*Soc* (3)	*Gov* (4)
Female_CEO	0.018	0.021	0.015	−0.036
	2.694***	0.020	1.841*	−0.031
Tenure	0.006	0.003	0.009	0.723
	3.992***	0.012	4.837***	2.720***
Board_Size	0.072	0.072	0.073	8.971
	6.316***	0.061	6.144***	7.321***
Gender_diversity	−0.038	−0.127	0.053	25.719
	−0.377	−0.014	0.518	2.484**
Firm_Size	0.072	0.079	0.064	2.692
	13.304***	0.113	10.356***	3.705***
Leverage	−9.182	−6.693	−11.464	80.075
	−2.459**	−0.013	−2.505**	1.266
M-to-B	0.002	0.0004	0.003	−0.196
	2.924***	0.004	4.135***	−2.013**
Slack	−0.003	−0.015	0.010	−0.703
	−2.266**	−0.084	6.668***	−3.572***
ROA	−0.022	0.011	−0.054	−6.697
	−1.138	0.002	−2.328**	−2.078**
Country control	Yes	Yes	Yes	Yes
Year and firm fixed-effects	Yes	Yes	Yes	Yes
Observations	2,129	2,129	2,130	2,122
Adjusted R^2	0.554	0.375	0.565	0.319

Notes: This table shows the results of the impact of female leaders on the average of the environmental and social combined (*ES*) scores and the individual environmental (Env), social (Soc) and governance (Gov) scores. Female_CEO is a dummy that equals one if a woman is the CEO of firm *i* at time *t* or zeros otherwise, Tenure is the natural logarithm of the number of years since the official's appointment to the current year of observation, Board_Size is the natural logarithm of the number of board members in firm *i* at time *t*, Gender_Diversity is the percentage of women firm *i* board at time *t*. Firm_Size (Natural log of total firm sales), Leverage is the natural logarithm of total debt over total equity of firm *i* at time *t*, MB is the ratio of firm *i* market value of equity to its the book value of equity at time *t*, Slack i.e. current liabilities of firm *i* at time *t* divided by its current asset in the same period, ROA is firm *i* earnings before interest and taxes over its total assets at time *t*. The last rows include the country control, year and firm fixed-effects, the number of observations in the models estimated and adjusted R^2. Firm-level standard error clustering is applied, and *t*-statistics are reported in parentheses. *** (**, *) denotes significance at the 1% (5%, 10%) level (two-sided test)
Source: Authors' own work

In a similar analysis as in Table 3, this study considers the presence of a female chairperson and how it affects the ES performance of the firm. The result is presented in Table 4. No significant relationship exists between the ES and ES pillar scores as shown in Models 1–3. Though the economic significance suggests that firm performance in these scores is increasing, there is no evidence that firms perform better or worse with a woman (*vis-a-vis* man) as board chair. This is contrary to the findings of Furlotti *et al.* (2019), suggesting that female chairpersons believe in social values and pay attention to conflict management and other CSR issues. Interestingly, the governance score analysis shows an increase in female chair presence in a firm. The results in Table 3 and 4 these findings thus reiterate the fact that despite the similarities due to the strive for a common goal i.e. improved firm performance, the roles, and influence of the corporate leaders i.e. CEOs, board chairs, and CFOs are different.

4.3 Transition in leadership and environmental and social performance of firms

The low number of females in leadership roles can be argued to cause selection bias in analyses like this. In addition, the influence of women leaders can be subjective especially if a firm has had a female leader, i.e. CEO or board chair from inception. The implication is

Table 4 Female board chairpersons and ES performance of firms

	ES (1)	*Env* (2)	*Soc* (3)	*Gov* (4)
Female_Chair	0.029	0.035	0.024	0.964**
	1.209	0.019	1.485	2.418
Tenure	0.006	0.004	0.009	0.728
	4.163***	0.015	4.830***	2.760***
Board_Size	0.072	0.073	0.073	8.972
	6.329***	0.061	6.065***	7.366***
Gender_Diversity	−0.039	−0.128	0.052	25.801
	−0.389	−0.014	0.498	2.507**
Firm_Size	0.072	0.079	0.064	2.700
	13.247***	0.112	10.346***	3.733***
Leverage	−8.408	−5.681	−10.950	86.146
	−2.259**	−0.011	−2.406**	1.289
M-to-B	0.002	0.0002	0.003	−0.198
	2.629***	0.001	4.015***	−2.054**
Slack	−0.002	−0.015	0.010	−0.706
	−2.084**	−0.082	6.798***	−3.605***
ROA	−0.023	0.008	−0.054	−6.642
	−1.214	0.002	−2.345**	−2.065**
Country control	Yes	Yes	Yes	Yes
Year and firm fixed-effects	Yes	Yes	Yes	Yes
Observations	2,142	2,142	2,143	2,135
Adjusted R^2	0.553	0.374	0.565	0.321

Notes: This table shows the results of the impact of female leaders on the average of the environmental and social combined (*ES*) scores and the individual environmental (Env), social (Soc) and governance (Gov) scores. Female_Chair is a dummy that equals one if a woman is the board chairperson in firm *i* at time *t* or zeros otherwise, Tenure is the natural logarithm of the number of years since the official's appointment to the current year of observation, Board_Size is the natural logarithm of the number of board members in firm *i* at time *t*, Gender_Diversity is the percentage of women firm *i* board at time *t*. Firm_Size (Natural log of total firm sales), Leverage is the natural logarithm of total debt over total equity of firm *i* at time *t*, MB is the ratio of firm *i* market value of equity to its the book value of equity at time *t*, Slack i.e. current liabilities of firm *i* at time *t* divided by its current asset in the same period, ROA is firm *i* earnings before interest and taxes over its total assets at time *t*. The last rows include the country control, year and firm fixed-effects, the number of observations in the models estimated and adjusted R^2. Firm-level standard error clustering is applied, and *t*-statistics are reported in parentheses. *** (**, *) denotes significance at the 1% (5%, 10%) level (two-sided test)
Source: Authors' own work

that the accompanying positive impact due to the female leader's presence in the firm may be a result of external factors such as public reception that afford it financial and reputation benefits. According to Di Giuli *et al.* (2022), there is a higher likelihood that firms headed by female CEOs enjoy favorable voting by women-led management mutual funds. This may be due to two reasons. First, there is a tendency for favorable gender in-group bias (Hewstone *et al.*, 2002) from women-led fund managers toward female leaders. Second, the high-risk aversion preference exhibited by female leaders ensures that investors' funds are secure as a result of their inclination to reduce leverage and volatile earnings (Faccio *et al.*, 2016). As such, this study considers the effect of changes in leadership positions from male to female on a firm's ES performance, i.e. the study examines the influence of female leaders on the ES performance of firms where the female leader has replaced a male leader in the same position. The result of this analysis focusing on changes in the CEO and board chair positions of firms is presented in Table 5.

The result in Models 1–3 shows an increase in the weighted average of the ES performance as well as the ES pillar scores where a firm has had a change in CEO from a man to a female. The result is similar to the findings of Zou *et al.* (2018) that documented evidence of a positive relationship between transition in executives' position from male to female and

Table 5 Male to female transition in leadership and ES performance of firms

	ES (1)	*Env* (2)	*Soc* (3)	*Gov* (4)	*ES* (5)	*Env* (6)	*Soc* (7)	*Gov* (8)
MtoF_EXE	0.006	0.015	0.037	−6.223				
	1.958*	2.136**	2.066**	−3.059***				
MtoF_Chair					0.052	0.171	0.120	2.788***
					1.343	1.361	1.109	4.224
Tenure	0.007	0.004	0.009	−0.671	0.007	0.011	0.009	−0.649
	4.382***	2.581***	2.253**	−1.538	4.379***	2.447**	2.254**	−1.482
Board_Size	0.030	0.006	0.053	15.971	0.030	0.006	0.054	15.880
	4.090***	0.006	6.464***	17.063***	4.139***	0.678	6.540***	16.932***
Gender_Diversity	0.065	0.033	0.097	35.710	0.064	0.033	0.095	35.945
	2.313**	0.008	3.077***	9.923***	2.287**	0.906	3.026***	9.967***
Firm_Size	0.071	0.074	0.065	3.707	0.071	0.083	0.066	3.610
	10.449***	10.895***	22.832***	11.251***	10.491***	25.033***	23.098***	10.983***
Leverage	−8.779	−5.977	−14.846	−162.755	−8.661	−31.911	−14.496	−218.846
	−2.334**	−2.049**	−1.836*	−0.176	−2.305**	−3.396***	−1.792*	−0.237
M-to-B	0.002	0.0002	0.004	−0.102	0.002	0.005	0.004	−0.103
	2.734***	0.296	4.774***	−0.982	2.706***	4.602***	4.773***	−0.985
Slack	−0.003	−0.015	0.005	2.165	−0.003	−0.002	0.005	2.109
	−2.081**	−12.410***	2.794***	11.405***	−2.048**	−0.976	3.009***	11.133***
ROA	−0.026	0.004	0.111	−30.977	−0.025	−0.118	0.120	−32.448
	−1.344	0.173	3.234***	−7.881***	−1.313	−2.927***	3.521***	−8.297***
Country control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	No	Yes	No	Yes	Yes	Yes
Firm FE	Yes	No	No	Yes	No	Yes	Yes	Yes
Observations	2,142	2,142	2,143	2,135	2,142	2,142	2,143	2,135
Adjusted R^2	0.503	0.307	0.288	0.245	0.503	0.403	0.287	0.241

Notes: This table shows the results of the impact of change in leadership from male to female on the average of the environmental and social combined (*ES*) scores and the individual environmental (Env), social (Soc) and governance (Gov) scores. MtoF_EXE is a dummy that equals one if the new appointee into the CEO position is a woman and replacing a man in firm *i* at time *t* or zeros otherwise, MtoF_Chair is a dummy that equals one if the new appointee into the board chairperson position is a woman and replacing a man in firm *i* at time *t* or zeros otherwise, Tenure is the natural logarithm of the number of years since the official's appointment to the current year of observation, Board_Size is the natural logarithm of the number of board members in firm *i* at time *t*, Gender_Diversity is the percentage of women firm *i* board at time *t*. Firm_Size (Natural log of total firm sales), Leverage is the natural logarithm of total debt over total equity of firm *i* at time *t*, MB is the ratio of firm *i* market value of equity to its the book value of equity at time *t*, Slack i.e. current liabilities of firm *i* at time *t* divided by its current asset in the same period, ROA is firm *i* earnings before interest and taxes over its total assets at time *t*. The last rows include the country control, year and firm fixed-effects, the number of observations in the models estimated and adjusted R^2. Firm-level standard error clustering is applied, and *t*-statistics are reported in parentheses. *** (**, *) denotes significance at the 1% (5%, 10%) level (two-sided test)

Source: Authors' own work

CSR strength. However, this study adds to the understanding of the influence of the transition by considering the performance in ES activities of a firm. The significant influence of female CEO after the firm's transition may be explained by the widely argued fact in the literature (Byoun *et al.*, 2016), that in corporate decision-making, female managers demonstrate significant differences from their male counterparts. These are based on highlighted care characteristics of the female gender (Adams and Ferreira, 2009) that include e.g. focus on fairness (Kruger, 2009). The relationship between male-to-female transition in the CEO position of a firm and the governance score shows a decreasing influence, suggesting that the transition is not positively influencing firm performance in governance and thus alleviates the bias tendency as a result of sample selection.

A repeat of similar analyses considering the transition in board chair position from male to female is done. The result in Models 5–7 of Table 5 shows that there is no significant improvement in the ES performance of firms that have had the transition from a male-to-female board chair. The result is contrary to the findings of Zou *et al.* (2018) that showed a positive link between male-to-female transition in CEO and the board chair position. This study provides a robust assessment of the influence of the transition different from earlier

studies by looking at the CEO and board position separately. It thus shows that analysis considering both positions together may be drawing false conclusions. Interestingly, the relationship between the transition and firm governance performance is positive.

To establish concretely that the influence of transition on firm ES performance is due to gender difference and not just change in personnel regardless of gender, this study considers transitions in firms where a male CEO or board chair replaces another man in the position. As shown in Table 6, CEO change in firms where a man takes over from another man is decreasing the ES and social performance of the firm. The result conforms with Zou *et al.*'s (2018) findings that male-to-male corporate leadership is associated with lesser CSR strength in comparison with male-to-female transitions in similar roles. The impact of the transitions is insignificant on the corporate governance of the firm as shown in Model 4.

Similarly, models examining the influence of male-to-male transition in corporate boards on the ES performance of firms show that a firm's ESG performance is not affected by transition in board chair position when a man has replaced another man in the office. This result

Table 6 Male to male transition in leadership and ES performance of firms

	ESG (1)	*Env* (2)	*Soc* (3)	*Gov* (4)	*ESG* (5)	*Env* (6)	*Soc* (7)	*Gov* (8)
MtoM_EXE	−0.020	0.039	−0.016	−0.880				
	−3.585***	−1.724	−1.935*	−0.948				
MtoM_Chair					−0.010	−0.029	−0.084	−0.573
					−0.505	−0.920	−0.082	−0.724
Tenure	0.004	0.011	0.009	−0.631	0.003	0.010	0.009	−0.688
	1.398	0.028	2.272**	−1.443	1.269	2.368**	2.300**	−1.580
Board_Size	0.076	0.012	0.056	16.018	0.073	0.006	0.055	15.688
	13.040***	0.012	6.745***	16.892***	12.557***	0.605	6.701***	16.762***
Gender_Diversity	0.169	0.039	0.098	36.068	0.166	0.033	0.097	35.759
	7.620***	0.010	3.109***	9.996***	7.457***	0.903	3.081***	9.950***
Firm_Size	0.061	0.083	0.066	3.617	0.061	0.083	0.066	3.669
	30.507***	0.234	23.161***	11.003***	30.328***	25.056***	22.981***	11.189***
Leverage	−18.708	−31.166	−14.211	−202.239	−19.079	−31.858	−14.703	−192.653
	−3.287***	−0.050	−1.757*	−0.219	−3.342***	−3.390***	−1.821*	−0.209
M-to-B	0.003	0.005	0.004	−0.103	0.003	0.005	0.004	−0.097
	5.088***	0.042	4.764***	−0.992	5.103***	4.612***	4.742***	−0.938
Slack	0.009	−0.001	0.005	2.126	0.009	−0.002	0.005	2.097
	7.694***	−0.007	3.178***	11.176***	7.352***	−0.997	3.064***	11.107***
ROA	−0.066	−0.113	0.122	−32.314	−0.069	−0.117	0.115	−31.812
	−2.759***	−0.028	3.574***	−8.260***	−2.849***	−2.897***	3.379***	−8.156***
Country control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	No	Yes	No	Yes	Yes	Yes
Firm FE	Yes	No	No	Yes	No	Yes	Yes	Yes
Observations	2,143	2,142	2,143	2,135	2,143	2,142	2,143	2,135
Adjusted R^2	0.459	0.408	0.288	0.242	0.456	0.403	0.290	0.247

Notes: This table shows the results of the impact of change in leadership from male to male on the average of the environmental and social combined (*ES*) scores and the individual environmental (Env), social (Soc) and governance (Gov) scores. MtoM_EXE is a dummy that equals one if the new appointee into the CEO position is a man and replacing another man in firm *i* at time *t* or zeros otherwise, MtoM_Chair is a dummy that equals one if the new appointee into the board chairperson position is a man and replacing another man in firm *i* at time *t* or zeros otherwise, Tenure is the natural logarithm of the number of years since the official's appointment to the current year of observation, Board_Size is the natural logarithm of the number of board members in firm *i* at time *t*, Gender_Diversity is the percentage of women firm *i* board at time *t*. Firm_Size (Natural log of total firm sales), Leverage is the natural logarithm of total debt over total equity of firm *i* at time *t*, MB is the ratio of firm *i* market value of equity to its the book value of equity at time *t*, Slack i.e. current liabilities of firm *i* at time *t* divided by its current asset in the same period, ROA is firm *i* earnings before interest and taxes over its total assets at time *t*. The last rows include the country control, year and firm fixed-effects, the number of observations in the models estimated and adjusted R^2. Firm-level standard error clustering is applied, and *t*-statistics are reported in parentheses. *** (**, *) denotes significance at the 1% (5%, 10%) level (two-sided test)

Source: Authors' own work

provides a robust conclusion for the finding that women's leadership is associated with improved social performance of firms.

5. Summary and conclusion

This study considers the influence of corporate female leadership on the ES performance of firms in Nordic countries. The study bridges the gap in the existing literature by examining the topic in a region that led in efforts to increase women's participation in corporate boards and management since Norway first introduced and implemented the gender quota law in 2006. The channel through which female leadership influences the ESG performance of firms is based on either the high risk-aversion preference or altruistic characteristics associated with women. Both of which align with the focus of corporate ESG practices.

The findings of this study showed that female leadership is associated with increased ES and social performance of the firm. This further confirms the female altruistic attributes which suggest that women care more about others in corporate decisions. A closer examination showed that the ES and social performance of firms only increased with the presence of a female CEO and not a female board chairperson. The insignificant relationship between female leader presence in firms and environmental performance can be explained by the outweighing regulatory demands from firms and accompanying sanctions to meet environmental sustainability standards. The regulations require strict compliance by firms which goes beyond gender-characteristic differences in leadership. In the analysis considering transitions in corporate leadership positions, this study documents evidence of increasing ES as well as ES pillar scores performance where a female CEO replaces a male CEO in a firm. No significant impact was found in the case of the board chair transition from male to female in firms. Similarly, there is no established positive impact of a transition from male to male in either CEO or board chair positions in firms on ES performance.

This study thus add to the literature on the understanding of the aspects of ESG that are influenced by women's leadership and differences that exists in the different leadership role's influence on the firm ESG performance. In addition, a number of policy implications are derived from the finding of this study. At the microlevel, this study opines that firms can leverage the altruistic and risk-aversion preferences of women by appointing them into corporate leadership positions to achieve improved performance built on optimal sustainability activities. On the macrolevel, governments and agencies promoting sustainable development would benefit more from the appointment of women into leadership positions in policy design and implementation.

However, there are a few limitations to this study. First, the percentage of females in corporate leadership positions is still relatively low in publicly listed firms. This could be argued to influence the result. Nevertheless, the motivation for studying this topic which arises from the minority influence perspective is a strong point. Second, typically leadership positions especially that of the CEO do not change much in Nordic firms. As such, the impact of the influence of transition may not be too pronounced in this study, especially with limited ESG data on firms. A good suggestion for future research will be a study that considers closely the components of the social pillar scores, i.e. CSR, to understand the aspects that are influenced by female leaders.

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Notes

1. The ES is a weighted average of the environmental and social scores of a firm in a year.
2. The Centre provides a detailed data description including sources and methods of collection.
3. The MTFs are commonly used by growth companies in their early stages of growth and development. They are First North Sweden, First North Finland, and Nordic SME.
4. The gender of persons in executive or board positions has been identified by their first name according to the data source- Center for Corporate Governance, Copenhagen Business School.
5. https://bcg.ft.com/article/cfos-must-lead-efforts-to-net-zero?utm_source=FT&utm_medium=Premium_Native_Amplification

References

Adams, R.B. and Ferreira, D. (2009), "Women in the boardroom and their impact on governance and performance", *Journal of Financial Economics*, Vol. 94 No. 2, pp. 291-309.

Adams, R.B. and Funk, P. (2012), "Beyond the glass ceiling: does gender matter?", *Management Science*, Vol. 58 No. 2, pp. 219-235.

Adams, R.B. and Kim, M.S. (2020), "Gender discrimination as a consequence of team failure", *available at SSRN 3215521*.

Adams, R.B., Licht, A.N. and Sagiv, L. (2011), "Shareholders and stakeholders: how do directors decide?", *Strategic Management Journal*, Vol. 32 No. 12, pp. 1331-1355.

Aguilera-Caracuel, J., Guerrero-Villegas, J., Vidal-Salazar, M.D. and Delgado-Márquez, B.L. (2015), "International cultural diversification and corporate social performance in multinational enterprises: the role of slack financial resources", *Management International Review*, Vol. 55 No. 3, pp. 323-353.

Ahern, K.R. and Dittmar, A.K. (2012), "The changing of the boards: the impact on firm valuation of mandated female board representation", *The Quarterly Journal of Economics*, Vol. 127 No. 1, pp. 137-197.

Al Fadli, A., Sands, J., Jones, G., Beattie, C. and Pensiero, D. (2019), "Board gender diversity and CSR reporting: evidence from Jordan", *Australasian Accounting, Business and Finance Journal*, Vol. 13 No. 3, pp. 29-52.

Alshorman, S., Qaderi, S., Alhmoud, T. and Meqbel, R. (2022), "The role of slack resources in explaining the relationship between corporate social responsibility disclosure and firm market value: a case from an emerging market", *Journal of Sustainable Finance & Investment*, pp. 1-20.

Altunbas, Y., Gambacorta, L., Reghezza, A. and Velliscig, G. (2022), "Does gender diversity in the workplace mitigate climate change?", *Journal of Corporate Finance*, Vol. 77, p. 102303.

Barber, B.M. and Odean, T. (2001), "Boys will be boys: gender, overconfidence, and common stock investment", *The Quarterly Journal of Economics*, Vol. 116 No. 1, pp. 261-292.

Bernstein, R., Buse, K. and Bilimoria, D. (2016), "Revisiting agency and stewardship theories: perspectives from nonprofit board chairs and CEOs", *Nonprofit Management and Leadership*, Vol. 26 No. 4, pp. 489-498.

Booth, A. and Nolen, P. (2012), "Choosing to compete: how different are girls and boys?", *Journal of Economic Behavior & Organization*, Vol. 81 No. 2, pp. 542-555.

Brammer, S., Millington, A. and Pavelin, S. (2007), "Gender and ethnic diversity among UK corporate boards", *Corporate Governance: An International Review*, Vol. 15 No. 2, pp. 393-403.

Braun, P. (2010), "Going green: women entrepreneurs and the environment", *International Journal of Gender and Entrepreneurship*, Vol. 2 No. 3.

Buallay, A. (2018), "Is sustainability reporting (ESG) associated with performance? Evidence from the European banking sector", *Management of Environmental Quality: An International Journal*, Vol. 30 No. 1.

Burkhardt, K., Nguyen, P. and Poincelot, E. (2020), "Agents of change: women in top management and corporate environmental performance", *Corporate Social Responsibility and Environmental Management*, Vol. 27 No. 4, pp. 1591-1604.

Byoun, S., Chang, K. and Kim, Y.S. (2016), "Does corporate board diversity affect corporate payout policy?", *Asia-Pacific Journal of Financial Studies*, Vol. 45 No. 1, pp. 48-101.

Cheng, B., Ioannou, I. and Serafeim, G. (2014), "Corporate social responsibility and access to finance", *Strategic Management Journal*, Vol. 35 No. 1, pp. 1-23.

Cook, N.J., Grillos, T. and Andersson, K.P. (2019), "Gender quotas increase the equality and effectiveness of climate policy interventions", *Nature Climate Change*, Vol. 9 No. 4, pp. 330-334.

Cronqvist, H. and Yu, F. (2017), "Shaped by their daughters: executives, female socialization, and corporate social responsibility", *Journal of Financial Economics*, Vol. 126 No. 3, pp. 543-562.

Croson, R. and Gneezy, U. (2009), "Gender differences in preferences", *Journal of Economic Literature*, Vol. 47 No. 2, pp. 448-474.

Daily, C.M. and Dalton, D.R. (1997), "CEO and board chair roles held jointly or separately: much ado about nothing?", *Academy of Management Perspectives*, Vol. 11 No. 3, pp. 11-20.

Davidson, D.J. and Haan, M. (2012), "Gender, political ideology, and climate change beliefs in an extractive industry community", *Population and Environment*, Vol. 34 No. 2, pp. 217-234.

Di Giuli, A., Garel, A. and Petit-Romec, A. (2022), "The voting behavior of women-led mutual funds", *available at SSRN*.

Dikolli, S.S., Mayew, W.J. and Nanda, D. (2014), "CEO tenure and the performance-turnover relation", *Review of Accounting Studies*, Vol. 19 No. 1, pp. 281-327.

Duru, A., Iyengar, R.J. and Zampelli, E.M. (2016), "The dynamic relationship between CEO duality and firm performance: the moderating role of board independence", *Journal of Business Research*, Vol. 69 No. 10, pp. 4269-4277.

Eagly, A.H. and Carli, L.L. (2007), *Through the Labyrinth: The Truth about How Women Become Leaders*, Harvard Business Press, Harvard.

Eckel, C.C. and Grossman, P.J. (2008), "Men, women and risk aversion: experimental evidence", *Handbook of Experimental Economics Results*, Vol. 1, pp. 1061-1073.

Faccio, M., Marchica, M.-T. and Mura, R. (2016), "CEO gender, corporate risk-taking, and the efficiency of capital allocation", *Journal of Corporate Finance*, Vol. 39, pp. 193-209.

Francis, B.B., Hasan, I., Shen, Y.V. and Wu, Q. (2021), "Do activist hedge funds target female CEOs? The role of CEO gender in hedge fund activism", *Journal of Financial Economics*, Vol. 141 No. 1, pp. 372-393.

Furlotti, K., Mazza, T., Tibiletti, V. and Triani, S. (2019), "Women in top positions on boards of directors: gender policies disclosed in Italian sustainability reporting", *Corporate Social Responsibility and Environmental Management*, Vol. 26 No. 1, pp. 57-70.

Galbreath, J. (2011), "Are there gender-related influences on corporate sustainability? A study of women on boards of directors", *Journal of Management & Organization*, Vol. 17 No. 1, pp. 17-38.

Gilligan, C. and Attanucci, J. (1988), "Two moral orientations: gender differences and similarities", *Merrill-Palmer Quarterly*, pp. 223-237.

Glass, C., Cook, A. and Ingersoll, A.R. (2016), "Do women leaders promote sustainability? Analyzing the effect of corporate governance composition on environmental performance", *Business Strategy and the Environment*, Vol. 25 No. 7, pp. 495-511.

Grewal, R., Chakravarty, A., Ding, M. and Liechty, J. (2008), "Counting chickens before the eggs hatch: associating new product development portfolios with shareholder expectations in the pharmaceutical sector", *International Journal of Research in Marketing*, Vol. 25 No. 4, pp. 261-272.

Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E. and Tatham, R.L. (2006), *Multivariate Data Analysis*, Vol. 6, Pearson Prentice Hall, Upper Saddle River, NJ.

Hewstone, M., Rubin, M. and Willis, H. (2002), "Intergroup bias", *Annual Review of Psychology*, Vol. 53 No. 1, pp. 575-604.

Hyun, S., Kim, J.M., Han, J. and Anderson, M. (2022), "Female executive leadership and corporate social responsibility", *Accounting & Finance*, Vol. 62 No. 3, pp. 3475-3511.

Jannati, S., Kumar, A., Niessen-Ruenzi, A. and Wolfers, J. (2020), "In-group bias in financial markets", *available at SSRN 2884218*.

Khatri, I. (2022), "Board gender diversity and sustainability performance: Nordic evidence", *Corporate Social Responsibility and Environmental Management*, Vol. 30 No. 3.

Kimball, A., Palmer, D. and Marquis, C. (2012), "The impact of women top managers and directors on corporate environmental performance", *available at SSRN 2211826*.

Kolk, A. and Van Tulder, R. (2010), "International business, corporate social responsibility and sustainable development", *International Business Review*, Vol. 19 No. 2, pp. 119-125.

Kruger, P. (2009), "Corporate social responsibility and the board of directors", working paper (job market paper), Toulouse School of Economics, Toulouse.

Landry, E.E., Bernardi, R.A. and Bosco, S.M. (2016), "Recognition for sustained corporate social responsibility: female directors make a difference", *Corporate Social Responsibility and Environmental Management*, Vol. 23 No. 1, pp. 27-36.

Larrieta-Rubín de Celis, I., Velasco-Balmaseda, E., Fernández de Bobadilla, S., Alonso-Almeida, M. D M. and Intxaurburu-Clemente, G. (2015), "Does having women managers lead to increased gender equality practices in corporate social responsibility?", *Business Ethics: A European Review*, Vol. 24 No. 1, pp. 91-110.

Lim, M.-H. and Chung, J.Y. (2021), "The effects of female chief executive officers on corporate social responsibility", *Managerial and Decision Economics*, Vol. 42 No. 5, pp. 1235-1247.

Liu, C. (2018), "Are women greener? Corporate gender diversity and environmental violations", *Journal of Corporate Finance*, Vol. 52, pp. 118-142.

Lueg, R., Pedersen, M.M. and Clemmensen, S.N. (2015), "The role of corporate sustainability in a low-cost business model – a case study in the Scandinavian fashion industry", *Business Strategy and the Environment*, Vol. 24 No. 5, pp. 344-359.

Matsa, D.A. and Miller, A.R. (2013), "A female style in corporate leadership? Evidence from quotas", *American Economic Journal: Applied Economics*, Vol. 5 No. 3, pp. 136-169.

Meng, X. and Zhu, P. (2023), "Females' social responsibility: the impact of female executives on ESG performance", *Applied Economics Letters*, pp. 1-6.

Niessen-Ruenzi, A. and Ruenzi, S. (2019), "Sex matters: gender bias in the mutual fund industry", *Management Science*, Vol. 65 No. 7, pp. 3001-3025.

Seierstad, C. and Huse, M. (2017), "Gender quotas on corporate boards in Norway: ten years later and lessons learned", *Gender Diversity in the Boardroom: Volume 1: The Use of Different Quota Regulations*, Springer, Cham, pp. 11-45.

Smith, A. and Rogers, V. (2000), "Ethics-related responses to specific situation vignettes: evidence of gender-based differences and occupational socialization", *Journal of Business Ethics*, Vol. 28 No. 1, pp. 73-85.

Surroca, J., Tribó, J.A. and Waddock, S. (2010), "Corporate responsibility and financial performance: the role of intangible resources", *Strategic Management Journal*, Vol. 31 No. 5, pp. 463-490.

Teigen, M. (2012), "Gender quotas for corporate boards in Norway: innovative gender equality policy", *Women on Corporate Boards and in Top Management: European Trends and Policy*, Springer, Cham, pp. 70-90.

Tiwari, A.K. and Ahamed, N. (2018), "Executive tenure and firm performance: an empirical examination of Indian corporate landscape", *Advances in Decision Sciences*, Vol. 22, pp. 1-29.

Vitezić, N., Vuko, T. and Mörec, B. (2012), "Does financial performance have an impact on corporate sustainability and CSR disclosure? A case of Croatian companies", *Journal of Business Management*.

Yarram, S.R. and Adapa, S. (2021), "Board gender diversity and corporate social responsibility: is there a case for critical mass?", *Journal of Cleaner Production*, Vol. 278, p. 123319.

Zhou, S., Simnett, R. and Green, W. (2017), "Does integrated reporting matter to the capital market?", *Abacus*, Vol. 53 No. 1, pp. 94-132.

Zou, Z., Wu, Y., Zhu, Q. and Yang, S. (2018), "Do female executives prioritize corporate social responsibility?", *Emerging Markets Finance and Trade*, Vol. 54 No. 13, pp. 2965-2981.

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