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Corporate social responsibility and financial performance: the role of innovation

Is there a relationship between CSR and financial performance and does innovation moderate it?

Isabelle von Dahn
24791@student.hhs.se

Linda Ericson
24850@student.hhs.se

Abstract

This study aims to investigate whether there is a relationship between corporate social performance and corporate financial performance and if innovation has a moderating effect on the relationship. To examine this, we use fixed effects regression models on an unbalanced panel dataset consisting of firms listed on the Nordic stock exchanges and with active headquarters in the Nordic region between 2011 and 2021. Our results support a positive relationship between corporate social performance and corporate financial performance. Moreover, our results support innovation as a negative moderator for the relationship; thus, the relationship between corporate social performance and corporate financial performance is stronger in low-innovation firms.

Tutor: Irina Gazizova
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1 Introduction

In recent years, the awareness concerning sustainability has increased, resulting in corporate social responsibility (CSR) becoming a highly debated topic. Consequently, the interdependence between corporations and society is relevant to consider (Porter & Kramer, 2006). Due to the gaining momentum of CSR, along with its developing value to society, it is essential to consider whether CSR is reflected in the financial performance of firms.

The link between firm performance in terms of CSR, from here on referred to as corporate social performance (CSP), and corporate financial performance (CFP) has been debated over decades (Ullmann, 1985; Waddock & Graves, 1997; McWilliams & Siegel, 2000; Orlitzky et al., 2003; Blanco et al., 2013). The relationship, initially perceived as straightforward (Preston, 1978; Bowman, 1978), has proven to be characterized by ambiguity and complexity (Ullmann, 1985; Waddock & Graves, 1997; Dowell et al., 2000; Hull & Rothenberg, 2008; Krüger, 2015). On the one hand, CSP is constructive, as it can increase firm performance. Instrumental stakeholder theory argues that CSP can create positive stakeholder relationships (Freeman, 1984; Waddock & Graves, 1997). Similarly, legitimacy theory states that CSP improves firm reputation (Suchman, 1995), and the resource-based view (RBV) suggests that CSP can be considered an intangible asset, creating a competitive advantage (Barney, 1991; Hart,1995; Russo & Fouts, 1997). On the other hand, CSP is destructive, as it could be indicative of an agency problem and thus a conflict between shareholders and managers using CSR to further their own agendas (Friedman, 1970; Waddock & Graves, 1997). Since this field of research is characterized by various findings and ambiguity, we aim to investigate this relationship in the relatively unexplored Nordic market. Thus, our first research question is:

Does corporate social performance influence corporate financial performance of Nordic firms?

The discrepancies in the research field point to the potential of confounding variables (McWilliams & Siegel, 2000; McWilliams et al., 2006; Orlitzky, 2008), and thus recent research has investigated the effect of such variables on the CSP-CFP relationship. In particular, the role of intangible assets has received an increasing amount of attention (McWilliams & Siegel, 2000; Hull & Rothenberg, 2008; Surroca et al., 2010), where the

moderating effect of innovation has been in the spotlight (e.g., Hull & Rothenberg, 2008; Blanco et al., 2013; Rogers et al., 2013).

According to the resource-based view (RBV), both CSP and innovation can provide a firm with a competitive advantage and thereby increase CFP. Moreover, research suggests that the two variables are interrelated. With this in mind, scholars finding a negative moderator argue that innovation blunts the effect of CSP on CFP (Hull & Rothenberg, 2008). However, scholars finding that innovation does not moderate the relationship or that innovation is a positive moderator of the relationship contradicts this reasoning (Blanco et al., 2013; Rogers et al., 2013). Given that this research area is still relatively unexplored and that researchers have not yet reached a consensus regarding the moderating effect of innovation, there is a call for further research. Thus, our second research question is formulated as follows:

Does innovation intensity moderate the relationship between corporate social performance and corporate financial performance in Nordic firms?

We have adopted a panel data methodology by using multivariate ordinary least squares (OLS) regressions with fixed effects and robust standard errors when performing our research. Our first hypothesis states a positive correlation between CSP and CFP. The second hypothesis expands the investigation by including innovation as a moderator. As previous studies have found that innovation has a negative moderating effect on the CSP-CFP relationship (e.g., Hull & Rothenberg, 2008), we predict this outcome.

Our results suggest a positive correlation between CSP and CFP. Moreover, when introducing innovation as a moderator in the model, we find that innovation negatively moderates the relationship between CSP and CFP. Thus, our results align with Hull and Rothenberg (2008), who also present innovation as a negative moderator of the CSP-CFP relationship.

1.1 Contribution

Our thesis contributes to prior research in three ways. Firstly, CSR is subjected to continuous scrutiny and new regulations. The legal developments are most recently reflected in the Directive on CSR due diligence, proposed by the European Commission in February 2022 (European Commission, 2022). Due to the dynamic legal and political landscape of CSR, it is crucial to present recent findings in this area, reflecting the current corporate climate. Thus, we contribute to prior research by presenting results based on current data.

Secondly, we include innovation as a moderating variable in the relationship between CSP and CFP. Although a long stream of research (e.g., Ullmann, 1985; McGuire, 1988; Waddock & Graves, 1997; Margolis & Walsh, 2003; Orlitzky et al., 2003) has been conducted in this area, a limited number of scholars consider the role of innovation in the CSP-CFP link (McWilliams & Siegel, 2000; Hull & Rothenberg, 2008; Surroca et al., 2013; Blanco et al., 2013; Rodgers et al., 2013). Prior literature in the CSP-CFP research area argues that there is a large amount of unexplained variance across existing studies (Orlitzky et al., 2003; Margolis & Walsh, 2003), indicating the potential of confounding variables (McWilliams & Siegel, 2000; Orlitzky, 2008). Thus, by investigating the moderating effect of innovation, we contribute to the existing research by shedding light on a confounding variable seldom accounted for in the literature covering the CSP and CFP link.

Thirdly, we investigate the link between CSP and CFP, with innovation as a moderator, in the Nordic market. To the best of our knowledge, this has not yet been done in this market. Moreover, the Nordic countries are leading in both CSR and innovation (European Commission, 2021; Robeco, 2021), making this an interesting region to study. Since we conduct our research on an unexplored region with distinguishing characteristics, we provide a new perspective to the research area.

1.2 Delimitations

Our thesis is delimited to firms listed on the Nordic market and with active headquarters in the Nordic region.[1] Our research period is 2011-2021, but due to the use of lagged variables, we have collected data from 2010 to 2021. With this delimitation, we exclude data from the financial crisis and use data reflecting the current corporate climate while maintaining a sufficient data sample.

1.3 Disposition

Our study is divided into six chapters. In chapter 2, theory and previous literature are discussed, followed by the development of our two hypotheses. Chapter 3 presents our sample construction, research design, variables, and models. Our results are introduced in chapter 4. Finally, our discussion is found in section 5, followed by limitations and suggestions for future research, and a conclusion in chapter 6.

[1] When we refer to firms listed on the Nordic market, the following exchanges are considered: OMX Stockholm Stock Exchange (XSTO), OMX Copenhagen Stock Exchange (XCSE), Nasdaq Helsinki (XHEL), Oslo Stock Exchange (XOSL) and Iceland Stock Exchange (XICE).

2 Theory and literature review

In this chapter, we introduce our theoretical framework and previous research. We begin by defining CSR and reviewing previous literature and theory on its relationship with CFP. Followingly, we introduce the role of innovation by putting forward its definition and relationship with CSP and CFP separately, along with its moderating effect on the CSP-CFP relationship. Finally, we develop our hypotheses based on previous literature and theory.

2.1 Defining corporate social responsibility

"*Corporate social responsibility encompasses the economic, legal, ethical, and discretionary (philanthropic) expectations that society has of organizations at a given point in time*" (Carroll, 1979, 1991).

This definition of CSR, provided by Archie Carroll in 1979, is widely accepted. Later on, the definition was constructed into a pyramid containing the four aspects of CSR: philanthropic, ethical, legal, and economic (Carroll, 1991). In the recent decade, CSR has gained momentum and received increased attention, and further research defining CSR has based its definition on the one provided by Carroll (Waddock & Graves, 1997). Thus, this is the considered definition in our thesis.

In 2004, the acronym ESG was introduced by a group of twenty financial institutions as a response to a request from the Secretary-General of the United Nations, Kofi Annan. The term refers to the integration of environmental, social, and governance concerns in the business models of firms and investors (Gillan et al., 2021). Explained by its origins, the term is, in comparison to CSR, more suitable for evaluating and measuring firms' sustainability performance (Robeco, 2021). In this paper, we consider CSR and ESG interchangeable. Additionally, the term CSP will be used throughout the paper to express performance in both CSR and ESG.

2.2 The relationship between corporate social performance and financial performance

An extensive amount of previous research examines the relationship between CSP and CFP, and the relationship has not been proven indisputable (Waddock & Graves, 1997; McWilliams & Siegel, 2000; Orlitzky et al., 2003). In the following section, 2.2, three streams of research with different findings on the relationship between CSP and CFP are presented: positive relationship, negative relationship, and no relationship.

2.2.1 Positive relationship between corporate social performance and financial performance

The majority of research in this area suggests a positive relationship between CSP and CFP (Hart & Ahuja, 1996; Dowell et al., 2000; Hillman & Keim, 2001; Orlitzky et al., 2003). This line of reasoning mainly relates to the instrumental stakeholder theory (Donaldson & Preston, 1995; Jones, 1995). The fundamental idea is that good management and corporate adherence to CSP attributes can create positive stakeholder relationships and improve CFP (Freeman, 1984; Waddock & Graves, 1997). The theory predicts that firms acting socially irresponsible when lowering their implicit costs will incur higher explicit costs. For instance, improving an employee relations policy may be of low cost but can result in considerable gains in morale and productivity, yielding a competitive advantage. Hence, a firm trying to cut costs by, e.g., compromising employee relationships, may eventually obtain higher costs than a firm initially investing more into the employee relations (Waddock & Graves, 1997).

Furthermore, acting socially responsible is argued to enhance firm reputation and thereby increase the demand for a firm's services or products. Legitimacy theory (Suchman, 1995) can explain how firm reputation is affected by CSR activities. Legitimacy is considered as general perceptions or assumptions that a company's activities are appropriate within the frame of socially accepted values and beliefs. If a firm has a place within this frame, the firm reputation improves, increasing the likelihood of being chosen by consumers and, in turn, CFP (Doh et al., 2009).

Finally, scholars finding a positive relationship between CSP and CFP use arguments grounded in the resource-based view. The RBV logic suggests that a competitive advantage comprises valuable, rare, inimitable, and nonsubstitutable resources (Barney, 1991).

Researchers argue that firms acquire the resources needed to achieve a competitive advantage by engaging in CSP activities (Hart,1995; Russo & Fouts, 1997; Schnietz & Epstein, 2005). In line with this, CSP can be considered an intangible asset, able to increase the efficiency in the use of resources and generate a positive impact on CFP (Hillman & Keim, 2001; Orlitzky et al., 2003). For instance, the literature suggests that CSP can reduce costs, increase efficiency and provide companies with qualitative employees (Hart & Ahuja. 1996). The competitive advantage generated by CSP is also reflected in increased market opportunities (Porter & Linde, 1995) and improved supply quality (Hull & Rothenberg, 2008).

In summary, research finding a positive link between CSP and CFP is commonly based on instrumental stakeholder theory, legitimacy theory, and RBV logic. Instrumental stakeholder theory predicts that increased CSP leads to positive stakeholder relationships and, in turn, lower costs. Legitimacy theory argues that increased CSP generates a better firm reputation and thus more customers. Finally, RBV logic suggests that CSP is a resource providing the firm with a competitive advantage, resulting in increased CFP.

2.2.2 Negative relationship between corporate social performance and financial performance

However, the second stream of research finds a negative relationship between CSP and CFP (Wright & Ferris, 1997; Krüger, 2015). Wright and Ferris' (1997) event study found that stock prices reacted negatively to the announcement of disinvestment of assets in South Africa, which the colleagues interpreted to be consistent with agency theory. Similarly, Krüger (2015) found that investors responded negatively to positive CSR news, which he too contributed to agency problems. Scholars suggesting a negative relationship between CSP and CFP argue that firms that enhance their social performance draw resources and management efforts away from core business areas, resulting in lower profit (Hull & Rothenberg, 2008). Hence, firms acting socially responsibly form a competitive disadvantage as they incur costs that might otherwise be avoided or borne by others, such as individuals or the government (Waddock & Graves, 1997). This argument stems from Friedman (1970) and other neoclassical economists, stating that there are few measurable economic benefits to socially responsible behaviors, while there are numerous costs (Waddock & Graves, 1997). Friedman (1970) further argues that CSR engagement is indicative of an agency problem or conflict between the interests of managers and shareholders. Furthermore, Friedman states

that managers use CSR to further their own agendas (e.g., social, political, or career agendas) at the expense of value-adding projects or returns to shareholders. In other words, scholars finding a negative relationship between CSP and CFP explain their outcome with Freidman's reasoning stemming from agency theory: that CSP draws resources from core business areas, resulting in lower CFP.

2.2.3 No relationship between corporate social performance and financial performance

Finally, the third stream of research suggests no relationship between CSP and CFP (McWilliams & Siegel, 2000). Others argue that, even if a relationship exists, it is too complex to be found (Ullmann, 1985; Margolis & Walsh, 2003). Ullmann (1985) attributes the inconsistencies in the research area to (1) lack in theory, (2) inappropriate definition of key terms (3) deficiencies in the empirical databases currently available. Moreover, Ullmann and other proponents of a non-existent relationship between CSP and CFP state that the various intervening variables between social and financial performance give no reason to believe that a relationship exists. Additionally, early publications in this area of research are subjected to measurement problems due to the absenteeism of good measurements of CSP. Thus, the measurement problem can be the cause of ambiguous results concerning the CSP-CFP link (Waddock & Graves, 1997).

2.3 Innovation

Orlitzky and Benjamin (2001), Ortlizky et al. (2003), and Margolis and Walsh (2003) argue that, despite the positive relationship between CSP and CFP found by some empirical research, a large amount of unexplained variance across studies exists. The discrepancies in the research field point to the potential of confounding variables (McWilliams & Siegel, 2000; Orlitzky, 2008; McWilliams et al., 2006). Recent research has tried to shed light on this discrepancy by incorporating potential omitted variables like innovation (McWilliams & Siegel, 2000; Pavelin & Porter, 2008; Hull & Rothenberg, 2008; Surroca et al., 2010) to investigate causality effects (Waddock & Graves, 1997; Surroca et al., 2010) or incorporating moderating effects (Hull & Rothenberg, 2008). In this section, 2.3, we will discuss the relationship between CFP and innovation and the relationship between CSP and innovation. Both relationships are argued to be grounded in the RBV logic. Finally, innovation as a moderator to the relationship between CSP and CFP will be discussed.

2.3.1 The relationship between financial performance and innovation

Baragheh, Rowley, and Sambrook (2009) define the nature of innovation as something "new or improved." Innovation is a variable long argued to be a strong driver of financial performance (Schumpeter, 1934; Burns & Stalker, 1961; Abernathy & Utterback, 1978; Abernathy & Clark, 1985; Hamel & Prahalad, 1994; Christensen & Bower, 1996). Porter (1980) argues that companies achieving a higher level of differentiation in terms of innovation typically generate returns above average. Drawing on the previously mentioned RBV logic, Russe and Fouts (1997) and Sharma and Vredenburg (1998) argue that due to the substantial costs associated with the development of new products, technology, and processes, innovation can be considered a source of competitive advantage and in turn increase CFP.

2.3.2 The relationship between corporate social performance and innovation

Pavelin and Porter (2008) argue that there is a close link between CSP and innovation, as the development of improved CSR commonly implies a need for new technology. McWilliams and Siegel (2000) further develop this argument, stating that products with CSR attributes imply firm engagement in processes and product innovation. Additionally, they find a correlation between R&D[2] and CSP, as firm engagement in CSP implies a differentiation strategy, requiring strategic R&D investments.

Padgett and Galan (2010) build on this previous research and find that R&D intensity positively affects CSR. The colleagues base their reasoning on the RBV logic. Hence, R&D is considered an investment resulting in increased knowledge as it leads to product and process innovation and, in turn, CSR-related processes and products. For instance, an R&D activity may improve processes by making them more effective, reducing the amount of energy consumed by the firm, ensuing cost reductions and less pollution.

2.3.3 The moderating effect of innovation

Scholars investigating the moderating effect of innovation present different results (Hull & Rothenberg, 2008; Blanco et al., 2013; Rodgers et al., 2013). The findings can be divided into

[2] R&D is a factor associated with a firm's innovative capabilities (Lichtenberg & Siegel, 1991), thus we use R&D as a proxy for innovation.

three streams of research, finding innovation as a moderator to be negative, positive, or non-significant.

2.3.3.1 Innovation as a negative moderator in the relationship between corporate social performance and financial performance

The first stream of research puts forward innovation as a negative moderator of the CSP-CFP relationship (Hull & Rothenberg, 2008). These findings suggest that CSP has a stronger positive impact in firms with lower innovation intensity. Hull and Rothenberg (2008) suggest that CSP and innovation lead to differentiation as they both, according to RBV logic, can be regarded as a competitive advantage. Thus, Hull and his colleague firms argue that firms with high levels of innovation, generating products of high quality, may need lower levels of CSP to differentiate. Similarly, firms that are forced to innovate to survive in the short run, or firms that freely choose to innovate, may experience a limited effect of CSP on CFP. Meanwhile, less innovative firms can achieve differentiation by simply improving their CSP. Hence, provided that the firm is offering products of acceptable quality compared to the supply on the market, CSP can help firms achieve differentiation (Mackey et al., 2007; Siegel & Vitaliano, 2007). The above suggests that both innovation and CSP can generate differentiation and increase CFP. In line with this, innovation undermines the differentiation effect achieved by CSP (McWilliams & Siegel, 2000). Therefore, innovation is suggested to blunt the relationship between CSP on CFP (Hull & Rothenberg, 2008).

2.3.3.2 Innovation as a positive moderator in the relationship between corporate social performance and financial performance

Research finding a positive moderating effect of innovation is limited. Rodgers et al. (2013) investigated the moderating effect of innovation between CSR and an accounting-based performance, proxied by the Zmijewski score, and CSR and firm value, proxied by Tobin's Q. Although they did not find a moderating effect of innovation when examining the relationship between the aggregated CSR dimensions and CFP, this changed when they looked further into the social dimensions. Specifically, they divided the social dimension into employees, customers, and community. In this case, the collogues found a positive moderating effect of innovation on the relationship between community and CFP, suggesting that CSR investments in community relations positively affect the firm value for firms with high innovation intensity.

2.3.3.3 Innovation does not moderate the relationship between corporate social performance and financial performance

The third stream of research finds that innovation does not moderate the relationship between CSP and CFP (Blanco et al., 2013; Rodgers et al., 2013). Blanco and his colleagues (2013) investigated the role of innovation in a sample of non-socially responsible companies involved in controversial activities. They found no indication of a moderating effect of innovation in the relationship between CSP and CFP. As mentioned in the section above, Rodgers et al. (2013) tested the moderating effect of innovation on the relationship between CSR and accounting performance and CSR and firm value. The colleagues observed no significant moderating effect of innovation on accounting-based performance.

2.4 Hypothesis development

2.4.1 First hypothesis

Previous research finds a variety of correlations between CSP and CFP. Literature finding a positive relationship is rooted in instrumental stakeholder theory, legitimacy theory, and the RBV logic. Under instrumental stakeholder theory, firm engagement in good management and CSR activities can improve stakeholder relationships, avoid costs, and increase firm performance (Freeman, 1984; Waddock & Graves, 1997). Legitimacy theory argues that CSP can improve firm reputation and thus increase CFP through, e.g., increased sales (Suchman, 1995; Doh et al., 2009). Similarly, research grounded in the RBV logic argues that CSP provides firms with a competitive advantage, increasing CFP (Hart, 1995; Russo & Fouts, 1997; Schnietz & Epstein, 2005). Together, the three theories suggest that CSP is positively correlated to CFP. However, agency problems derived from conflicts between stakeholders and agents, and neoclassical arguments, stressing that the cost of CSR is greater than its benefit, suggest that CSR investments decrease CFP (Friedman, 1970; Waddock & Graves, 1997). Although previous research suggests different correlations in the CSP-CFP link, most research suggests a positive relationship between CSP and CFP. Thus, our main hypothesis is defined as:

H1: Corporate social performance is positively linked to corporate financial performance.

2.4.2 Second hypothesis

Although most previous research finds a positive relationship between CSP and CFP, scholars finding no relationship argue that unexplained variance between studies exists (Ortlizky et al., 2003; Margolis & Walsh, 2003). The unexplained variance implies a need for incorporating confounding variables when investigating the CSP and CFP link (McWilliams & Siegel, 2000; McWilliams et al., 2006; Orlitzky, 2008).

Scholars suggest that innovation correlates with CSP (Padgett & Galan, 2010) and CFP (Porter, 1980). The literature argues that these relationships are based on the RBV logic (Hart, 1995; Russo & Fouts, 1997; Sharma & Vredenburg, 1998; Schnietz & Epstein, 2005). In the relationship between innovation and CSP, investments in innovation result in increased knowledge, leading to product and process innovation and, in turn, CSR-related processes and products (Padgett & Galan, 2010). Similarly, in the relationship between innovation and CFP, spendings on innovation can result in intangible assets. Thus, both CSP and innovation can be regarded as a competitive advantage, leading to increased CFP (Russe & Fouts, 1997; Sharma & Vredenburg, 1998; Hull & Rothenberg, 2008).

The ambiguous findings in the literature investigating the CSP-CFP link call for more research. The ambiguity, combined with both CSP and innovation being considered a competitive advantage, and innovation having an established relationship with both CSP and CFP, makes investigating the moderating effect of innovation in the relationship between CSP and CFP of utmost interest.

As this area of research is relatively unexplored, a consensus on innovation as a moderator in the CSP-CFP relationship is not established. In line with the presented theory and the findings of Hull and Rothenberg (2008), we predict that innovation blunts the effect of CSP on CFP. Thus, we predict a negative moderating effect of innovation on the CSP-CFP link. Based on this, our hypothesis is formulated as:

H2: Corporate social performance impacts corporate financial performance more positively in low-innovation firms than in high-innovation firms.

3 Methodology

This chapter includes a detailed account of our sample selection process and sample characteristics. Our general research design and regression models are included, followed by detailed definitions of our dependent, independent, and moderating variables.

3.1 Sample selection

Several aspects have been considered in our sample selection. We have balanced the aim of conducting our study on a sample of firms from markets with high similarities and having a sample with enough observations to reach significant results. Furthermore, our study aims to contribute to the existing literature studying the relationship between CSP and CFP by focusing on a region where significantly less research has been conducted: the Nordics (Sweden, Norway, Denmark, Finland, and Iceland). Moreover, the chosen region is motivated by its distinct characteristics in the area of our study. According to Robeco's sustainability ranking 2021, the Nordic countries are in the lead. Sweden tops the current Country Sustainability Ranking, just ahead of Finland, Norway, Denmark, and Iceland (Robeco, 2021). Additionally, the European innovation scoreboard (2021) by the European Commission categorizes Sweden, Finland, and Denmark as "Innovation leaders" as they are the second, third, and fourth most innovative countries in the EU. Norway and Iceland are categorized as "Strong innovators" and ranked the 11th and 13th most innovative countries in the EU.

Considering the accessibility of the relevant information needed in our research, we delimit our study to public firms. Public firms have significantly more data availability than private firms, especially in the region of our study. Additionally, public firms are more likely to showcase their CSR activities than similar private firms (Hickman, 2020).

Our data has been collected through the Thomson Reuters database Eikon Refinitiv. Eikon Refinitiv is the world's most comprehensive financial time-series database and has one of the world's most extensive ESG content collections operations (Refintiv, 2022). Our sample comprises companies listed in the Nordic region from 2011 to 2021 to exclude direct effects of the financial crisis and have data representing the current corporate climate. However, we obtained data for the period 2010-2021 due to the use of lagged variables in our model. We

also exclude firms without an active headquarters position in the Nordic region to ensure that we have a sample of firms with comparable conditions for CSP and innovation. These criteria gave us our total sample of 1 732 firms which is gradually reduced by the data availability. The first adjustment is for the availability of ESG data. This adjustment reduces our sample by 1 178 unique firms. Secondly, our sample is reduced by 411 firms when adjusting for the available data on R&D expenses. Three more firms are dropped due to their sector division. Finally, one firm is dropped due to a lack of financial data. Our final sample consists of an unbalanced panel dataset with 139 firms and 622 firm-year observations.

Table 1. Removal process

	# of firm-year observations.	**# of Firms**
Total sample*	19 052	1 732
ESG data	-17 040	-1 178
R&D	-1 377	-411
Sector drops**	-7	-3
Other financial data	-6	-1
Final sample main regression	**622**	**139**

**Firms listed on the Nordic market with active headquarters in the Nordic region from 2011 to 2021.*

***Firms in the sectors: financials, real estate, and utilities.*

In Table 2, the sample distribution by country is presented. As evident, the majority of the firm-year observations and firms are Swedish. Furthermore, we observe that Iceland has a limited amount of data, corresponding to two observations and firms, respectively. However, as we study the Nordic region as a whole and believe that the characteristics of the Nordic countries align, we keep Iceland in our sample. Moreover, as we do not assume unobserved heteroscedasticity between countries nor draw any country-specific conclusions, we see no reason to exclude Iceland from our data sample.

Table 2. Sample distribution by country

Country	# of firm-year observations	# of firms
Denmark	146	19
Finland	134	24
Iceland	2	2
Norway	56	11
Sweden	284	83
Total	**622**	**139**

The final sample for the main regression includes the following eight sectors defined by the global industry classification standard (GICS). We exclude firms in the financial and real-estate sectors because their capital structures significantly differ from the rest of the sample. Moreover, the data of the utility sector only comprises two firms and three observations, and the data is not considered to be representative of the sector. Thus, to improve the quality of our sample, we exclude the data from the utility sector. The sample distribution by sector is presented in Table 3.

Table 3. Sample distribution by sector

Sector	# of firm-year observations	# of firms
Communication Services	12	3
Consumer Discretionary	24	5
Consumer Staples	16	6
Energy	48	9
Health Care	164	42
Industrials	200	43
Information Technology	70	21
Materials	88	10
Total	**622**	**139**

3.2 Design

The study aims to examine the relationship between CSP and CFP in Nordic listed firms with active headquarters in the region. Additionally, it aims to uncover moderating effects of innovation in this relationship. Aligning with prior research (Hull & Rothenberg, 2008; Surroca et al., 2010), we use a multivariate regression analysis with ordinary least squares (OLS) and fixed effects on an unbalanced panel dataset. The dataset consists of firms listed on the Nordic stock exchanges and with active headquarters in the Nordic region between 2011 and 2021. Moreover, control variables associated with financial performance are included in the model (Waddock & Graves, 1997; Hull & Rothenberg, 2008; Blanco, 2013).

3.3 Variables

The following section puts forward the variables in models 1 and 2 with their origin and expected relationship with the dependent variable following earlier studies. The independent variables are lagged with one year to examine if they can predict the financial performance in the next period. All continuous variables are winsorized at the top and bottom 1 percent of their distributions.

3.3.1 Dependent variable

ROA – Previous research uses a variety of proxies for financial performance. Blanco et al. (2013) shed light on the difference in financial performance measures, suggesting that previous research use either markets-based measures, such as Tobin's Q and market capitalization, or accounting-based measures, e.g., profitability measures. Our paper aims to capture the financial performance measured by accounting-based measures. Two commonly used accounting-based measures are return on equity (ROE) and return on assets (ROA) (McGuire et el., 1988; Griffin & Mahon, 1997; Waddock & Graves, 1997; McWilliams & Siegel, 2000; Hull & Rothenberg; 2008, Blanco, 2013). Following the method of Hull and Rothenberg (2008) and other previous scholars (e.g., McGuire et el., 1988; Griffin & Mahon, 1997; Hull & Rothenberg, 2008), we include ROA as our measure for financial performance. We consider this an appropriate measure, as it reflects the profitability of the assets, or resources, used in the firm. Moreover, the allocation of resources is critical in achieving a competitive advantage (Barney, 1991). With this in mind, ROA expresses the direct effect on financial performance, stemming from the allocation of resources and thus a competitive

advantage (Hull & Rothenberg, 2008). As the financial impact of competitive advantage is central in our research, we assess ROA to be an informative measurement of financial performance.

We calculate *ROA* as EBIT in year t divided by total assets closing balance in t-1. Both EBIT and total assets are converted into SEK.

$$ROA_{i,t} = \frac{EBIT_t}{Total\ assets_{t-1}}$$

3.3.2 Main independent variable

ESGSCORE - Our main independent variable and proxy for CSP is the ESG score provided by the Thomson Reuters database Eikon Refinitiv. This measurement is a weighted average of company performance in the environmental, social, and governance pillars and ranges between 0 and 100.

The Eikon Refinitiv database evaluates 9 000 firms globally. To arrive at the ESG score, Thomson Reuters processes information extracted from over 630 measures per firm. The 186 most material and comparable measures per industry are drivers when generating the ESG scores. The information provided by each measure is publicly reported and standardized to become comparable across companies (Refinitiv, 2022). The measurements are categorized into three different pillar scores: environmental, social, and corporate governance. Each pillar score is a relative sum of category weights. The weights of the social and environmental scores vary per industry, while the weight of the corporate governance score is fixed across industries. The separate scores are presented below. A further development of the ESG score can be found in Appendix 1.

ESCORE – is defined by the Eikon Refintitv as a company's performance in the environmental pillar and consists of emissions, innovation, and resource use. This score is a part of the *ESGSCORE* used as our proxy for CSP.

SSCORE – is defined by the Eikon Refintitv as a company's performance in the social pillar and consists of community, human rights and product responsibility, and workforce. This score is a part of the *ESGSCORE* used as our proxy for CSP.

GSCORE – is defined by the Eikon Refintitv as a company's performance in the governance pillar and consists of CSR strategy, management, and shareholders. This score is a part of the *ESGSCORE* used as our proxy for CSP.

3.3.3 Control variables

When choosing our control variables, we mainly followed the model used by Hull and Rothenberg (2008) by including risk, size, and innovation. Although we do not include an industry dummy variable, we use sector and year fixed-effects instead, eliminating any time-invariant variables aligning with more recent studies (e.g., Surroca et al., 2010). Research anteceding Hull and Rothenberg (2008), investigating the relationship between CSP and CFP, has consistently used the mentioned control variables (Ullmann, 1985; Waddock & Graves, 1997). Finally, we include liquidity as a control variable aligning with more recent literature (e.g., Surroca et al., 2010; Blanco et al., 2013; Rodgers et al., 2013).

Table 4. Definition of control variables

Variable	Definition	Expected correlation
$SIZE_{i,t}$	$Ln(Total\ assets_t)$	No prediction (?)
$LIQUIDITY_{i,t}$	$\frac{Current\ assets_t - Inventory_t}{Current\ liabilties_t}$	Positive (+)
$RISK_{i,t}$	$\frac{Total\ debt_t}{Total\ assets_{t-1}}$	Negative (-)
$INNOVATION_{i,t}$	$\frac{Research\ and\ development\ expenses_t}{Sales_t}$	Positive (+)

All balance sheet data is calculated as closing balance, and all currencies are converted into SEK.

SIZE – We define firm size as the natural logarithm of a firm's total assets at the beginning of period t. Previous research has mixed results on the correlation coefficient between firm size and CFP (Waddock & Graves, 1997; Surroca et al., 2010; Blanco et al., 2013). Based on this, we do not predict the correlation of the *SIZE* coefficient.

LIQUIDITY – We define liquidity by subtracting inventory from current assets divided by current liabilities, also known as the quick ratio (Blanco et al., 2013). Aligning with previous research (Surroca et al., 2010; Rodgers et al., 2013), we expect that the higher the firm's

liquidity, the greater the opportunity to invest in new projects that could have a positive financial outcome. Thus, the coefficient is predicted to be positive.

RISK **-** Risk is defined as total debt at the end of period t divided by total assets at the beginning of period t. Scholars suggest a negative correlation between debt-to-assets and ROA (Waddock & Graves, 1997; Hull & Rothenberg, 2008). Thus, we expect a negative coefficient of this variable.

INNOVATION – As mentioned in section 2.3.3, research argues that R&D is highly correlated with CSR. Therefore, scholars (e.g., McWilliams & Siegel, 2000) argue that models in previous research not including R&D as a control variable (e.g., Waddock & Graves, 1997) will have an upward biased estimate of the CSP variable. Thus, we include R&D in our model as a proxy for innovation. R&D is a factor associated with a firm's innovative capabilities (Lichtenberg & Siegel, 1991). Following prior research, we define innovation as a firm's research and development expenses (R&D) divided by sales (McWilliams & Siegel, 2000; Padgett & Galan, 2010). Innovation is a variable long argued to be a strong driver of financial performance, and several scholars find a positive relationship between innovation and CSP (McWilliams & Siegel, 2000; Hull & Rothenberg, 2008). In contrast, other scholars (e.g., Blanco et al., 2013) find a negative coefficient for innovation. However, as most previous research finds the relationship between innovation and ROA to be positive, we estimate the coefficient of *INNOVATION* in our model to be positive.

Sector and year fixed effect – By including a sector and year fixed effect, we can generate results of sector performance over our specific time period. We choose to include sector-fixed effects in our model to account for unobserved heterogeneity between sectors. Additionally, this allows us to adjust for sector-specific characteristics affecting our results. Waddock and Graves (1997) argue that R&D expenses and financial performance levels differ significantly between industries. Therefore, industries need to be accounted for to understand the main effects on the dependent variable. Moreover, we adapt a year fixed effect in our regression model. Thus, results derived from different time characteristics common for all firms, including changes and trends in the market, can be mitigated.

3.3.4 Moderating variable

To further provide context to the relationship between CSR and financial performance, we examine how innovation moderates the relationship in our second hypothesis. We calculate an interaction variable, *ESGSCOREINNOVATION*, by multiplying *INNOVATION* with our proxy for CSP, *ESGSCORE*. According to Dawson (2014), this is an established procedure when generating a moderator. Moreover, this aligns with previous research calculating the moderating variable of innovation and CSP (Hull & Rothenberg, 2008). The equation for our moderator is as follows:

$$ESGSCOREINNOVATION_{i,t} = ESGSCORE_{i,t} * INNOVATION_{i,t}$$

3.4 Description of applied models

3.4.1 Main regression model

To test our first hypothesis, we estimate a multivariate OLS regression. Aligning with previous research (e.g., Waddock & Graves, 1997; McWilliams & Siegel, 2000; Hull & Rothenberg, 2008), our model uses return on assets, *ROA*, as the dependent variable and our proxy for CSP, *ESGSCORE*, as the main independent variable. As described in section 3.3, we also include a set of control variables. Furthermore, to minimize the influence of outliers in our data, we winsorize all continuous variables at the top and bottom 1 percent of their distribution. To deal with endogeneity concerns, we use lagged independent variables (e.g., Waddock & Graves, 1997; Hull & Rothenberg, 2008; Surroca et al., 2010). Most prior research has conducted regression models with industrial variables or effects (Waddock & Graves, 1997; Hull & Rothenberg, 2008; Surroca et al., 2010). However, our industry identifier generates more groups than the sector identifier and results in an insufficient number of firms per industry. Thus, we consider a sector-fixed effect regression model to be appropriate. We use sector and year fixed effect to deal with the possible correlation between unobservable heterogeneity and the explanatory variables of financial performance in our model, aligning with previous research (e.g., Surroca et al., 2010). A Hausman test, found in Appendix 2, was performed to see if a fixed-effects (FE) model or a random-effects (RE) is appropriate. The test resulted in a prob>Chi2 of 0.0000, and we reject the null hypothesis, that RE is appropriate, and FE is favored.

Thus, all independent variables in our model are lagged by one year, and sector and year fixed effects are included. Following this, this model is used to test our first hypothesis:

Model 1:

$$ROA_{i,t} = \beta_0 + \beta_1 ESGSCORE_{i,t-1} + \beta_2 SIZE_{i,t-1} + \beta_3 LIQUIDITY_{i,t-1} + \beta_4 RISK_{i,t-1} + \beta_5 INNOVATION_{i,t-1} + SectorFixedEffect_i + YearFixedEffect_t + \varepsilon_{i,t}$$

In which $ROA_{i,t}$ equals CFP, *i* index firms and *t* time. β_0 is the constant, and $\varepsilon_{i\,t}$ is the error term.

3.4.2 Regression model with the moderating effect of innovation

To test our second hypothesis, model 2 is modified to include innovation. To examine if the relationship between the main independent variable, *ESGSCORE*, and the dependent variable, *ROA*, changes according to the value of our moderating variable *INNOVATION,* we add the interaction term, *ESGSCOREINNOVATION,* to our model (Dawson, 2014). The interaction term is generated by multiplying the *ESGSCORE* and *INNOVATION* variables. Thereby, our research model testing the potential moderating effect of innovation, model 2, is defined in the following way:

Model 2:

$$ROA_{i,t} = \beta_0 + \beta_1 ESGSCORE_{i,t-1} + \beta_2 SIZE_{i,t-1} + \beta_3 LIQUIDITY_{i,t-1} + \beta_4 RISK_{i,t-1} + \beta_5 INNOVATION_{i,t-1} + \beta_6 ESGSCOREINNOVATION_{,t-1} + SectorFixedEffect_i + YearFixedEffect_t + \varepsilon_{i,t}$$

In which $ROA_{i,t}$ equals CFP, *i* index firms, *t* time, and β_0 the constant. *ESGSCOREINNOVATION* is the interaction term and the product of *ESGSCORE* and *INNOVATION.* $\varepsilon_{i,t}$ is the error term. According to Dawson (2014), it is β_6 that determines whether we observe moderation or not and if we can accept our hypothesis.

4 Results

This chapter includes descriptive statistics of our variables and our Pearson's correlation coefficient test, together with insights from these. Finally, we present the results from testing our first and second hypotheses.

4.1 Descriptive statistics

This section presents a table of descriptive statistics of the number of firms, mean, standard deviation, median, upper and lower quarter percentile, and minimum and maximum value of our variables.

Table 5. Descriptive statistics

	N	Mean	SD	p25	Median	p75	Min	Max
ROA	622	.102	0.157	.053	.093	.164	-.575	.622
ESGSCORE	622	56.141	19.722	42.547	57.975	71.665	9.436	90.378
SIZE	622	23.583	1.830	22.482	23.635	24.827	18.671	27.566
LIQUIDITY	622	1.69	2.144	.812	1.085	1.527	.346	14.5
RISK	622	.416	1.554	.107	.225	.315	0	14.891
INNOVATION	622	.506	3.718	.013	.03	.089	-.007	37.257

The mean of the variable *ROA* is 10.2%. Previous research finds a somewhat lower *ROA*, corresponding to 9.9% (Blanco et al., 2013). However, as the difference between the mean values of *ROA* is 0.3 percentage points, we consider the *ROA* mean in our adjusted sample to be comparable to previous research.

Since previous research uses a different measure for CSR, the statistics of CSR are challenging to benchmark to previous findings. However, Eikon Refinitiv provides a framework for assessing the level of *ESGSCORE*. The measure provided by Refinitiv is a score between 0 and 100, where a score above 50 indicates a relatively satisfactory ESG performance and reporting transparency (Refinitiv, 2022). As the mean of *ESGSCORE* in our sample is 56.141, the average firm has a relatively high ESG performance. This number aligns with the Nordics being a leader in terms of sustainability (Robeco, 2021).

The mean firm size, measured by the natural logarithm of total assets, is 23 583 million SEK. Compared to our total sample, this number is relatively high, indicating that larger firms report ESG and R&D expenses, see Appendix 3. However, this number is somewhat low compared to previous research investigating the CSP-CFP link (Blanco, 2013). Thus, our data sample consists of smaller firms than in previous research. This difference could be explained by market characteristics differences. Previous literature investigating the CSP-CFP link has commonly been conducted on firms in the US market. However, as we are performing our research on Nordic firms, the lower mean of *SIZE* could be explained by characteristics differences, such as Sweden being a significantly smaller country than the US.

The *RISK* mean, measured by total debt divided by total assets, is 0.416. Scholars have found both a lower ratio (Waddock & Graves, 1997) and a higher ratio (Rodgers et al., 2013). Thus, this number corresponds to previous findings. Moreover, the mean debt-to-asset ratio in our final sample is 11.6 percentage points higher than the mean ratio of the total sample. Thus, evidence suggests that firms reporting ESG scores and R&D expenses in the Nordic region have high debt-to-assets ratios.

Our dataset's innovation level is considered somewhat high compared to previous research (McWilliam & Siegel, 2000; Rodgers et al., 2013). This aligns with the Nordics achieving high levels of innovation (European Commission, 2021). Additionally, the difference between our mean and median and mean and p75 indicate that a limited number of investment intensive firms increase the *INNOVATION* mean. Looking at the quick ratio, our mean of 1.69 is somewhat higher than previous research (Rodgers et al., 2013).

4.2 Pearson's correlation

To investigate if a linear relationship between our variables exists, we conduct Pearson's correlation test. In Table 6, Pearson's correlation coefficients of our variables are presented. Since we assume that the control variables will impact the dependent variable, we predict that our independent variables will significantly correlate with *ROA*. Amongst our other independent variables, we expect a limited significant correlation, as this could indicate the existence of multicollinearity.

Table 6. Pearson's correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) *ROA*	1.000					
(2) *ESGSCORE*	0.192***	1.000				
	(0.000)					
(6) *SIZE*	0.242***	0.714***	1.000			
	(0.000)	(0.000)				
(7) *LIQUIDITY*	-0.229***	-0.271***	-0.386***	1.000		
	(0.000)	(0.000)	(0.000)			
(8) *RISK*	0.053	0.012	0.126***	-0.073*	1.000	
	(0.190)	(0.772)	(0.002)	(0.069)		
(9) *INNOVATION*	-0.433***	-0.155***	-0.229***	0.381***	-0.032	1.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.423)	

*Note: The p-value is shown in the parenthesis below the variable, and significance levels of 10%, 5%, and 1% are indicated with *, **, and ***.*

Looking at Table 6, we see that most of our control variables correlate to *ROA* with a 1% significance. Thus, our predictions were overall correct. However, the variable RISK is not significantly correlated to *ROA*, which contradicts our expectations. In addition, we can observe that our control variables are correlated to each other with statistical significance. As this could indicate that our data is the subject of multicollinearity, we calculate our variables' Variance Inflation Factor (VIF), found in Appendix 4. None of our variables exceed a VIF above five, suggesting no collinearity issue in the data. More about multicollinearity is found in section 4.6.

4.3 Testing hypothesis 1: the relationship between corporate social performance and financial performance

In Table 7, the regressions testing our first hypothesis are presented. In column 4, we see that the adjusted r-square of our regression is 0.2373. This adjusted r-square is higher than the one in the OLS regression without fixed effects, presented in column 2. Thus, the model's explanatory value of the dependent variable increases when we control for firm and year-fixed effects.

Table 7. Regressions results of H1

	Expected Coefficient	**(1) ROA**	**(2) ROA**	**(3) ROA**	**(4) ROA**
ESGSCORE	+	0.0015***	0.0004	0.0006	0.0009*
		(0.000)	(0.367)	(0.221)	(0.084)
SIZE	?		0.0088	0.0100	0.0045
			(0.144)	(0.112)	(0.496)
LIQUIDITY	+		-0.0018	-0.0052	-0.0046
			(0.742)	(0.341)	(0.382)
RISK	-		0.0025	0.0030	0.0022
			(0.318)	(0.165)	(0.444)
INNOVATION	+		-0.0165***	-0.0171***	-0.0168***
			(0.000)	(0.000)	(0.000)
Constant		0.0166	-0.1180	-0.1519	-0.0405
		(0.515)	(0.358)	(0.251)	(0.771)
No of obs.		622	622	622	622
Adj. R-sq.		0.0370	0.2110	0.2323	0.2373
Sector Fixed Effect		NO	NO	YES	YES
Year Fixed Effect		NO	NO	NO	YES

Note: The table shows the results from five regressions testing our first hypothesis from 2011 to 2021. In column 1, a univariate analysis incorporating *ROA* and *ESGSCORE* is presented. Columns 2-4 show complete models incorporating the dependent variable *ROA*, the main independent variable *ESGSCORE,* and the control variables *SIZE*, *LIQUIDITY*, *RISK,* and *INNOVATION*. The columns present results of regressions with no fixed effect (column 2), sector fixed effect (column 3), and sector and year fixed effect (column 4). The variable *ESGSCORE* is the firm ESG score provided by the Thomson Reuters database Eikon Refinititv. *SIZE* is the natural logarithm of total assets. *LIQUIDITY* is the quick ratio, calculated as the current assets less inventory divided by current liabilities. *RISK* is the debt-to-asset ratio. *INNOVATION* is R&D expenses scaled by sales. All variables are winsorized at the top and bottom 1 percent. The predicted coefficient of each variable is presented in the column to the left. The p-values are shown in the parenthesis below the variables, and significance levels of 10%, 5%, and 1% are indicated with *, **, and ***.

The results from our regressions examining the first hypothesis can be observed in Table 7. In column 1, we can observe a significant positive relationship between *ESGSCORE* and *ROA*. In column 2, the results of the OLS regression without fixed effects are presented. There is no statistically significant correlation between *ESGSCORE* and *ROA in this instance*. The insignificant correlation remains when we control for sector fixed effect. However, when controlling for sector and year fixed effect, the coefficient of *ESGSCORE* ($\beta_{ESGSCORE} = 0{,}0009$) is statistically significant at 10%. Thus, we can accept our first hypothesis. However, we do so with caution, as the significance level is somewhat high.

The remaining variables, *SIZE, LIQUIDITY,* and *RISK,* are not correlated with the dependent variable in the regression model at any of the chosen significance levels. Thus, we cannot draw any conclusions regarding the coefficients of these variables. Moreover, the variable *INNOVATION* correlates with *ROA* at a statistical significance of 1%. The coefficient of *INNOVATION* is negative, contradicting our predictions.

The constant does not hold significance in any regression, indicating that if all independent variables equal zero, there is insufficient statistical evidence that the firm would have a *ROA* different from zero. As a company needs assets to operate, this is a probable result.

4.4 Testing hypothesis 2: the moderating effect of innovation

The table below includes our model adjusted to include the moderating variable, testing our second hypothesis. In column 3, the adjusted R-squared is 25.46%, which is higher than our main model, found in Table 7, column 4. Thus, our second regression model has better explanatory power than our first model, which indicates that more of the dependent variable is explained when including our interaction term *ESGSCOREINNOVATION* to test for the moderating effect of innovation.

Table 8. Regression results of H2

	Expected Coefficient	**(1) ROA**	**(2) ROA**	**(3) ROA**
ESGSCORE	+	0.0006 (0.162)	0.0009* (0.073)	0.0012** (0.015)
SIZE	?	0.0079 (0.179)	0.0090 (0.140)	0.0030 (0.644)
LIQUIDITY	+	-0.0002 (0.966)	-0.0036 (0.519)	-0.0028 (0.606)
RISK	–	0.0026 (0.303)	0.0031 (0.148)	0.0023 (0.418)
INNOVATION	+	-0.0048 (0.334)	-0.0038 (0.473)	-0.0026 (0.633)
ESGSCOREINNOVATION	-	-0.0005*** (0.008)	-0.0006*** (0.003)	-0.0006*** (0.002)
Constant		-0.1085 (0.390)	-0.1438 (0.268)	-0.0208 (0.878)
No of obs.		622	622	622
Adj. R-sq.		0.2549	0.2711	0.2546
Sector Fixed Effect		NO	YES	YES
Year Fixed Effect		NO	NO	YES

Note: The table shows the results from three regressions testing our second hypothesis. All regressions include the dependent variable *ROA*, the main independent variable *ESGSCORE*, the moderator *ESGSCOREINNOVATION,* and the control variables *SIZE*, *LIQUIDITY*, *RISK,* and *INNOVATION,* across the years 2011-2021. The columns present results of regressions with no fixed effect (column 1), sector fixed effect (column 2), and sector and year fixed effect (column 3). The variable *ESGSCORE* is the firm ESG score provided by Thomson Reuters Eikon Refinitiv. *SIZE* is the natural logarithm of total assets. *LIQUIDITY* is the quick ratio, calculated as the current assets less inventory divided by current liabilities. *RISK* is the debt-to-asset ratio. *INNOVATION* is R&D expenses scaled by sales. The moderator, *ESGSCOREINNOVATION*, is the product of *INNOVATION* and *ESGSCORE*. All variables are winsorized at the top and bottom 1 percent. The predicted coefficient of each variable is presented in the column to the left. The p-values are shown in the parenthesis below the variables, and significance levels of 10%, 5%, and 1% are indicated with *, **, and ***.

In order to test our second hypothesis, we test the coefficient for *ESGSCOREINNOVATION,* β_6, with a year and sector fixed effects regression in column 3. As we hypothesized a negative moderating effect of innovation on the CSP-CFP relationship, we predict a negative coefficient for the interaction term *ESGSCOREINNOVATION*. Our results yield a negative statistically significant coefficient ($\beta_6 = -0{,}0006$) at a 1% level in column 3, and thus our hypothesis is accepted. These results indicate a negative moderating effect of innovation on the CSP-CFP relationship. In other words, CSP impacts CFP more positively in low-innovation firms than in high-innovation firms.

In column 3, the results indicate that *ESGSCORE* has a positive association with the dependent variable, *ROA*, at a 5% significance level. Additionally, we see that the significance and coefficient increase when adding year and sector fixed effects. This number is an increase from model 1 testing our first hypothesis, where the *ESGSOCRE* variable was statistically significant at a 10% level. The remaining variables, *SIZE, LIQUIDITY, RISK,* and *INNOVATION,* are not correlated with the dependent variable in the regression model at any of the chosen significance levels.

Finally, as the regressions testing our first hypothesis, the constant does not hold significance, indicating that if all independent variables equal zero, there is insufficient statistical evidence that the firm would have a *ROA* different from zero. As a company needs assets to operate, this is a probable result.

4.5 Goodness-of-fit

To better understand the premises of our results, we study the goodness-of-fit in our models by using the adjusted R-squared. The adjusted R-squared is used instead of R-squared since the R-squared tends to overestimate the explanatory value of the model since the R-square increases with the number of independent variables. In model 1, found in Table 7 column 5, the adjusted R-square is 23.73%, and in model 2, found in Table 8 column 3, the adjusted R-square is 25.46%. This suggests that the input variables explain 23.73% of the variation in the output variable in model 1 and 25.46% in model 2.

Very few models in previous research have an adjusted R-squared above 30% (Waddock & Graves, 1997; McWilliams & Siegel, 2000; Surroca et al., 2010), and an adjusted R-square below 10% is not uncommon (Waddock & Graves, 1997; Blanco et al., 2013). This pattern indicates that this field of study has an inherent amount of unexplainable variation (Orlitzky & Benjamin, 2001; Orlitzky et al., 2003; Margolis & Walsh, 2003). In this light, our adjusted R-squared is expected when studying the complex relationship between CSP and CFP. However, the explanatory power of our models should be considered.

4.6 Additional analysis: disaggregating the *ESGSCORE*

As previously mentioned, the proxy used for CSP is the ESG score (*ESGSCORE*) provided by the Thomson Reuters database Eikon Refintitv. The measure is a weighted average of three different measures: the environmental pillar score, the social pillar score, and the governance pillar score. To further understand our results in H1 and H2, we open up the *ESGSCORE* and perform the regressions again but replace *ESGSCORE* with the different pillar scores: *ESCORE*, *GSCORE,* and *SSCORE*.

4.6.1 First hypothesis with the disaggregated *ESGSCORE*

Table 9 shows that *ESCORE* and *SSCORE* are significantly correlated to *ROA*. The variable *ESCORE* is positive at a statistically significant level of 1% ($\beta_{ESCORE} = 0.010$). In line with this, the coefficient of the variable *SSCORE* is positive and significant at a 1% level ($\beta_{SSCORE} = 0.0015$). However, *GSCORE* is not correlated with the dependent variable at any chosen significance level.

Table 9. Regression results of H1 with separate E-, S-, and G-scores

	Expected Coefficient	**(1) ROA**	**(2) ROA**	**(3) ROA**
ESCORE		0.0010***		
		(0.002)		
SSCORE			0.0015***	
			(0.002)	
GSCORE				-0.0005
				(0.152)
SIZE	?	0.0030	-0.0017	0.0152***
		(0.578)	(0.790)	(0.004)
LIQUIDITY	+	-0.0039	-0.0040	-0.0040
		(0.468)	(0.450)	(0.458)
RISK	–	0.0022	0.0023	0.0012
		(0.437)	(0.386)	(0.671)
INNOVATION	+	-0.0166***	-0.0166***	-0.0167***
		(0.000)	(0.000)	(0.000)
Constant		-0.0046	0.0677	-0.2179*
		(0.970)	(0.608)	(0.070)
No of obs.		622	622	622
Adj. R-sq.		0.2417	0.2500	0.2356
Sector Fixed Effect		YES	YES	YES
Year Fixed Effect		YES	YES	YES

Note: The table shows the results from three regressions, testing our first hypothesis across 2011-2021 with a disaggregated *ESGSCORE*. A regression with *ESCORE* as the main independent variable is presented in the first column. In column 2, *SSCORE* is the main independent variable, and in column 3, *GSCORE* is the main independent variable. The dependent variable is *ROA,* and the control variables are *SIZE*, *LIQUIDITY*, *RISK,* and *INNOVATION*. All regressions have sector and year-fixed effects. The variable *ESCORE* is the firm environmental score, the variable *SSCORE* is the firm social score, and the variable *GSCORE* is the firm governance score. The *ESCORE*, *SSCORE,* and *GSCORE* are provided by Thomson Reuters. *SIZE* is the natural logarithm of total assets. *LIQUIDITY* is the quick ratio, calculated as the current assets less inventor, divided by current liabilities. *RISK* is the debt-to-asset ratio. *INNOVATION* is R&D expenses scaled by sales. All variables are winsorized at the top and bottom 1 percent. The predicted coefficients are presented in the column to the left. The p-values are shown in the parenthesis below the variables, and significance levels of 10%, 5%, and 1% are indicated with *, **, and ***.

Additionally, all three regressions indicate a statistically significant relationship between *INNOVATION* and *ROA* at a 1% level; hence our results from Model 1 in Table 7 remain. The remaining variables, *SIZE*, *LIQUIDITY*, and *RISK,* are not correlated with the dependent variable in the regression models using *ESCORE* and *SSCORE* at any of the chosen significance levels. The same goes for the *GSCORE* regression, except for *SIZE*, which has a statistically significant positive coefficient at a 1% level.

4.6.2 Second hypothesis with the disaggregated *ESGSCORE*

Table 10 indicates a positive correlation between *ESCORE* and *ROA* with a 1% significance. Moreover, the *E-moderator* coefficient is negative and statistically significant at 5%. In column 2, we observe that *SSCORE* is positively correlated to *ROA* with a statistical significance of 1%. The results further indicate that innovation moderates the relationship between *SSCORE* and *ROA* at a statistically significant level of 1%. The *GSCORE* is not significantly correlated with *ROA*. However, the *G-moderator* is statistically significant at 5% and has a negative coefficient.

Table 10. Regression results of H2 with separate E-, S-, and G-scores

	Expected Coefficient	**(1) ROA**	**(2) ROA**	**(3) ROA**
ESCORE		0.0013***		
		(0.000)		
SSCORE			0.0018***	
			(0.000)	
GSCORE				-0.0003
				(0.387)
SIZE	?	0.0021	-0.0041	0.0145***
		(0.705)	(0.489)	(0.005)
LIQUIDITY	+	-0.0012	-0.0025	-0.0019
		(0.828)	(0.641)	(0.719)
RISK	–	0.0018	0.0025	-0.0014
		(0.510)	(0.360)	(0.640)
INNOVATION	+	-0.0169***	0.0016	-0.0043
		(0.000)	(0.771)	(0.529)
E-moderator		-0.0044**		
		(0.035)		
S-moderator			-0.0006***	
			(0.001)	
G-moderator				-0.0005**
				(0.020)
Constant		0.0093	0.1029	-0.2128*
		(0.940)	(0.418)	(0.068)
No of obs.		622	622	622
Adj. R-sq.		0.2515	0.2670	0.2529
Within R-sq.		0.2367	0.2526	0.2382
Sector Fixed Effect		YES	YES	YES
Year Fixed Effect		YES	YES	YES

Note: The table shows the results from three regressions, testing our first hypothesis across 2011-2021 with a disaggregated ESGSCORE. The first column presents a regression with *ESCORE* as the main independent variable and *E-moderator* as the interaction term. In column 2, *SSCORE* is the main independent variable, and the interaction term is *S-moderator*. In column 3, *GSCORE* is the main independent variable, and the interaction term is *G-moderator*. The regressions include the dependent variable *ROA* and the control variables *SIZE*, *LIQUIDITY*, *RISK,* and *INNOVATION.* All regressions are controlled for sector and year-fixed effects. The variable *ESCORE* is the firm environmental score, the variable *SSCORE* is the firm social

score, and the variable *GSCORE* is the firm governance score. The *ESCORE*, *SSCORE,* and *GSCORE* are provided by Thomson Reuters. *SIZE* is the natural logarithm of total assets. *LIQUIDITY* is the quick ratio, calculated as the current assets less inventory divided by current liabilities. *RISK* is the debt-to-asset ratio. *INNOVATION* is R&D expenses scaled by sales. The *E-moderator* is the product of *ESCORE* and *INNOVATION*, the *S-moderator* is the product of *SSCORE* and *INNOVATION*, and *G-moderator* is the product of *GSCORE* and *INNOVATION*. All variables are winsorized at the top and bottom 1 percent. The predicted coefficient of each variable is presented in the column to the left. The p-values are shown in the parenthesis below the variables, and significance levels of 10%, 5%, and 1% are indicated with *, **, and ***.

Additionally, we observe that the *S-moderator* has the highest significance. Looking at the coefficient of the moderators, we see that the *E-moderator* has a significantly larger coefficient ($\beta_{E-moderator} = -0{,}0044$) than the other moderators. Additionally, in column 1, *INNOVATION* negatively correlates with *ROA,* with 1% significance, when using *ESCORE* as an independent variable. In column 3, where *GSCORE* is the independent variable, *SIZE* positively correlates with *ROA* at a statistically significant level of 1%. Expectedly, when using the pillar scores as the main independent variable separately, the adjusted R-square remains similar to Model 2, where *ESGSCORE* is the main independent variable.

5 Discussion

In this chapter, we discuss our sample selection in section 5.1 and results in section 5.2. Moreover, in section 5.3, we present robustness tests. Finally, in section 5.4, we address endogeneity concerns and the quality of our study in 5.5.

5.1 Sample selection

Our data sample comprises firms listed in the Nordic market with headquarters in the Nordics from 2011 to 2021. The data is gathered from the database of Thomson Reuters database Eikon Refinitiv. As previously discussed in section 3.1, our sample is limited by the data availability. Primarily, the lack of reported ESG scores and R&D expenses limit the size of our sample (see Table 1), and our final adjusted sample consists of 622 firm-year observations. With a limited data sample, the risk of errors, primarily type 2 errors, increases. Therefore, the limited sample size could explain why many of our control variables are statistically insignificant. A possible action to increase the sample size is to expand the delimited market to Europe instead of the Nordics. However, including Europe in our sample would fall outside the scope of our analysis. Our study aims to investigate the CSP-CFP relationship in the Nordics, as this region holds distinguished characteristics in sustainability and innovation. Furthermore, the inclusion of other European countries would incorporate a more significant variation of market characteristics in our sample.

Moreover, our sample is skewed towards larger firms due to our delimited of listed companies and the data availability. When comparing the mean size of our total sample, found in Appendix 3, with the mean size of our adjusted sample, we can observe that firms reporting ESG scores and R&D expenses are larger. Thus, the data availability further creates a bias in our sample towards larger firms. Furthermore, looking at our firm observation distribution over the chosen time period, we observe that approximately 48 % of the sample consists of data reported in the past three years, as seen in Appendix 6. The skewness can be attributed to the increased awareness and regulations in the area, most recently reflected in the Directive proposed by the European Commission (European Commission, 2022).

Additionally, to remove outliers, we winsorized all our continuous variables at the top and bottom 1 percentile. This adjustment may have removed data points relevant for significance

in our results. However, this procedure is established and frequently performed by previous research to improve the quality of the data sample.

5.2 Analysis of results

5.2.1 Corporate social performance and financial performance

In our first hypothesis, we test for a correlation between CSP and CFP. Our main independent variable, *ESGSCORE*, has a positive coefficient of 0.0009 with 10% significance. Thus, we can accept our hypothesis with reservation for a high significance level. Our results support that CSP correlates with CFP. Hence, our research aligns with the majority of prior research, finding a positive relationship between CSP and CFP (e.g., Dowell et al., 2000; Orlitzky et al., 2003). The results align with the expectation of the instrumental stakeholder theory (Donaldson & Preston, 1995; Jones, 1995), where higher CSP, classified as good management by the theory, can create financial success, CFP (Freeman, 1984; Waddock & Graves, 1997). Moreover, the RBV logic would explain our results with the fact that CSP can reduce costs, increase efficiency and attract employees, making it an intangible asset generating a competitive advantage which in turn generates a positive impact on CFP (Hart & Ahuja, 1996; Orlitzky et al., 2003)

Our results show that *INNOVATION* correlates with *ROA* at a statistically significant level of 1% and has a negative coefficient of -0.0168, Aligning with prior research (McWilliams & Siegel, 2000; Hull & Rothenberg, 2008; Padgett & Galan, 2010) we predicted a positive correlation between innovation and CFP. Thus, our predictions are disproven. Instead, our results align with the minority share of the research (Blanco et al., 2013), suggesting a negative correlation. According to the RBV logic, a firm that acquires resources that are difficult to replicate can create a competitive advantage, thus a higher CFP (Barney, 1991; Hart, 1995; Russo & Fouts, 1997; Schnietz & Epstein, 2005). In this light, our *INNOVATION* coefficient being negative could be due to the previously mentioned characteristics of our sample. The Nordic region is leading in innovation, which likely raises the threshold for when innovation results in a competitive advantage and positively correlates with CFP. As our proxy for innovation is R&D expenses – the measure, without creating a competitive advantage, would have a negative effect on *ROA.*

Previous research finds a significant correlation between the control variables *RISK*, *LIQUIDITY*, *SIZE*, and the dependent variable *ROA* (Waddock & Graves, 1997; Hull & Rothenberg; 2008; Blanco et al., 2013). However, these control variables do not correlate with *ROA* on a statistically significant level in our regressions. The lack of statistically insignificant control variables could be a consequence of our limited data sample, increasing the risk of type 2 errors.

In our additional analysis, where we open up the *ESGSCORE* variable, the social and environmental score positively impacts CFP with statistical significance. Meanwhile, the governance score does not correlate with ROA at a statistically significant level. Hence, we conclude that the social and environmental scores drive the results in our first hypothesis. The evidence suggests that social and environmental performance correlates with CFP. However, the results do not support that governance performance correlates with CFP on a statistically significant level.

5.2.2 The moderating effect of innovation on the relationship between corporate social performance and financial performance

When testing our second hypothesis, we find that the interaction term *ESGSCOREINNOVATION* is statistically significant at a 1% level and has a negative coefficient of -0.0006. Therefore, we accept our second hypothesis, as our results indicate that innovation negatively moderates the CSP and CFP relationship. The negative moderator indicates that CSP has a stronger effect on CFP in low-innovation firms. Similarly, our results support that innovation undermines the effect of CSP on CFP. Our results align with Hull and Rothenberg (2008), who find a negative moderating effect of innovation on CSP. Contrastingly, we contradict the findings of Blanco et al. (2013) and Rodgers et al. (2013), who do not find that innovation moderates the relationship between CSP and CFP with statistical significance.

The results can be viewed in the light of the RBV theory (Barney, 1991). Both CSP and innovation can independently help a firm achieve a competitive advantage and generate higher CFP. The financial impact generated by CSP and innovation may stem from company differentiation. Thus, if a firm achieves differentiation through CSP, innovation can become a negative moderator, as its effect on financial performance is already captured by CSP.

To further understand the moderating relationship between CSP and CFP, we consider the moderating impact of innovation in each of the ESG pillar scores: *ESCORE*, *SSCORE*, and *GSCORE*. Our results indicate that innovation negatively moderates the relationship between the *ESCORE* and CFP, the *SSCORE* and CFP, and the *GSCORE* and CFP. Out of the three moderators, the *E-moderator* has the largest coefficient. Hence, the most prominent effect of the moderator can be found in the relationship between environmental performance and CFP. Thus, this relationship drives the results of our second hypothesis, presented in Table 8.

5.3 Robustness test

5.3.1 Testing for multicollinearity

To control for multicollinearity in our sample, we calculate our variables' variance inflation factors (VIF), found in Appendix 4. High correlations between independent variables in a multivariate regression model can cause multicollinearity. Multicollinearity makes it challenging to distinguish the contribution of an independent variable, with no or limited independent variation, to the explained variance (Farrar & Glauber, 1967). There is no formal threshold level, after which the VIF is considered too high. However, generic levels of VIF, indicating excessive multicollinearity, are 5 or 10 (Craney & Surles, 2002). Our data sample shows that the VIF of our independent variables *SIZE*, *RISK*, and *LIQUIDITY* are below 5. Thus, we assess the risk of multicollinearity amongst these independent variables as minor. We observe a higher VIF of *ESGSCOREINNOVATION*, *ESGSCORE*, and *INNOVATION*. However, according to Jaccard and Turrisi (2003), multicollinearity between an interaction term and its components is not considered an issue. Moreover, when excluding the moderator from the VIF test, all variables are found to have a VIF below 5. Thus, we assess that multicollinearity will not affect our results.

5.3.2 Testing for heteroskedasticity

Consecutively, the presence of heteroskedasticity in the two models is considered. The term heteroskedasticity refers to the circumstance in which the variability of a variable is unequal across different values of a second variable that predicts it. When this happens, there is an increased risk of the model yielding the wrong conclusions about the significance. To test for heteroskedasticity, we perform a Breusch-Pagan test on both Model 1 and Model 2, found in Appendix 5. The test yields a p-value=0.0000 for Model 1 and a p-value=0.0000 for Model 2;

hence we reject the null hypothesis of constant error variance in both models. These results indicate that heteroskedasticity is present in both our models. Subsequently, we use a multivariate OLS regression with robust standard errors to test our hypotheses.

5.4 Endogeneity concerns

The correlation between CSP and CFP is arguably subjected to endogeneity concerns. Previous research suggests the existence of a "virtuous circle," where both CSP and CFP impact each other. Grounded in slack resource theory, Waddock and Graves (1997) suggest that increased CFP allows firms to invest in CSP. Simultaneously, good management theory argues that CSP can lead to CFP. Hence, the causality of the relationship is difficult to assess. To counter the endogeneity concerns, we have lagged our independent variables with one time period, t-1, while maintaining our dependent variable at period t. However, this does not entirely eliminate the risk of endogeneity concerns, as the reverse causality between CSP and CFP may still prevail in the sample. Thus, we do not interpret nor draw any conclusions regarding the causality between the CSP-CFP link.

5.5 Quality of study

The level of validity of our study impacts the possibility of drawing conclusions regarding the correlation between CSP and CFP and the moderating effect of innovation on the relationship. Considering that CSP is complex and unobservable, establishing a measurement for CSP has been challenging. However, as our proxy for CSP is provided by a reliable database, Thomson Reuters Eikon Refinitiv, we consider our measurement reliable. Furthermore, the appropriateness of the control variables *SIZE*, *LIQUIDITY*, and *RISK* could be questioned as they do not significantly correlate with our dependent variable. However, excluding these variables would decrease the level of comparability to previous studies and the explanatory value of our models. Additionally, using proxies for firm size, liquidity and risk reduce the bias of our sample. We consider the reliability of this study to be high. Our data is extracted from the established database Thomson Reuters Eikon Refinitiv. Therefore, it is likely that researchers replicating our study would find similar results. Finally, the generalizability of our study is assessed as somewhat limited since the sample may not be representative of the total population. Therefore, transferring the results outside the boundaries of our delimitations should be made with caution.

6 Conclusion

Our study aims to investigate the link between CSP and CFP and the moderating effect of firms' innovation in the Nordic region between 2011 and 2021. OLS regression models with robust standard errors and fixed effects for sector and year were used to test our hypotheses.

Per our predictions, the results support that CSP is positively correlated with CFP. Specifically, our additional analysis suggests that environmental and social performance are drivers of the relationship between CSP and CFP. Thus, the evidence provides support for our first hypothesis. Our findings align with the majority of previous research, suggesting a positive correlation between CSP and CFP (Hart & Ahuja, 1996; Dowell et al., 2000; Hillman & Keim, 2001; Orlitzky et al., 2003). Moreover, the results can be analyzed using instrumental stakeholder theory, legitimacy theory, and the RBV logic. In addition, our results show that innovation is negatively correlated to ROA, contradicting previous research, suggesting that innovation positively impacts financial performance (Hull & Rothenberg, 2008). We suggest that the negative correlation is due to the Nordics being a leader in innovation and therefore having a higher threshold for when R&D expenses positively correlate with CFP.

The results from Model 2 support our second hypothesis, stating that CSP has a greater effect on CFP in low-innovation firms than in high-innovation firms. Moreover, our additional analysis suggests that innovation moderates the relationship between each of the pillars and CFP, respectively. Our results align with Hull and Rothenberg (2008), suggesting that innovation negatively moderates the link between CSP and CFP. The results can be interpreted in the light of the RBV logic, arguing that the competitive advantage generated by CSP and innovation, respectively, results in innovation having a blunting effect on the CSP-CFP relationship (Hull & Rothenberg, 2008). Consequently, our results contradict scholars who do not find innovation to be a moderator of the CSP-CFP link (Blanco et al., 2013, Rodgers et al., 2013).

To the best of our knowledge, no previous research investigates the relationship between CSP and CFP with innovation as a moderator in the Nordic market. Due to the high levels of innovation and CSP in this region, our research provides an additional perspective to the current stream of research. Additionally, the Nordic region is unexplored, and our data

comprises recent data points reflecting the current corporate climate. With this in mind, we contribute to this area of research.

6.1 Limitations and future research

Our paper is subjected to some limitations. We did not look into the potential moderating effect of advertising intensity on the CSP-CFP relationship, previously done by several studies (e.g., Luo & Bhattacharya, 2006, 2009; Hull & Rothenberg, 2008). Moreover, our study does not investigate the potential mediating effects of innovation (Surroca et al., 2010; Blanco et al., 2013; Rodgers et al., 2013). Furthermore, we did not control for potential moderating or mediating effects of intangible assets other than innovation (e.g., culture, reputation, and human capital) as done by Surroca et al. (2010). Controlling for the effects of other intangible assets would have been of particular interest since CSR can increase financial performance by improving reputation, and employee retainment, thus creating a competitive advantage, as discussed in chapter 2. The variables mentioned above were not included due to the lack of data available within our delimitation. Therefore, we encourage future research with more resources and time to collect this data manually to better understand these relationships in the Nordic market.

Another critical limitation is the measurements of our study. The vast majority of research investigating the link between CSP and CFP use the KLD database scores, currently known as MSCI KLD scores. However, as we do not have access to this database, we have used the Thomson Reuters database Eikon Refinitiv instead. The use of another database makes our results and previous research less comparable. Therefore, for comparability, it would be valuable for future research to use the MSCI KLD score when investigating the CSP-CFP relationship in the Nordic market.

Furthermore, another complicated aspect of organizational life is innovation. Although the vast majority of previous research uses the same proxy for innovation as used in our study, the limitations of this measure have to be acknowledged. Thus, we encourage future scholars to investigate the effects of different measures of innovation. One possible approach could be the one of Hull and Covin (2009), who studied external innovation, or the one of Dewar and Dutton (1986), considering the difference between radical and incremental innovation.

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Appendix

Appendix 1. Eikon Refintitv ESG score

This table displays a detailed view of the ESG themes under each category, with the respective data points evaluated as proxies of ESG magnitude per industry group (Refintitv, 2022)

Pillars	Catagories	Themes	Data points	Weight method
Environmental	**Emmission**	Emissions	TR.AnalyticCO2	Quant industry median
		Waste	TR.AnalyticTotalWaste	Quant industry median
		Biodiversity*		
		Environmental management systems*		
	Innovation	Product innovation	TR.EnvProducts	Transparency weights
		Green revenues, research and development (R&D) and capital expenditures (CapEx)	TR.AnalyticEnvRD	Quant industry median
	Resource use	Water	TR.AnalyticWaterUse	Quant industry median
		Energy	TR.AnalyticEnergyUse	Quant industry median
		Sustainable packaging*		
		Environmental supply chain*		
Social	**Community**	Equally important to all industry groups, hence a median weight of five is assigned to all		Equally important to all industry groups
	Human rights	Human rights	TR.PolicyHumanRights	Transparency weights
	Product responsibility	Responsible marketing	TR.PolicyResponsibleMarketing	Transparency weights
		Product quality	TR.ProductQualityMonitoring	Transparency weights
		Data privacy	TR.PolicyDataPrivacy	Transparency weights
	Workforce	Diversity and inclusion	TR.WomenEmployees	Quant industry median
		Career development and training	TR.AvgTrainingHours	Transparency weights
		Working conditions	TR.TradeUnionRep	Quant industry median
		Health and safety	TR.AnalyticLostDays	Transparency weights
Governance	**CSR strategy**	CSR strategy	Data points in governance category and governance pillar	Count of data points in each governance category/all data points in governance pillar
		ESG reporting and transparency		
	Management	Structure (independence, diversity, committees)	Data points in governance category and governance pillar	Count of data points in each governance category/all data points in governance pillar
		Compensation		
	Shareholders	Shareholder rights	Data points in governance category and governance pillar	Count of data points in each governance category/all data points in governance pillar
		Takeover defenses		

*No data points available that may be used as a proxy for ESG magnitude/materiality

Appendix 2. Hausman test

	Coefficients			
	(b) fe4	(B) re4	(b-B) Difference	sqrt(diag(V_b-V_B)) Std. err.
ESGSCORE	.0009203	.0004068	.0005135	.0001954
SIZE	.0045242	.0088194	-.0042953	.0025991
LIQUIDITY	-.0046172	-.0017757	-.0028415	.0004842
RISK	.0021751	.0025013	-.0003262	.0021907
INNOVATION	-.0168371	-.0165251	-.000312	.

b = Consistent under H0 and Ha; obtained from **reghdfe.**
B = Inconsistent under Ha, efficient under H0; obtained from **regress.**

Test of H0: Difference in coefficients not systematic

chi2(**5**) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= **57.52**
Prob > chi2 = **0.0000**
(V_b-V_B is not positive definite)

Appendix 3. Descriptives total sample

	N	Mean	SD	p25	Median	p75	Min	Max
ROA	11822	-.092	0.429	-.106	.03	.092	-2.431	.942
ESGSCORE	2014	51.326	20.093	37.602	53.045	67.361	5.526	88.429
SIZE	11941	20.385	2.726	18.274	20.308	22.363	14.678	26.741
LIQUIDITY	11070	2.554	4.757	.709	1.135	2.135	.06	35.811
RISK	11064	.3	0.545	.019	.172	.371	0	4.387
INNOVATION	1849	3.586	18.260	.016	.056	.21	-.69	152.853

Appendix 4. Variance Inflation Factor test (VIF)

Model 1:

	VIF	1/VIF
SIZE	2.289	.437
ESGSCORE	2.067	.484
LIQUIDITY	1.315	.76
INNOVATION	1.181	.847
RISK	1.03	.971
Mean VIF	1.576	.

Model 2:

	VIF	1/VIF
ESGSCOREINNOVATION	7.567	.132
INNOVATION	7.397	.135
SIZE	2.298	.435
ESGSCORE	2.113	.473
LIQUIDITY	1.351	.74
RISK	1.03	.971
Mean VIF	3.626	.

Appendix 5. Breusch-Pagan test

Model 1:

H_0= Constant covariance

chi2(5) = 51.53

Prob > chi2 = 0.0000

Model 2:

H_0= Constant covariance

chi2(6) = 40.99

Prob > chi2 = 0.0000

Appendix 6. Sample distribution across years

Year	# of firm-year observations
2011	30
2012	35
2013	36
2014	37
2015	41
2016	47
2017	48
2018	52
2019	75
2020	95
2021	126
Total	**622**