

# *ESG and Firm Performance: Evidence from the Nordic Countries\**

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## **Abstract**

This study examines the relationship between ESG and firm financial performance and market valuation using data on publicly listed firms in the Nordic countries from 2010 to 2020. The results show that ESG scores and individual pillar scores are positively related to profitability and firm valuation except for the governance pillar score which is negatively related to profitability. Further analysis shows a bi-directional relationship between ESG and firm profitability. This aligns with earlier studies suggesting that corporate sustainability is a predictor as well as a consequence of corporate financial performance.

## **Keywords:**

ESG; financial performance; firm valuation; Nordic countries

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## 1 Introduction

Sustainability has received increased attention during the past decade, as climate change, biodiversity loss, human rights, and social justice have taken center stage in public discussion. Following public interest, investors have begun to direct investments into firms that align their operations to meet sustainability goals. For firms, this has meant a tremendous challenge, yet an opportunity at the same time. As a result, many studies have been carried out on the relationship between corporate social responsibility, which has evolved into corporate sustainability, and firm performance. The relationship between sustainability and firms' financial performance is still an open issue with conflicting results (c.f., Khan, 2022). Some studies support a positive relationship (see, e.g., Fatemi et al., 2015; Wang and Sarkis, 2017; Pulino et al., 2022) whereas others find a negative relationship (see, e.g., Branco and Rodrigues, 2008; Lee and Faff, 2009; Duque-Grisales and Aguilera-Caracuel, 2021). A few studies have even found no evidence of linking sustainability performance to financial performance and the value of firms (e.g., Statman, 2006; Horváthová, 2010; Orlitzky et al., 2003).

These mixed results in empirical research on the relationship between sustainability and firm profitability as well as valuation are arguably due to several issues. Earlier studies suffered from measurement concerns and data constraints (Li et al., 2018). Namely, there was no commonly used measure for firms' actions and commitment toward sustainable operations. Luckily, more recently, many new measures for sustainability have emerged – although still somewhat controversial – with one of the most used being the ESG scoring. It typically considers firms' past performance on Environmental (E), Social (S), and Governance (G) issues. Furthermore, earlier results were often based on short sample periods which can hide the fact that incorporation of sustainable practices into existing firm operations may take some time before it is fully reflected in their ESG score and, in their financial performance. On the other hand, studies may have used a too narrow focus for the financial performance by examining only on a single measure. The impact of sustainability can differ, e.g., for valuation and profitability.

However, the main concern with the prior studies can be said to stem from the fact that the relationship between financial performance and sustainability is likely to be bi-directional which is a cause for concern econometrically.<sup>1</sup> For example, improved ESG performance can lead to higher profitability (e.g., via brand recognition and higher sales) and valuation (e.g., via positive screening), but firms with better financial performance can reciprocally do more to improve their ESG performance. From the theoretical point of view, research on the relationship between sustainability/ESG and firm financial performance is motivated by both shareholder and stakeholder theory. The main question centers around diverging views on the goal of the firms. Studies that document negative relationships have justified the finding with the shareholder theory of Friedman (1970) which suggests that a firm's sole responsibility is to maximize profits and deliver wealth to owners. Similarly, a positive relationship has been seen as support for the stakeholder theory of Freeman (1984), which concludes that the firm is responsible to all stakeholders (including the shareholders, creditors, employees, and community). Ultimately, the relationship between sustainability and a firm's financial performance is still a controversial one, and further empirical research is warranted.

In this study, we use ESG and financial data of publicly listed firms in the Nordic countries

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<sup>1</sup> There are also other econometrical issues. For example, studying the relationship between stock price and ESG performance, as done in some studies, is a questionable approach from an econometric perspective because non-stationarity of stock prices can inflate the t-statistics which then results in false interpretation.

– a region with a long history in sustainability – to study the relationship between ESG and the financial performance of the firms. We use a long sample from 2010 to 2020 to capture the improvements in firms' sustainability performance over longer periods. Most of the earlier studies on ESG have utilized shorter samples. Although a few studies on corporate sustainability have been carried out in the Nordic countries, our approach to studying the relationship with firm performance differs. For example, Lueg and Pesheva (2021) studied the relationship between corporate sustainability and total shareholder return (i.e., observed stock market return), whereas we utilize two different measures of financial performance. The first one is the return on assets (ROA), which reflects the profitability of the firm and allows for testing the tendency for reverse causality as could be the case in the profitability relationship with firm ESG performance. This is done with the approach of including lags of either variable (ESG and ROA) as a determinant of the other in alternative models explaining the relationship. The second one is Tobin's Q, which measures the valuation of the firm, and, as such, is more a forward-looking measure of the firm's financial performance. Our approach provides a robust conclusion that goes beyond the limitations of myopic interpretation caused by using only short samples and one measure of firm performance.

Generally, most studies on the relationship between firms' valuation and financial performance with firms' ESG performance have been done on the US market or less ESG-developed markets (see, e.g., Jayachandran et al., 2013; Fatemi et al., 2018; Buallay, 2019; Miralles-Quirós et al., 2018; Duque-Grisales and Aguilera-Caracuel, 2019; Ahsan and Qureshi, 2021). Our focus on the Nordic countries is motivated by the *ex-ante* expectation of good incorporation of sustainability values in companies' practice. Thus, one can expect to see a robust impact between sustainability and financial performance, if such a relationship exists. For example, Gjølborg (2010), and Strand et al. (2015) note that Nordic countries are characterised by thoughtful leadership in corporate sustainability. This is also seen, for example, from the Global Sustainable Competitiveness Ranking 2021, where all the Nordic countries occupy a position in the top six. The Nordic countries send strong signals to the rest of the world through leadership on human rights issues, social and welfare policies, and unwavering dedication to development aid. All of these show the homogeneity of the Nordic countries in pursuing these common goals.

Furthermore, the Nordic area shares unique regional similarities in sustainable development, yet few interesting national differences in governance approaches that tickle down to the implementation of the SDGs in their respective countries. These countries also share relatively similar welfare systems. A good welfare system can influence a firm's decision to align with sustainability values such as employee welfare, social inclusion, and gender equality. In addition, the ESG scores are calculated based on companies' self-reported activities in various areas of the components. This means the scores rely on the credibility and transparency of the companies to report genuine performance in issues of sustainability. The Nordic countries are known for integrity and transparency in reporting which can be expected to transcend through to comparable ESG scores. Overall, these countries have a culture that is grounded in creating value for society through deliberate and designed corporate sustainability practices that influence the companies' business models (Strand et al., 2015).

Thus, this paper contributes to the literature on sustainability most notably by establishing that the relationship between ESG and firms' financial performance does not have to be one-way but rather a complement of each other. The result contributes to the ongoing discussion on the purpose of the company. For example, Graham (2022) reports a shift from shareholder wealth maximization towards a more balanced view of the stakeholders during the past two

decades in US firms. In addition, the uniqueness of the employed data from countries, in which companies can be said to be at the forefront of actions on sustainability, shows evidence of future development in other countries.

The result of this study shows that using the whole sample, profitability is influenced by the current and immediate past year ESG scores of the firm. At the same time, firms tend to have higher ESG performance when the company has had higher profitability in the current and immediate past year. In pillar scores analysis, only the social pillar of ESG is positive and significantly related to profitability, the governance pillar is related to decreased profitability as we find a negative and significant relationship between the governance pillar score and ROA. Firm valuation is found to be positively related to all individual ESG pillars, the overall ESG score of firms, and immediate past year ESG scores. However, the significance of past period ESG scores seems to matter when more than one year of ESG historical performance is considered with firm valuation.

The rest of the article is organised as follows. In Section 2 we review existing literature in this field of study in more detail and develop testable hypotheses. In Section 3 we discuss our research design. In Section 4 we present the main empirical results, and additional considerations and discuss their implications while the final section summarises the paper and sets out the conclusions while we offer suggestions for further research.

## 2 Literature review and hypothesis development

### 2.1 Motivation for sustainability in firms

Over the years, the world has witnessed several environmental disasters that can be said to be the results of company actions.<sup>2</sup> However, it is the accumulated daily impact of companies that has the biggest impact on the environment going forward. The role of the companies in the environmentally sensitive industry (ESI) will be critical for the development, ranging from emission issues (e.g., global greenhouse gas emissions) to resource use. Companies' environmental impact has also social and economic effects on our world. Social issues like employee welfare, community development, and product responsibility are actions demanded from all companies regardless of their industry.

The motives for companies to engage in ESG activities have been widely explored in the literature over the years. Brønn and Vidaver-Cohen (2009) examined the topic by answering three important questions: what do managers see as important reasons for engaging in society-benefiting activities, whether the reasons differ across industries, and whether empirical support can be found for documented theoretical explanations for firms engaging in ESG activities. They addressed these questions from the theoretical perspective of Davis (1973) highlighting key motives for firms as long-run self-interest that will ensure long-term future performance as well as preservation of public image, the need to maintain continuous relevance which is essential in societal value creation and would ensure that the institution of business retains social power. In addition, the avoidance of regulation which may force companies to lose the flexibility in decision-making and can be costly is cited as another incentive for them to adopt a cheaper alternative in social initiatives and engagements. Other motivation includes changes in sociocultural norms and the business profitability attributed to solving social and societal issues.

<sup>2</sup> One could mention, for example, the 1986 Nuclear Power Plant Explosion in Chernobyl Ukraine, the Exxon Valdez Oil Spill of 1989, and the 2010 British Petroleum Oil Spill in the Gulf of Mexico.

Largely, the strategic perspective for motives why firms engage in ESG activities is argued from both instrumental and institutional perspectives (Hahn and Scheermesser, 2006). Several studies have shown that the instrumental perspective stems from the belief that the profitability of a firm is improved and maintained through social/ESG initiatives (see, e.g., Gardberg and Fombrun, 2006; Aguilera et al., 2007). The institutional perspective of the motive results from institutional pressures faced by firms to engage in social/ESG initiatives (Babiak and Trendafilova, 2011). According to Davis (1973), the increasing demand for CSR/ESG values has redefined legitimacy criteria for businesses such that economic outlook is not enough to maintain public support, but CSR/ESG values are also required. Finally, a moral perspective is identified as another motivation for firms' engagement in CSR/ESG activities. This is based on the ethical idea that the business has a duty to 'give back' to society. While this perspective is said to have been replaced by the strategic perspective (Kotler and Lee, 2005), the desire to positively contribute to society is still a moral value that some businesses uphold (Hahn and Scheermesser, 2006).

Other motives for companies' sustainability actions have also been discussed in the literature. For example, Bansal and Roth (2000) argue that firms go green for the reason of ecological responsibility while at the same time taking care of their competitiveness and legitimation. The actions to achieve green performance by these firms include reduction in energy consumption, waste generation, and using ecologically sustainable resources with a good environmental management system implemented. Wu and Shen (2013), on the other hand, show that the primary motive for banks to engage in CSR is a strategic one as they find that CSR is positively associated with financial performance. They assert that altruistic motives are not driving banks' CSR activities as they document a negative relationship between CSR and non-performing loans.

Companies' actions toward sustainability have at times been criticised for various reasons. First, the companies are being seen as only greenwashing their operations – no real development takes place in the end. Second, the companies can be seen as only acting to avoid the risk of sanctions or backlash from stakeholders. Confirming either view is challenging because it is obviously in the firm's interest to act to some degree in the interest of the stakeholders and to avoid sanctions that can be enforced when the guidelines and expectations for achieving a more sustainable world are not followed. However, it must not overshadow the fact that the opportunities (e.g., inviting investors whose interests are more aligned with sustainable companies, or attracting new customers who prefer sustainable products) presented to firms who are performing excellently in sustainability issues are enormous.

## 2.2 Research hypothesis

According to Branco and Rodrigues (2006), CSR (in this case ESG) and the financial performance of firms should not be considered tradeoffs. This assertion is supported by earlier studies (e.g., Orlitzky, 2005; Orlitzky et al., 2003; Waddock and Graves, 1997) that document evidence of high CSR or ESG performance being both a determinant and consequence of high firm financial performance. This suggests the ESG-financial performance relationship can be bi-directional. Thus, as a starting point for the analysis, we study whether profitable firms, especially those in the prior period(s), would be able to financially commit more to environmental, social, and governance issues than those that are not. Vitezić et al. (2012) established that companies with higher financial performance and who fall in the big-size category of firms

have a better urge to engage in CSR activities. Similarly, Alshorman et al. (2022) document evidence that slack resources, including profitability, positively moderate the CSR disclosure and firm market value.

**H1:** Firms' profitability has a positive impact on firms' (future) ESG scores.

As noted earlier, our main interest is whether firms with sustainable operations do well financially. Initial studies on corporate social responsibility investments (the root of ESG) suggested that a negative relationship exists between ESG and firm profitability and valuation (see, e.g., Vance, 1975; Wright and Ferris, 1997). These studies supported their findings with the shareholder theory of Friedman (1970), who argued that the sole social responsibility of a firm is value maximization and that there are no commensurate rewards to ESG investments by firms. More recent studies have also found continued support for the negative relationship. For example, firms with good environmental performance experience negative abnormal returns (c.f., Lyon et al., 2013) and ROA (Duque-Grisales and Aguilera-Caracuel, 2019), implying that shareholders see investment in this sustainability approach as costly and they usually do not support it (Fatemi et al., 2018).

On the other hand, some studies have found inconclusive results (see, e.g., Horváthová, 2010; Renneboog et al., 2008a and 2008b) as well as evidence in favor of a positive effect of ESG on both firm profitability and valuation (see, e.g., Margolis et al., 2009; Edmans, 2011; Dimson et al., 2015; Fatemi et al., 2015; Krüger, 2015). The positive effect can be motivated using different channels through which ESG impacts firm performance. These channels include, for example, sustainable innovations, efficient processes, as well as reduced energy and material consumption. They have been studied widely in the literature and they are documented to improve firm performance (Aras and Crowther, 2008). In addition, researchers have found a conducive work environment for employees (Bhattacharya et al., 2008), improved customer relations and loyalty (Ramlugun and Raboute, 2015), and general customer satisfaction (Xie, 2014) to be positively related to financial performance. Finally, Choi and Wang (2009) and Hennisz et al. (2014) find that firms that deliver values to a broad spectrum of stakeholders also have higher financial performance. Most of these channels, however, typically require significant operational changes in firms that require extended time to materialise which could account for the inconclusive results on ESG's effect on firm performance. As a result, we form the following hypothesis.

**H2:** Higher ESG scores have a positive impact on a firm's (future) profitability.

When studying the hypothesis, we acknowledge this type of study faces a major issue with the argument that ESG performance is endogenous (see, e.g., Karnani, 2011; Hategan et al., 2018; Eisenbeiss et al., 2015). The studies argue that the significant effect of ESG performance on financial performance may be biased by the fact that firms do good when doing well (as opposed to doing good leads to doing well). However, we tackle this issue by studying temporal leads/lags in the relationship and using more advanced econometric techniques.

Ultimately, however, we can see that the first two hypotheses are not mutually exclusive. Investments in sustainability (higher ESG scores) can lead to higher profitability which, in turn, can lead to higher sustainability investments. As such, we argue that the relationship between ESG and firm profitability is bi-directional i.e., the ESG performance of a firm can be influenced

by its profitability and vice versa. This argument is in line with Waddock and Graves's (1997) study that established two-directional significance in corporate social performance (CSP) and corporate financial performance (CFP). Their conclusion is based on the theory that slack resource availability to firms improves their CSP and that good management (as in improvements in all areas of CSP) leads to better CFP in the future. Surroca et al. (2010), capture the findings of Waddock and Graves (1997) as implying that CSP is a predictor as well as a consequence of CFP in a virtuous circle. More recently, Lueg et al. (2019) found a bi-directional relationship between organizational sustainability and risk. Similarly, Nelling and Webb (2009), argued that there is a tendency for a bi-directional relationship between ESG and firm profitability due to endogeneity e.g., the timing of CSR/ESG disclosure is strategic to when firms are or are expected to be more profitable and vice-versa. From the strategic theoretical perspective (as in, Hahn and Scheermesser, 2006), the instrumental and institutional motives for firms to engage in ESG activities justify the bi-directional tendency since profitable firms would engage more in ESG activities and ESG activities are the current legitimacy criteria for businesses.

Our third and final hypothesis focuses on the influence of ESG scores on firms' market value. Recently, studies (see, e.g., Kang and Jung, 2020; Miralles-Quirós et al., 2018) found that ESG performance has a positive impact on firm value. These studies have interpreted the positive relationship as evidence in favor of the Freeman (1984) stakeholder theory or value-enhancing theory which implies that ESG ensures optimal contracts between stakeholders in order to foster growth and risk reduction (c.f., Fatemi and Fooladi, 2013). One can also argue that ESG disclosure is capable of reducing agency costs as well as enhancing investor trust as it reduces information asymmetry (Cheng et al., 2014). In addition, an increasing number of investors conduct positive (investing more in high ESG-rated firms) and/or negative screening (disinvesting low ESG-rated firms) which can give highly rated ESG firms preferential access to the capital market i.e., more capital and with the lower required rate. Finally, recent studies have shown that innovation through investment in ESG improves firm value (Hao and He, 2022; Jia et al., 2022). Thus, we state our third hypothesis as follows:

**H3:** There is a positive relationship between ESG and firm valuation (Tobin's Q).

### 3 Research data and design

#### 3.1 Sample and data

This study uses both the financial and ESG rating data of publicly listed firms on Nordic (Finland, Sweden, Norway, and Denmark) stock exchanges. The data is downloaded from Thomson Reuters Eikon's database for the period from 2010 to 2020. The sample includes all main stock exchanges (Nasdaq Helsinki Ltd, Nasdaq Stockholm AB, Nasdaq Copenhagen A/S operated exchange in Finland, Sweden, and Denmark respectively, and the Oslo Børs ASA in Norway) and the multilateral trading facilities (MTF) operated by them, i.e., First North Sweden, First North Finland, and Nordic SME. The inclusion of MTFs, which are commonly used by growth companies in their early stages of growth and development, is to ensure all publicly listed firms in the Nordics with ESG ratings during the sample period are captured in the study. This is particularly important given the significance of sustainability in company practices that go beyond the size and status of the firm.

The initially collected data includes 1782 Nordic firms (active or delisted during the sample period) with 501 firms having parallel financial and ESG data at least for one year over the sample period. The loss in observations is because the data on ESG is not available for all companies and/or for all years in the sample period. In addition, banks and insurance companies are excluded from the sample. The remaining 472 firms consist of 61 firms from Finland, 270 from Sweden, 85 from Norway, and 56 from Denmark.<sup>3</sup> Overall, 1885 rating observations are obtained for the firms in the sample over the sample period. Our eleven-year sample period is longer than in most prior studies. The sample period covers years when the interest in sustainability was still in its infancy as well as the recent surge in global interest in sustainability. As such, we believe that the sample size and coverage provide enough observations for a representative sample in the study.

### 3.2 Variables

Our study is concerned with how the opportunity presented by the ESG performance of firms is associated with their profitability and valuation. As such, we limit our research to establishing the direction of the relationship between ESG and firm performance for continuous understanding and efforts towards developing a system that incorporates this non-financial performance measure as much as the established financial performance measures of firms.

The main dependent variables, i.e., measures of firm financial performance in this study are return on assets (ROA) and Tobin's Q. Many studies have used Tobin's Q, the market valuation of a company divided by its assets' replacement cost, where replacement costs have typically been proxied by equity book value plus the liabilities book value (see, e.g., Tang et al., 2012; Fatemi et al., 2018; Alshorman et al., 2022). In this study, we define Tobin's Q as the market value of the company's equity plus liabilities divided by the company's book value of equity plus liabilities. Our second dependent variable, ROA, has also been used in many studies (see, e.g., Choi and Wang, 2009; Fatemi et al., 2018; Ahsan and Qureshi, 2021). It is calculated by dividing a company's net income during a particular year by the book value of assets (equity and debt) at the end of the year.

Tobin's Q is a measure of firm valuation said to represent a firm's investment or growth opportunities (Fu et al., 2016) and ROA reflects current period profitability (Jayachandran et al., 2013). The choice of Tobin's Q and ROA in this study is particularly motivated by the nature of sustainability issues which are both forward-looking and present assessment-focused; as such, the choice of these variables aligns well as a measure of firm performance in this subject matter.<sup>4</sup>

Our main independent variable of interest is the ESG rating score collected from Thomson Reuters/Refinitiv Eikon terminal as a measure of firm sustainability performance. The minimum score is zero and the maximum is one hundred. In effect, we have time-series ESG scores for the firms in our sample. Besides the overall score, the ESG performance in three sub-areas (referred to as pillars) environment, social, and governance is included. According to Refinitiv's definition, overall ESG scores are aggregated scores based on 10 category weights based on Refinitiv's magnitude matrix. A category weight is the magnitude weight of a category divided

<sup>3</sup> Icelandic companies are excluded because ESG ratings are available only for year 2020 and there are only six companies in our sample.

<sup>4</sup> We also tested the model using the Market-to-Book ratio in place of Tobin's Q for robustness and the results are basically similar.

by the sum of the magnitudes of all categories and the magnitude matrix is calculated using numeric and Boolean data points. The ESG score is based on pillar scores which are the relative sum of the category weights. These pillar scores are composed of sustainability categories: resource use, emissions, product innovation, human rights, product responsibility, workforce, community, management, shareholders, and CSR strategy.

As our main control variables, we use firm size as in Buallay (2019), and financial leverage (debt-to-equity ratio) as in Grewal et al. (2008). These variables are particularly important to mitigate the effect of individual firms' characteristics that are due to size and financial strength. Firm size is proxied by the logarithm of total assets and leverage is the ratio of total debts to the book value of equity. In addition, we include two additional control variables as in Hu and Zhang (2021). Namely, cash holding is measured as a firm's cash and short-term investments over its total assets, and tangibility represents the firm's tangible assets (property, plant, and equipment) over its total assets. According to Brush et al. (2000), improvement in revenue of the firm can affect profitability and valuation, hence we control for the effect of sales on firm performance with the percentage change in sales i.e., sales growth variable. Finally, as pointed out by Buallay (2019), in economics-based integrated report research, endogeneity concern is often an issue and this includes correlated variables, reverse causality, and simultaneity (Larcker and Rusticus, 2010). Economic condition positively affects the influence of different ESG disclosure practice on firm financial performance (Alfalih, 2022). For this reason, we also include a macroeconomic variable, the GDP growth (i.e., change in the GDP for the country of the firm in question) which captures the difference in technological advancement, economic development, intellectual property regimes, and other geographical differences (Contractor et al., 2016). We use year, firm, and country-fixed effects to control time and group-specific characteristics.

## 4 Empirical results

### 4.1 Descriptive statistics

Panel A of Table 1 provides descriptive statistics for the variables in this study. The average ESG score is 50.89 with a median of 52.39. The score values below 50 are regarded as weak and those above 50 as strong in the Thomson Reuters Refinitiv ESG scores methodology. The average social pillar score, 54.33, is better than the average environmental and governance pillar scores which are 49.23 and 48.45, respectively. Environmental pillar scores are not available for all ESG-rated firms in the sample (hence lower  $N$ ) and for a very small number of firms they are reported as zero. The standard deviation of ESG and pillar scores (between 20 and 27) shows a widespread as a result of cross-sectional dispersion in the data, indicating that the ratings cover a wide range providing us an interesting starting point for the analysis. The last three columns show the first three partial autocorrelation coefficients for the variables in this paper. It is evident that the dependent variables exhibit strong serial correlation, yet the partial autocorrelation diminishes after the first lag in most cases. Autocorrelation can be of concern in linear regression, as the standard adjustment for robustness considers mostly heteroscedasticity. However, we re-estimate our main regressions with Newey-West adjustment for robustness. In most cases, there is no major impact on the  $t$ -values which might be due to short samples. Panel B of Table 1 provides us with an insight into the correlation between the variables of interest in this research. There is a positive contemporary correlation between ESG and pillar

**Table 1.** Sample descriptive statistics and correlation matrix.

This table shows the descriptive statistics (Panel A) and the correlation matrix (Panel B) for the main variables used in this study. The variables include the ESG score, its three pillar scores (environment, social, and governance) as well as six financial variables: Tobin's Q, Return on assets (ROA), Leverage, Tangibility, CashHolding, natural logarithm of total assets, Ln(Asset), and Sales\_growth. Tangibility and CashHolding are calculated as the sum of tangible assets (property, plant, and equipment) and cash in the firm balance sheet divided by the total assets of a firm, respectively. Annual data from 2010 to 2020 is used in the analysis.

PANEL A: DESCRIPTIVE STATISTICS										
	N	Mean	Std. Dev.	Median	Skewness	Kurtosis	$\phi_1$	$\phi_2$	$\phi_3$	
ESG	1885	50.89	20.19	52.39	-0.29	-0.63	0.906	0.165	0.146	
Env	1833	49.23	26.66	51.90	-0.20	-1.09	0.879	0.158	0.109	
Soc	1885	54.33	22.76	56.22	-0.38	-0.72	0.871	0.103	0.097	
Gov	1885	48.45	22.59	48.50	0.03	-0.99	0.759	0.132	0.069	
Ln(Tobin's Q)	1885	0.52	0.66	0.37	1.07	2.44	0.639	0.083	-0.043	
ROA	1881	0.04	0.14	0.05	-4.08	46.99	0.428	0.061	0.022	
Leverage	1885	0.01	0.14	0.01	36.34	1409.94	0.011	0.012	0.007	
Tangibility	1875	0.21	0.22	0.13	1.29	1.12	0.756	0.099	0.023	
CashHolding	1709	0.12	0.17	0.07	4.61	40.68	0.564	0.160	0.037	
Ln(Asset)	1885	21.60	1.98	21.67	-0.02	0.52	0.837	0.083	0.041	
Sales_growth	1658	0.03	0.34	0.04	5.47	144.60	0.142	-0.054	-0.016	
PANEL B: PEARSON CORRELATION MATRIX										
	ESG	Env	Soc	Gov	Ln(Tobin's Q)	ROA	Leverage	Tangibility	CashHolding	Ln(Asset)
Env	0.848***									
Soc	0.894**	0.708**								
Gov	0.722**	0.433***	0.456**							
Ln(Tobin's Q)	-0.085*	-0.158*	-0.049	-0.060						
ROA	0.132**	0.101***	0.166***	0.015**	0.165***					
Leverage	0.022	0.013	0.028	0.016	-0.051	-0.083				
Tangibility	0.107***	0.189**	0.086***	-0.021*	-0.226***	-0.017*	0.063			
CashHolding	-0.152*	-0.176**	-0.169	-0.015**	0.380**	-0.222*	-0.014*	-0.150**		
Ln(Asset)	0.522*	0.580**	0.441**	0.368*	-0.434	0.140**	0.033*	0.040***	-0.409	
Sales_growth	-0.053	-0.072*	-0.057**	-0.024	0.141**	0.136*	-0.036**	-0.072*	0.058**	-0.036

scores with profitability (measured with ROA) but a negative correlation with firm valuation (measured with Tobin's Q). For each model in this study, we conduct the Hausman test of panel regression and variance inflation factors (VIF). The Hausman test is conducted to confirm the choice between random and fixed effects models and find that the fixed effect is appropriate for our models. The test of multicollinearity using the variance inflation factors (VIF) shows lower than 5 for all the models. This means our results are not biased due to issues of multicollinearity (Hair et al., 2012).

Table 2 shows descriptive statistics for the ESG score for each country in the sample. Somewhat surprisingly, Finnish firms are doing better than other Nordic countries in all ESG pillars and the overall ESG score. The statistics in the other countries are relatively similar for the firms on average.

**Table 2.** ESG statistics by country  
This table shows statistics on the ESG performance of firms across Nordic countries.

	<b>N</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Median</b>	<b>Skewness</b>	<b>Kurtosis</b>
<b>SWEDEN</b>						
ESG	905	49.63	21.47	51.72	-0.27	-0.83
Env	874	46.40	28.73	48.82	-0.09	-1.29
Soc	905	53.60	24.19	56.07	-0.40	-0.86
Gov	905	48.42	23.02	48.52	-0.03	-1.01
<b>FINLAND</b>						
ESG	283	57.84	18.68	59.46	-0.41	-0.41
Env	283	62.21	22.80	66.83	-0.69	-0.17
Soc	283	59.82	20.28	62.93	-0.54	-0.32
Gov	281	49.78	23.23	49.37	0.10	-1.09
<b>DENMARK</b>						
ESG	321	49.73	17.78	50.95	-0.39	-0.27
Env	316	45.82	24.00	45.40	0.01	-1.12
Soc	321	53.15	20.40	54.58	-0.31	-0.45
Gov	318	47.62	21.63	48.43	-0.08	-0.93
<b>NORWAY</b>						
ESG	376	49.70	19.01	51.34	-0.14	-0.61
Env	360	48.90	23.29	51.97	-0.19	-0.79
Soc	376	52.94	22.35	53.30	-0.19	-0.88
Gov	373	48.22	21.89	47.71	0.21	-1.00

Looking at the mean and average scores alone may not be enough to represent the relative time-series performance in these countries. So, the time-series development of individual countries' overall ESG scores performance is shown in Figure 1. Overall, the ESG scores seem to have improved until 2017 after which they started to weaken. This is likely to be caused by the rise in the bar of reported sustainability practices and activities due to stakeholder demand for increasing standards of sustainability performance in firms as well as the addition of new entrants whose ESG scores typically only grow over time. In addition, the graph shows that Finnish companies post-2014, on average, have consistently performed better than their Nordic peers on sustainability (overall ESG score). Somewhat strikingly, Firms in Norway and Denmark have ESG scores of around 50% on average over time overall.<sup>5</sup>

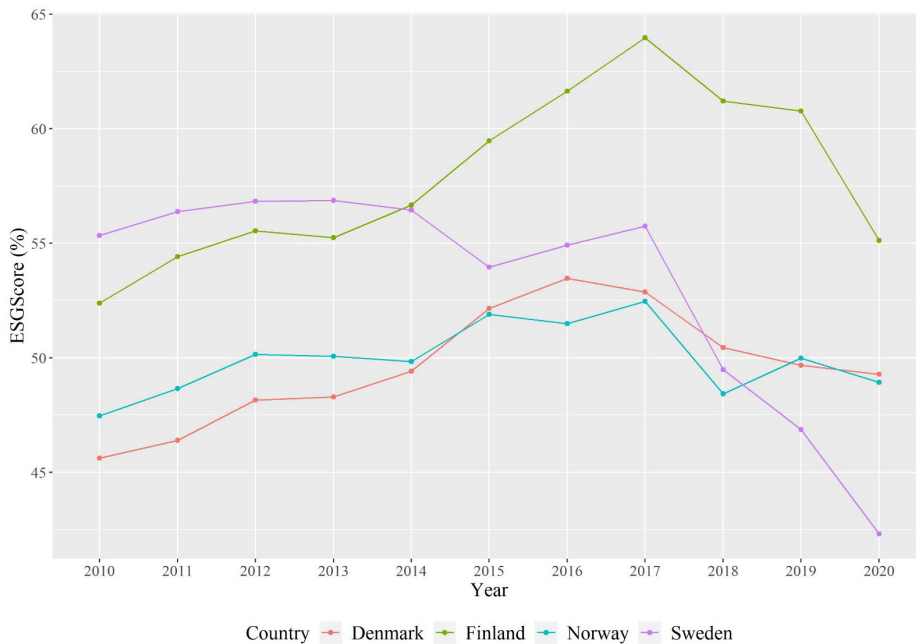


Figure 1. Average ESG score performance 2010-2020

#### 4.2 ESG and firm financial performance

The first hypothesis is based on the idea that the causal relationship runs from profitability to sustainability – profitable firms do good. To test the first hypothesis, we study the impact of firms' financial performance on ESG scores. Estimation is conducted using a fixed-effect unbalanced panel regression model with clustered standard errors. In practice, we estimate the following regression model:

<sup>5</sup> We show in additional graphs (available upon request) how the existing ESG scores are influenced retrospectively when new companies are added into the Refinitiv ESG database. This is due to the Refinitiv score methodology which is based on industry peer performance in ESG.

$$ESG_{i,t} = \alpha + \beta_1 ROA_{i,t} + \text{Controls} + \gamma_i + \eta_t + \epsilon_{i,t}, \quad (1)$$

where  $ESG_{i,t}$  is the overall ESG score, and  $ROA_{i,t}$  is the return on assets, both for firm  $i$  at year  $t$ . Note that both values are for the same year, even though they are reported the next year; ROA is typically in the spring when the financial results are reported and ESG score is a bit later in the year when they are announced by Refinitiv.<sup>6</sup> Parameter  $\alpha$  is the common constant,  $\gamma_i$  is the fixed effect for firm  $i$ , and  $\eta_t$  is the time (year) fixed effect. As control variables, this study uses the size, leverage, cash holding, tangibility, sales growth, and GDP growth measures. The results are shown in Table 3.

We test two models where we first use the contemporary and then the lagged ROA to explain the current ESG scores. The results suggest that firms' ESG performance is dependent on how profitable the firm is. The same result holds regardless of using contemporary and lagged profitability in the analysis, although again we find stronger evidence for the lagged effect which is more in line with the intuition that profitability needs to be established before firms invest in sustainability. Next, we re-estimate Model 2 with the addition of the sales growth control variable (Model 3) and lagged values of all independent variables (Model 4). The results are unchanged, an indication of robust outcomes in the influence of firm profitability on ESG performance.<sup>7</sup> Finally, we again test a finite distributed lag model with three lags of the ROA variable to test whether and in what capacity past profitability matters for ESG performance.<sup>8</sup> The coefficients are often interpreted as the lag weights and their sequence as a lag pattern (Hill et al., 2018). Interestingly, firms' profitability two years ago is found to be the only significant of the three lag years.<sup>9</sup> As a result, we re-estimate Models 2 to 4 with ROA lagged by two years instead of one, and again the results stayed practically the same (results available upon request). All coefficients remained significant, although with slightly higher  $p$ -values. Overall, the results are consistent with the intuition – profitable companies can invest in changing their operations to be more sustainable, but it takes time before the impact of these actions becomes visible in the ESG scores.

<sup>6</sup> The timing issue is not of major importance here unlike in event studies as it is obvious that the firm's profitability and sustainability are both revealed to investors throughout the year and the surprise element is quite small.

<sup>7</sup> We again re-estimated Model 3 with the Newey-West adjustment. The standard error for the lagged ROA is basically unchanged and the coefficient is clearly significant at five percent.

<sup>8</sup> Distributed lag (DL) models are suitable if the impact from the regressor is distributed over future periods and as such the lags can reveal something about how the impact is borne. DL models are also shown to produce better results than single lag models although they can suffer from collinearity if the explanatory variables suffer from autocorrelation (see, e.g., Basagaña and Barrera-Gómez, 2022). Collinearity typically leads to higher estimator standard errors which make it harder to conclude that parameter estimates are significantly different from zero. However, the least squares estimator is still the best linear unbiased estimator. (Hill et al., 2018).

<sup>9</sup> The result is the same even if we add the contemporary ROA into the model.

**Table 3.** Firm financial performance impact on ESG

This table presents results from unbalanced panel regression. The dependent variable is the ESG score for firm *i* during year *t*. Note that ESG is the ESG score for each firm for year *t*, but publicly announced the next year. ESG\_1 is a value lagged by one year. ROA\_1 are values lagged by one year. All other lags are indicated similarly. ROA is net income over the total assets of the firm. ESG is the overall score for the individual pillars measured as the combined weighted average of the pillars. Ln(Asset) is the natural logarithm of the book value of total assets of a firm at the end of the year *t*. Leverage is the debt to equity ratio of the firm at the end of the year *t*, Tangibility is tangible assets (property, plant, and equipment) over total assets of a firm at time *t* in percentage, CashHolding is cash in the firm balance sheet divided by the total assets of the firm at time *t* in percentage. Sales\_growth is the percentage change in firm *i* sales at time *t*. ΔGDP is the percentage annual change in GDP for the country in question during year *t*. Models 3 and 4 are similar but all independent variables including control variables are values lagged by one year in Model 4. The last rows include the fixed effects, Country control, Year and Firm fixed effects, the number of observations in the models estimated, and adjusted R2. Firm-level clustered standard errors are given in parentheses, and \*\*\* (\*\*, \*) denotes significance at the 1% (5%, 10%) level (two-sided test).

	ESG				
	(1)	(2)	(3)	(4)	(5)
ROA	0.046* (0.027)				
ROA_1		0.060** (0.023)	0.063** (0.028)	0.048** (0.024)	-0.025 (0.045)
ROA_2					0.139** (0.054)
ROA_3					-0.022 (0.052)
Ln(Asset)	0.082*** (0.003)	0.082*** (0.003)	0.082*** (0.003)	0.073*** (0.003)	0.081*** (0.003)
Leverage	0.030 (0.026)	0.031*** (0.008)	0.028 (0.026)	0.024 (0.026)	0.033 (0.025)
Tangibility	-0.022 (0.018)	-0.022 (0.023)	-0.025 (0.019)	-0.039* (0.022)	-0.026 (0.020)
CashHolding	0.147*** (0.026)	0.150*** (0.026)	0.148*** (0.030)	0.134*** (0.038)	0.139*** (0.032)
Sales_growth			-0.027** (0.011)	-0.036*** (0.014)	-0.034** (0.015)
ΔGDP	0.194* (0.111)	0.276** (0.137)	0.297** (0.123)	0.436** (0.171)	0.404*** (0.130)
Country control	Yes	Yes	Yes	Yes	Yes
Year & Firm FE	Yes	Yes	Yes	Yes	Yes
Observations	1,698	1,607	1,587	1,156	1,384
Adjusted R2	0.379	0.386	0.392	0.294	0.412

As discussed earlier, our main interest is whether the causal relationship also runs from sustainability to profitability – whether doing good is profitable. To test this second hypothesis, we re-estimate equation (1) after switching the role of ROA and ESG in the equation. Results are reported in Table 4. Results for Model 1 show a significant and positive contemporary relationship between the ESG score and financial performance. This result is consistent with previous studies (e.g., Kang and Jung, 2020; Chams et al., 2021). The contemporary relationship asks for a closer look. *A priori* one expects to see the firm's sustainability take some time to be reflected in the firm's profitability. To study this, we re-estimate the model with lagged ESG scores, initially by one year. The positive coefficient for the lagged ESG (Model 2) implies that a good sustainability performance seems to lead to higher profitability. This result is in line with the earlier reviews on empirical CSR literature (see, e.g., Margolis and Walsh, 2003; Orlitzky et al., 2003) that found a positive relationship between investing in what was then termed socially responsible activities and firm financial performance.

In Model 3 we include the sales growth variable to control for the effect of sales on profitability through free cash flow as suggested by Brush et al. (2000). The coefficient for the lagged ESG is highly significant (0.087 with a *p*-value of 0.013 percent) which gives strong support for our hypothesis 2 stating that firms financial performance is positively influenced by its past ESG score.

To validate this result, we do a number of additional tests. First, we estimate Model 3 with Newey-West standard errors which take into account both heteroscedasticity and autocorrelation. The results (available upon request) are similar to those reported although the *p*-value is slightly higher (1.65 percent). Second, we re-estimate Model 3 with all control variables lagged by one year to match the ESG score lag. The results (Model 4) are similar to those for Model 3 indicating that the main result is robust to past development in the control variables. Third, we consider the hypothesis that the impact of ESG on profitability can take years to materialize. To test this and to take into account the serial correlation in the ESG scores, we again test this using a finite distributed lag (DL) version of the model. Model 5 includes the first three lags of the ESG variable. The results show interestingly that only the first lag is significant suggesting that sustainability improvements, in terms of higher ESG score, can result in higher profitability, perhaps even surprisingly fast.<sup>10</sup> Finally, we estimate a dynamic version of Model 3 by adding a one-year lagged ROA among the regressors. Again, the results (Model 6) are consistent with the earlier ones, although now the coefficient on lagged ESG is significant only at a ten percent level (*p*-value is 6.09%).

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<sup>10</sup> DL models assume that the error term is not autocorrelated. If this assumption is violated, one can use, e.g., Newey-West standard errors (Hill et al., 2018, p. 448). As the ESG variable shows evidence of autocorrelation even past the first lag, we re-estimated the DL model using the Newey-West standard errors. The results are again basically the same, only the first lag is statistically significant. However, a word of caution is warranted when making inferences from the results as one can still consider the estimation samples quite short and, as a result, the statistical nature of the ESG variable is yet to be discovered.

**Table 4.** ESG and firm financial performance

This table presents results from unbalanced panel regression. The dependent variable is the return on asset (ROA) for firm *i* during year *t*. Note that ROA is made public at the beginning of the next year when the company announces its financial statement. ESG\_1 are values lagged by one year. All other lags are indicated similarly. ROA is net income over the total assets of the firm. ESG is the overall score for the individual pillars measured as the combined weighted average of the pillars. Ln(Asset) is the natural logarithm of the book value of total assets of a firm at the end of the year *t*, Leverage is the debt to equity ratio of the firm at the end of the year *t*, Tangibility is tangible assets (property, plant, and equipment) over total assets of a firm at time *t* in percentage, CashHolding is cash in the firm balance sheet divided by the total assets of the firm at time *t* in percentage. Sales\_growth is the percentage change in firm *i* sales at time *t*. ΔGDP is the percentage annual change in GDP for the country in question during year *t*. Models 3 and 4 are similar but all independent variables including control variables are values lagged by one year in Model 4. The ESG coefficients are scaled up by 100 for reporting. The last rows include the fixed effects, Country control, Year and Firm fixed effects, the number of observations in the models estimated, and adjusted R<sup>2</sup>. Firm-level clustered standard errors are given in parentheses, and \*\*\* (\*\*, \*) denotes significance at the 1% (5%, 10%) level (two-sided test).

	ROA					
	(1)	(2)	(3)	(4)	(5)	(6)
ESG	0.037*					
	(0.022)					
ESG_1		0.021*	0.087***	0.046**	0.141**	0.053*
		(0.012)	(0.030)	(0.019)	(0.070)	(0.028)
ESG_2					-0.089	
					(0.086)	
ESG_3					-0.010	
					(0.065)	
ROA_1						0.384***
						(0.032)
LnAsset	0.008**	0.050***	0.056***	-0.003	0.004	0.028***
	(0.003)	(0.017)	(0.008)	(0.003)	(0.003)	(0.008)
Leverage	-0.071***	-0.032*	-0.031***	-0.148***	-0.056***	-0.018
	(0.023)	(0.018)	(0.012)	(0.017)	(0.016)	(0.011)
Tangibility	-0.055***	-0.008	0.047	-0.080***	-0.057***	0.043
	(0.016)	(0.043)	(0.035)	(0.014)	(0.016)	(0.032)
CashHolding	-0.157***	0.109***	0.197***	-0.006	0.058*	0.203***
	(0.023)	(0.035)	(0.048)	(0.025)	(0.033)	(0.045)
Sales_growth			0.074***	0.053***	0.143***	0.081***
			(0.008)	(0.009)	(0.015)	(0.008)
CGDP	0.293***	0.320***	0.258***	0.251**	0.468***	0.172***
	(0.099)	(0.092)	(0.059)	(0.113)	(0.117)	(0.056)
Country control	Yes	Yes	Yes	Yes	Yes	Yes
Year & Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,698	1,256	1,240	1,156	768	1,239
Adjusted R <sup>2</sup>	0.059	0.059	0.171	0.123	0.189	0.076

Overall, the analysis here examines the debate in the literature on whether firms are doing good as a result of doing well (see, e.g., Hategan et al., 2018; Eisenbeiss et al., 2015). However, our result is in line with the earlier conclusion by Branco and Rodrigues (2006), which argues that CSR (in this case ESG) and the financial performance of firms should not be considered as tradeoffs, and other studies documenting evidence that high CSR or ESG performance can be both a determinant and consequence of high firm financial performance (see, e.g., Orlitzky, 2005; Orlitzky et al., 2003; Waddock and Graves, 1997).

### 4.3 Firm valuation and ESG

Next, we study the relationship between firms' ESG and stock market valuation. We estimate the following regression to test our second hypothesis. Estimation is conducted using a fixed-effect unbalanced panel regression model with clustered standard errors.

$$\text{Tobin's } Q_{i,t} = \alpha + \beta_1 \text{ESG}_{i,t} + \text{Controls} + \gamma_i + \eta_t + \epsilon_{i,t}, \quad (2)$$

where Tobin's  $Q_{i,t}$  is the natural logarithm of Tobin's Q for firm  $i$  at the end of year  $t$ , and the rest of the variables are similar to those defined in equation (1). In addition, we estimate a finite distributed lag model with lagged ESG scores.<sup>11</sup> Results are presented in Table 5.

The results show that there is a contemporary and positive relationship between the overall ESG score and firm valuation. A similar relationship exists when we re-estimate the model with the ESG lagged by one year. These results may sound partly confusing as the first result implies that investors take the firm's actions on sustainability into account as they happen even though the official ESG rating is announced the next year whereas the latter result supports delayed impact.<sup>12</sup> To test this further, we run again a distributed lag model with three lags. The results are shown in Model (3). Now, we can see that the contemporary ESG score is the only significant relationship that indicates that firms' ESG activities are reflected on valuation without lag. Thus, the results are consistent with the idea that investors can track a firm's actions, or lack thereof, on sustainability as they happen – as one would expect in efficient stock markets – and that the relationship is positive. The result is further corroborated when we re-estimate Model (1) with lagged control variables as Model (4). Although the results from the estimation give stronger support for the contemporaneous relationship, one should be cautious about interpreting the result. As the ESG variable shows relatively small, but significant levels of serial correlation after the first lag, the DL models may produce biased results as noted earlier.

<sup>11</sup> For consistency, we test the (unlikely) relationship from valuation to the ESG score as we did in the profitability estimation. We find that the result is in line with our expectation that firm valuation does not determine ESG performance of firms.

<sup>12</sup> Remember that ESG scores for year  $t$  are reported in the second or third quarter of the next year. Tobin's Q for year  $t$  is calculated with year-end market and book data.

**Table 5.** ESG and firm valuation

This table presents results from unbalanced panel regression. The dependent variable in all models is the natural logarithm of the firm's Tobin's Q for each firm at the end of the year t. ESG is the ESG score for each firm for year t, but publicly announced the next year. ESG\_1 is a value lagged by one year. All other lags are indicated similarly. Tobin's Q is the market value of the firm divided by the asset replacement cost. ESG is the overall score for the individual pillars measured as the combined weighted average of the pillars. ROA is net income over the total assets of the firm. Ln(Asset) is the natural logarithm of the book value of total assets of a firm at the end of the year t, Leverage is the debt to equity ratio of the firm at the end of the year t, Tangibility is tangible assets (property, plant, and equipment) over total assets of a firm at time t in percentage, CashHolding is cash in the firm balance sheet divided by the total assets of the firm at time t in percentage. Sales\_growth is the percentage change in firm i sales at time t. ΔGDP is the percentage annual change in GDP for the country in question during year t. Models 3 and 4 are similar but all independent variables including control variables are values lagged by one year in Model 4. The ESG coefficients are scaled up by 100 for reporting. The last rows include the fixed effects, Country control, Year and Firm fixed effects, the number of observations in the models estimated, and adjusted R<sup>2</sup>, Firm-level clustered standard errors are given in parentheses, and \*\*\* (\*\*, \*) denotes significance at the 1% (5%, 10%) level (two-sided test).

	LN(TOBIN'S Q)			
	(1)	(2)	(3)	(4)
ESG	0.539*** (0.081)		0.899*** (0.275)	0.584*** (0.088)
ESG_1		0.451*** (0.086)	-0.453 (0.362)	
ESG_2			0.519 (0.478)	
ROA	1.550*** (0.098)	2.427*** (0.271)	2.636*** (0.143)	2.223*** (0.130)
Ln(Asset)	-0.156*** (0.011)	-0.153*** (0.012)	-0.153*** (0.013)	-0.160*** (0.012)
Leverage	-0.001 (0.082)	0.061 (0.041)	0.073 (0.073)	0.232*** (0.076)
Tangibility	-0.361*** (0.060)	-0.296*** (0.062)	-0.311*** (0.067)	-0.374*** (0.064)
CashHolding	1.482*** (0.095)	1.670*** (0.131)	1.431*** (0.127)	1.545*** (0.114)
Sales_growth	0.125*** (0.037)	0.117* (0.063)	0.037 (0.056)	0.056 (0.04)
ΔGDP	0.656* (0.397)	0.813* (0.417)	0.859* (0.442)	0.508 (0.509)
Country control	Yes	Yes	Yes	Yes
Year & Firm FE	Yes	Yes	Yes	Yes
Observations	1,590	1,240	981	1,156
Adjusted R <sup>2</sup>	0.410	0.486	0.480	0.481

#### 4.4 ESG pillar scores analysis

As a final test, we study the relationship between individual pillar scores and firm profitability (models 1-3) and valuation (models 4-6). This is also in line with common practice in research on this topic (e.g., Nollet et al., 2016; Lueg and Pesheva, 2021). The results with pillar scores are reported in Table 6.

Somewhat surprisingly, we do not find a significant relationship between the environment pillar score and firms' profitability. This might be due to the nature of actions that influence environmental pillar scores compared to other pillar scores. Namely, the actions take typically longer to execute and they often require investments that result in lower profitability in the short term. This view is supported by the results for model 4 where we find a positive and highly significant relationship between the environmental pillar score and the market valuation of the company. Stock valuation, by nature, is forward-looking and as such, it overlooks short-term financial hurdles in favor of the long-term impact of the cash flows.

We find a positive and significant relationship between the social score and return on asset as well as on market valuation. This implies that social performance is beneficial for the firms. This is understandable as social issues of ESG have to do with the workforce, product responsibility, human rights, and the community and they all have immediate and long-term impacts on firms' financial performance. This finding is supported by earlier studies that evidenced the positive impact of CSR on firm performance through positive human resource management (see, e.g., Boesso & Michelon, 2010).

On the other hand, the results show that the governance score has a negative and significant relationship with ROA. This governance-ROA relationship could be down to the fact that companies have invested hugely in related issues such as the gender quotas system that is quite pronounced in Nordic countries. Expectedly, this could affect the profitability of firms in the short term as found by Ahern and Dittmar (2012) who suggested that gender quotas led to younger and less-experienced boards and the accompanying poor firm performance. The result contrasts with the study of Fatemi et al. (2018) on US firms, documenting a more substantial impact on governance-induced ESG disclosure than environmental and social issues.

**Table 6.** ESG and firm performance.

This table presents results from unbalanced panel regression. The dependent variable in columns (1) to (3) is the return on asset (ROA) whereas in columns (4) to (6) the dependent variable is the natural logarithm of Tobin's Q for firm *i* during year *t*. ROA is net income over total assets of the firm and Tobin's Q is the market value of the firm divided by the asset replacement cost. The E, S, and G pillar scores in ROA models are values lagged by one year while the scores in Tobin's Q models are current period values. Ln(Asset) is the natural logarithm of the book value of total assets of a firm at the end of the year *t*, Leverage is the debt to equity ratio of the firm at the end of the year *t*, Tangibility is tangible assets (property, plant, and equipment) over total assets of a firm at time *t* in percentage, Cash-Holding is cash in the firm balance sheet divided by the total assets of the firm at time *t* in percentage. Sales\_growth is the percentage change in firm *i* sales at time *t*. ΔGDP is the percentage annual change in GDP for the country in question during year *t*. The E, S, and G coefficients are scaled up by 100 for reporting. The last rows include the fixed effects, Country control, Year and Firm fixed effects, the number of observations in the models estimated, and adjusted R<sup>2</sup>, Firm-level clustered standard errors are given in parentheses, and \*\*\* (\*\*, \*) denotes significance at the 1% (5%, 10%) level (two-sided test).

	ROA			LN(TOBIN'S Q)		
	(1)	(2)	(3)	(4)	(5)	(6)
Env_1	0.013 (0.013)			0.338*** (0.067)		
Soc_1		0.046** (0.019)			0.549*** (0.072)	
Gov_1			-0.045*** (0.014)			0.114* (0.069)
Ln(Asset)	0.003 (0.002)	0.0002 (0.003)	0.007*** (0.002)	-0.123*** (0.011)	-0.139*** (0.011)	-0.103*** (0.011)
Leverage	-0.064*** (0.016)	-0.064** (0.026)	-0.061*** (0.017)	-0.087 (0.089)	-0.118 (0.088)	-0.093 (0.089)
Tangibility	-0.058*** (0.014)	-0.062*** (0.015)	-0.069*** (0.014)	-0.534*** (0.067)	-0.442*** (0.064)	-0.463*** (0.066)
CashHolding	0.03 (0.025)	-0.023 (0.050)	-0.005 (0.025)	1.443*** (0.107)	1.416*** (0.101)	1.426*** (0.104)
Sales_growth	0.074*** (0.01)	0.079*** (0.025)	0.075*** (0.010)	0.197*** (0.040)	0.207*** (0.039)	0.188*** (0.040)
ΔGDP	0.354*** (0.089)	0.365*** (0.102)	0.382*** (0.091)	1.060** (0.435)	1.028** (0.425)	1.201*** (0.432)
Country control	Yes	Yes	Yes	Yes	Yes	Yes
Year & Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,215	1,240	1,240	1,562	1,593	1,593
Adjusted R <sup>2</sup>	0.093	0.098	0.098	0.298	0.321	0.298

#### 4.5 Robustness analysis

It is possible that the relationship between ESG and ROA could be driven by large and successful firms as they have higher slack resources to invest in ESG (Aguilera-Caracuel et al., 2015) and as the high-ESG firms have been found to have increased access to external finance (Wellalage et al., 2022). To test this, we re-estimate our Model (3) in Table 3 after removing the top decile of firms with the best financial performance (ROA) each year. The results (available upon request) are similar to those reported earlier, the one-year lagged ESG is still positively related to ROA, although the coefficient of 0.051 is now only marginally significant ( $p$ -value 5.4%). The same happens if we estimate Model (3) in Table 4. Again, the one-year lagged ROA is found to be positively related to ESG, now with a coefficient of 0.072 significant at a 10 percent level ( $p$ -value 3.2%). All in all, the result supports our earlier conclusion that there is a bi-directional relationship between ESG and ROA.

Typically, there are very little within-firm changes in ESG scores (Bauer et al., 2022). As such the ESG scores are quite sticky and establishing short-term (i.e., year-on-year) impact on firm performance may look forced. Unlike in firm valuation which relies on external multiples like the value of a firm's outstanding shares and debt compared with its asset replacement cost, the relationship of the 'sticky' ESG scores on profitability which is based on internal multiples i.e., net income ratio to total asset can be a challenge. To analyze this, we study the impact of the change in the ESG scores over a longer period on financial performance. Two different methods are used (results are available upon request). First, we run a cross-sectional regression where the dependent variable is the last available value of ROA and the independent variable is the corresponding difference in the ESG ( $ESG_t$  minus  $ESG_{t-5}$ ) calculated over the longest period possible (potentially up to eleven years). The same control variables are used as before. We find the change in the ESG to be positively related to the ROA although the coefficient (0.046) is significant only at the ten percent level ( $p$ -value 1.8%). Second, we estimate a panel model where the dependent variable is again ROA, but now the independent variable is the change in the ESG over five years (as a result, the sample includes only ROAs from 2015 onwards). The result is again consistent with the earlier ones. An increase in ESG rating leads to higher ROA. The coefficient is significant at a five percent level (0.089,  $p$ -value 4.5%) and economically meaningful (e.g., an increase of 10% would indicate an increase of 0.89 percentage points in ROA). Overall, the result suggests that an improvement in ESG leads to an improvement in profitability, at least during the latter part of the sample (as the five-year difference results reflect the situation in the latter part of the sample).

### 5 Summary and conclusion

The debate on whether environmental, social, and governance practices of firms are related to the firm's financial performance and valuation has been largely explored in academic research. Most of the earlier studies have argued that firms are doing good because they are doing well rather than doing well because of doing good. Our study addresses the (reverse) causality challenge documented in the literature on ESG-firm financial performance by considering the lag effects and by arguing that the relationship is not necessarily one-way. We add to the understanding of shareholders and other stakeholders on the impact of a firm's ESG performance on their profitability (short-term firm performance measure) or valuation (long-term firm performance measure) with data on representative economies for valid generalisation using data

from the Nordic countries from 2010 to 2020 via the panel regressions model.

Consistent with the earlier result, the result shows that the firm's past profitability is positively related to overall ESG and pillar scores except for the governance scores. The negative relationship with the governance pillar is in line with some findings on corporate governance e.g., Ahern and Dittmar (2012) who found that gender quotas led to younger and less-experienced boards and the accompanying poor firm performance. More importantly, we also found that past ESG performance is positively related to firms' profitability (and valuation). In the robustness analysis, we found clear evidence that an improvement in ESG increases future profitability. Taken together, the results suggest that ESG performance can be a cause and an implication of better firm profitability. These findings have important practical implications for the firms and their stakeholders as far as sustainability is concerned ranging from the importance of reporting positive actions on sustainability to actual steps to improve a firm's ESG score.

This study has some limitations. First, the Refinitiv ESG data suffers from the backfilling issue which reduces replicability to some degree. However, this issue is not a major concern for this study as we are not interested in the stock market reaction to the rating announcements, but rather in the overall effect of firms' sustainability actions on firms' financial performance. These actions are mostly observable even without the ESG rating. Second, one may raise the question of whether the results from the Nordic countries can be generalized to other countries and markets. The Nordics area has been in many ways at the forefront of the change, but the casual observation of the recent development taking place in many countries gives us reason to believe that the results apply to other markets as well.

A good idea for future research is to examine how different types of shareholders affect the performance of firms in ESG and consequently firm profitability and valuation because of the fundamental role shareholders play in promoting sustainable development globally. Similarly, it would be interesting to conduct, a comparative study between developed and emerging markets to understand what aspect of sustainability is important at the different levels of development especially as sustainability issues are fast spreading across borders.

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