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The impact of mandatory non-financial disclosure and ESG score on financial performance and firm-risk

An empirical study of the Nordic market

Abstract

This research investigates the impact of mandatory non-financial disclosure and ESG score on financial performance and firm-risk using a panel of 278 Nordic companies covering the time period 2014-2019. Using a Difference-in-Difference technique, the results imply that the accounting-based financial performance increases subsequent to the EU Directive 2014/95/EU, while the firm-risk is reduced. In addition, using Ordinary-Least-Squares regression analyses, the results show that the financial performance increases from a unit increase in ESG score, while no evidence could be found of a relationship between ESG score and firm-risk. Evaluating the impact of the separated components of ESG, the social score implies to have a positive relationship with financial performance and total risk, while the governance score implies the opposite. The environmental score appears to have no impact on firm-risk, while a positive impact on the accounting-based financial performance.

Keywords: *Mandatory Non-Financial Disclosure, ESG Scores, Financial Performance, Firm-Risk, Nordic Market, Corporate Social Responsibility, EU Directive 2014/95/EU.*

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1. Introduction

During the last decade Corporate Social Responsibility (CSR) and Socially Responsible Investments (SRI) have gained increased attention (Avetisyan & Hockerts, 2017). The concept of CSR and SRI has further been expanded to account for environmental, social and governance (ESG) concerns. One event that has contributed to the increased attention towards ESG is the financial crisis that occurred during 2008/2009. The crisis resulted in a decreased trust towards stakeholders and, as a consequence, the European Commission (EC) introduced regulations in order to improve corporate governance (Velte, 2017). For instance, the EC presented the Directive 2014/95/EU regarding non-financial disclosures and diversity information in 2014 (EUROPA, 2014). The Directive mandates European companies to improve their transparency in reporting social and environmental information. As a consequence, the number of companies in Europe with ESG scores[1] has increased rapidly since 2017 (Refinitiv, 2021).

Along with the increased regulations, environmental and social concerns have also gained focus. Socially responsible investments (SRI) have gone from being mainly associated with divestments of unethical firms to involving strategic investments in sustainable firms (Richardson, 2009). Investors are now actively searching for sustainable investments instead of only excluding unethical firms, and therefore, ethical investments have converged from being part of a niche market into the market for traditional asset management (Revelli, 2017). Hence, institutional investors have incorporated ESG as an objective in their portfolio allocation process to a greater extent during recent years (Giglio et al., 2020). There are several investor motivations for integrating ESG factors into the investment process, where these potential motivators, besides contributing to positive environmental or social impact, are risk or return enhancements (Avery, 2019).

The increased interest from stakeholders toward sustainable investments has contributed to an increased number of researchers evaluating the effect of ESG score on financial performance and firm-risk. Some researchers have found a positive relationship between ESG engagement and financial performance (Velte, 2017), while others have not (Friede et al., 2015; Garcia et al., 2017). Regarding firm-risk, a number of researchers have found that engagement in ESG activities decreases firms' market-based and downside risk (Hoepner et al., 2020; Sassen et al., 2016). Although the relationship between ESG performance and financial

[1] The aggregated ESG score is a combined score of the separate components E, S and G based on firms self-reporting information regarding environmental, social and governance criteria (Refinitiv, 2021).

performance or firm-risk has been the topic of many empirical studies, there is still a lack of studies accounting for the impact of the EU Directive on financial performance and firm-risk.

The aim of this research is to investigate the impact of mandatory non-financial disclosure and ESG score, both as aggregated and separate components, on financial performance and firm-risk using a panel of 278 public Nordic companies provided by Thomson Reuters Eikon database covering the time period 2014-2019. The fixed effects (FEs) regression analyses with cluster-robust standard error (at industry level), using Difference-in-Difference (DiD) technique, suggest that Nordic firms, compared to control firms, experience an increase in accounting-based financial performance and a decrease in firm-risk subsequent to the EU Directive 2014/95/EU. The fixed effects regression analyses, using Ordinary-Least-Squares (OLS) method, provide evidence that higher ESG score leads to higher accounting and market-based financial performance, while no evidence could be found of ESG score having an impact on firm-risk. Analyses of the separate components of the ESG score imply that higher social score increases financial performance and firm-risk, higher environmental score increases accounting-based financial performance, while higher governance score decreases financial performance and firm-risk.

The introduction section is continued with the motivation of this research. The remainder of this paper is structured as follows: In Section 2, the institutional background is discussed followed by the relevant literature and the stated hypotheses in Section 3. Section 4 describes the data and the samples, while section 5 outlines the methodology of this research. Section 6 and 7 present the results and discussion, respectively.

1.1 Motivation and Research Questions

Previously, companies have been focused on maximizing shareholder value. Today firms are not only recognizing the importance of financial performance but they are also considering the impact of their actions on the individuals and the planet. The EC introduced the Directive 2014/95/EU regarding non-financial disclosures and diversity information in order to mandate companies to become more transparent. Studies have shown that the introduction of mandatory disclosure sets pressure on companies to engage in CSR activities (Chen et al., 2018; Jackson et al., 2020), create incentive within companies to act more sustainably (CSR Europe and GRI, 2017) and encourage investors to only finance companies that are sustainable (ESMA, 2021). In addition, research has shown that the main interest of investors is firm performance such as financial performance and firm-risk (Tse, 2011), and, the main drivers of these two factors within the field of ESG could, arguably, be mandatory non-financial disclosure and ESG score.

Nordic companies have historically been superior to European and especially North American companies on ESG performance (Fredriksson et al., 2018). Nordic companies, as firms with relatively higher ESG scores, have significant potential to achieve market shares and increase profitability in the long-term (Fredriksson et al., 2018). Moreover, due to the increasing public interest towards ESG and the fact that Nordic companies on average have higher ESG scores, one could argue that the awareness of the ESG issues is greater among Nordic companies compared to companies in other geographical areas. Therefore, the Nordic market could be considered a mature research area when it comes to ESG topics and, hence, this could lead to less noise in data collected from the Nordic market compared to other markets. In turn, any results could be observed as true variation or causation rather than coincidence.

The purpose of this research is to investigate whether there is any difference in change in financial performance and firm-risk between Nordic firms and control firms before and after the enforcement of the EU Directive 2014/95/EU. ESG-related disclosure is necessary for creating increased transparency and reducing uncertainty, which in turn could have a positive impact on financial performance and firm-risk. On the other hand, ESG data collection and reporting bear huge costs that should not be neglected, since it could have a negative impact on financial performance and firm-risk. Additionally, another purpose of this study is to contribute to the understanding of the impact of the aggregated ESG score and its separated components on financial performance and firm-risk with recent data. ESG score could be considered a measurement of companies CSR activities and is commonly used in research concerning sustainable finance (Ioannou & Serafeim, 2017; Eccles et al., 2012; Sassen et al., 2016). Moreover, previous research shows that the separate components of ESG concern different kinds of stakeholder (Sassen et al., 2016), which should be taken into consideration when evaluating the impact of ESG scores on financial performance and firm-risk.

Conclusively, these remarks shed light on two main research questions:

Q1: Is there a difference in change in financial performance and/or firm-risk subsequent to the EU Directive 2014/95/EU?

Q2: Does the aggregated ESG score and/or the separate components of the ESG score have an impact on financial performance and/or firm-risk?

1.2 Contribution

This study adds to existing literature by contributing to the understanding of the potential drivers of financial performance and firm-risk within the field of ESG. This research focuses on the impact of the EU Directive 2014/95/EU and ESG score on Nordic companies' financial performance and firm-risk using data ranging between 2014 and 2019. The recent data contributes to an increased number of companies with ESG scores, and hence, additional number of firm-year observations due to the implementation of mandatory non-financial disclosure. In addition, this study converges from previous research as it is based on firms with non-voluntary disclosure settings. In terms of academic contributions, this research evaluates the impact of mandatory non-financial disclosure and ESG score in a relatively unexplored market, specially, when it comes to the EU Directive. Hence, this study strives to contribute to knowledge which could be of interest for both managers, investors, financial advisors, policy makers and other stakeholders active in the Nordic region.

2. Institutional Background

This section gives a brief overview of the ESG performance in the Nordic market and the national-level transpositions of the EU Directive 2014/95/EU across the Nordic countries.

2.1 The Nordic Market

According to Buder (2019) Sweden and Denmark were on the top five-list of the most environmentally friendly countries during 2018. Buder's (2019) study is based on several measurements such as level of pollution, quality of air and resources of water. Furthermore, Hodgson (2018) states that the Nordic countries are among the most equal countries in the world. For instance, the income gap between men and women in these countries is smaller compared to most other countries, which suggests that the Nordic countries have a high level of social standard. The ESG scores of the Nordic companies also imply that these countries are outperforming the rest of the world when it comes to ESG, as they have a historically higher average ESG score than most other countries (Fredriksson et al., 2018). Fredriksson et al. (2018) further argues that Nordic companies can take advantage of the increased public interest in ESG to achieve market shares and increase profitability in the long-term.

2.2 Mandatory CSR Reporting

The 17 Sustainable Development Goals[2] (SDGs) of the Agenda 2030 have created guidelines for sustainable management in all United Nations (UN) Member States (UN, 2021). All Nordic countries, as a part of the UN, are committed to the 2030 Agenda for Sustainable Development. The goal of Sustainable Finance refers to the process of considering ESG criteria when making investment decisions in order to only finance sustainable companies (ESMA, 2021). The European Union (EU) Directive 2014/95/EU regarding non-financial disclosures and diversity information is an action to boost the private sector commitment towards reaching the SDGs, specifically, the Sustainable Finance goal (CSR Europe and GRI, 2017). The affected companies are required to disclose non-financial statements containing information related to environmental, social and governance aspects including policies, outcomes and risks related to climate change, human rights, anti-corruption, equality and diversity matters. The directive is intended to improve transparency of the social and environmental practices and information provided by companies within various industries and Member States. The European parliament considers the disclosure of non-financial information as a step towards a sustainable global economy, as it will contribute to long-term profitability and create incentive within companies to act more sustainably. The Directive has a key role towards reaching the UN SDGs and is intended to provide more information regarding the firm's actions and performance to investors and other stakeholders.

The Directive applies to organisations (1) defined as large undertakings with 500 or more employees, (2) a net turnover of over EUR 40 million or a balance sheet of over EUR 20 million, or are (3) considered to be public-interest entities (PIEs). However, all Nordic countries do not comply with the new EU Directive 2014/95/EU in the same way. Each EU Member State incorporates the disclosure requirements into its national law in order to achieve the objectives of the Directive. Additionally, non-EU countries, such as Norway and Iceland, as European Economic Area (EEA)[3] countries, also implement the Directive as an amendment

[2] The 17 Sustainable Development Goals are part of the United Nations' 2030 Agenda for Sustainable Development and provide a framework for addressing the world's most urgent sustainability challenges such as poverty, human rights, inequality and climate change (UN, 2021).

[3] The European Economic Area (EEA) includes all members of the EU and the non-EU countries Iceland, Norway and Liechtenstein (EFTA, 2021).

on the Accounting Act[4]. The CSR Europe[5] and the Global Reporting Initiative[6] (GRI) have worked closely with the Member States to transpose the Directive into local laws. Table 1 shows a brief overview of the similarities and differences between the company scope national-level transpositions of the EU Directive across the EU Member states and the EEA member in the Nordic.

Table 1. Member State Implementation of EU Directive 2014/95/EU

A brief overview of the company scope Member State-specific requirements of the EU Directive on non-financial disclosure and diversity information across Nordic countries.

Country	**(1) Number of employees**	**(2) Net turnover**	**(2) Balance sheet**	**(3) Company Scope**
Sweden	> 250	> SEK 350 million;	or > SEK 175 million	Applies to PIEs and all types of companies that fulfils at least two of the criteria regarding employees, turnover or assets.
Norway	> 500	> EUR 40 million;	or > EUR 20 million	PIEs such as, listed entities, banks and other credit institutions and insurance undertakings.
Finland	> 500	> EUR 40 million;	or > EUR 20 million	PIEs such as, listed companies, credit institutions and insurance undertakings.
Denmark	> 250	> DRK 313 million;	or > DRK 156 million	All large undertakings of accounting class C and D.
Iceland	> 250	> ISK 6 billion;	or > ISK 3 billion	PIEs such as, listed companies, credit institutions, insurance undertakings and pension funds.

Source: CSR Europe and GRI (2017)

[4] The Accounting Act are the rules and information materials issued by a government authority that sets the framework for businesses' accounting principles (BFN, 2021).

[5] CSR Europe is a network supporting business to act more sustainably (CSR Europe, 2021).

[6] The Global Reporting Initiative (GRI) is an international independent organization which helps businesses, governments and other organizations to understand their impact on society and the planet and to improve their sustainability reporting (Global Reporting, 2021).

3. Relevant Literature

This section presents a framework of previous literature to support this study in terms of methodology, which includes the choice of data source, variables and financial and risk measurements. Furthermore, this section presents potential mechanisms and drivers behind the impact of mandatory non-financial disclosure and ESG scores on financial performance and firm-risk and continues to state the hypotheses.

3.1 The Impact of Mandatory CSR Reporting on Firm Performance

During recent years, researchers have found interest in exploring the impact of mandatory CSR reporting on firm performance[7] (Chen et al., 2018; Ioannou & Serafeim, 2017; Grewal et al., 2017).

Table 2. Empirical Research on Mandatory CSR Reporting

Summary table of empirical studies on the impact of mandatory CSR reporting on financial performance and firm-risk discussed in Section 3.1.

Researchers (year)	**Time period**	**Population**	**Interpretation**
Chen et al. (2018)	2006-2011	China	Mandatory disclosure of CSR information is associated with lower ROA and ROE.
Ioannou & Serafeim (2017)	2005-2012	International	Mandatory disclosure of ESG information is associated with higher Tobin's Q.
Grewal et al. (2017)	2011-2014	Europe	Mandating non-financial disclosure is associated with an on average negative equity market reaction.

According to Chen et al. (2018), analysis using DiD technique shows that requiring Chinese firms to disclose CSR information leads to decrease in profitability. Specifically, the results show that the companies affected by the CSR-requirement have lower return on assets (ROA) and return on equity (ROE) compared to firms not affected by the requirement subsequent to the disclosure shock. These results remain unchanged with alternative model specification using firm and year fixed effects in the DiD estimation. Furthermore, Chen et al. (2018) found that the cities impacted by the CSR-requirement experience a decrease in SO_2 emission levels and industrial wastewater. The results can be interpreted as mandatory CSR disclosure has a positive impact on the environment at the expense of the shareholders.

Ioannou & Serafeim (2017) investigated the consequences of mandatory disclosure of ESG information in China, Denmark, Malaysia and South Africa using DiD technique and

[7] Firm performance refers to financial performance and firm-risk.

instrumental variable estimation. The results suggest that the treatment firms concerned by the regulations, compared to the benchmark firms consisting of firms from the US, have significantly increased disclosure comparability and credibility. In addition, the authors found that mandatory sustainability disclosure has increased firm valuation as reflected by Tobin's Q. Moreover, Grewal et al. (2017) examined the association between mandatory non-financial disclosure, as a result of an EU Directive, and equity market reactions. The authors found that on average the market reacts negatively to the events increasing the likelihood of mandated non-financial disclosure, where the reactions are less negative for firms with higher non-financial disclosure performance or levels prior to the directive.

3.1.1 Potential Mechanisms and Hypotheses Development of Mandatory CSR Reporting

According to Chen et al. (2018), policy makers and investors are the main constituent groups that have particular interest in the trend towards mandatory CSR disclosure. ESG-related disclosure creates transparency and reduces uncertainty, which could be considered favourable to investors since it could lead to higher firm-value (Fredriksson et al., 2018). Mandatory non-financial disclosure does not necessarily request firms to make any changes in their actions or behaviours. However, Chen et al. (2018) argues that increased transparency sets pressure on firms to engage in CSR activities and better their behaviour according to the non-financial information they are required to display. This argument is also supported by Jackson et al. (2019) who found that mandatory CSR disclosure contributed to an increased level of CSR activities within the companies affected by the regulation, specifically, in companies where the number of CSR activities was low before the introduction of the regulation.

Governance activities could have an indirect impact on companies' financial performance since it could have an impact on the behavior of the affected firms. Chen et al. (2018) showed that a directive regarding mandatory CSR disclosure in China had a negative effect on the financial performance in the concerned firms. According to Chen et al. (2018) the reason for the decrease in the financial performance is that companies spent more money on ESG activities when they had to publicly announce their activities, and, as a consequence, the financial performance took a turn. Grewal et al. (2017) got similar results when they evaluated the impact of the European Directive on stocks traded on a European exchange. However, they find that only companies with weak ESG reporting are punished by the investors, while companies with strong ESG reporting are rewarded. Fredriksson et al. (2018) argues that failure to disclose ESG-related topics could be more costly than actually investing time and money into collecting and reporting data. In addition, the lack of ESG disclosure could increase

uncertainty and the risk of the investment, and investors would therefore require higher return on investments to compensate for the risk they take.

To summarize, studies show that CSR reporting and ESG activities have a number of benefits to companies' stakeholders (Chen et al., 2018). Some previous studies show that the introduction of mandatory disclosure of CSR activities is associated with lower financial performance (Chen et al., 2018). However, other studies have shown that disclosure of ESG information increases financial performance (Ioannou & Serafeim, 2017). In addition, studies show that mandated non-financial disclosure is associated with, on average, less negative equity market reaction for firms with higher non-financial disclosure performance before the mandate (Grewal et al., 2017). The EU Directive 2014/95/EU regarding non-financial disclosures and diversity information could have a potential impact on the financial performance and firm-risk of the Nordic companies. However, since there is a lack of studies investigating the impact of this Directive, it is difficult to state any presumptions about its impact. Hence, the first hypothesis is stated as following:

Hypothesis 1a: *There is no difference in change in the financial performance between the treatment firms and the control firms subsequent to the EU Directive 2014/95/EU.*
Hypothesis 1b: *There is no difference in change in the firm-risk between the treatment firms and the control firms subsequent to the EU Directive 2014/95/EU.*

3.2. The Impact of ESG on Firm Performance

Many researchers have also investigated the relationship between CSR and financial performance, which has often shown a positive correlation (Velte, 2017; Friede et al., 2015; Eccles et al., 2012). However, a summary of previous studies has also found a negative or non-significant association between CSR and financial performance (Friede et al., 2015; Garcia et al., 2017). There are several underlying aspects leading to these inconsistent results, such as the wide range of financial measurements and/or major differences between industries, firm-size and firm-risk. In addition, most of these studies are based on past data and firms with voluntary disclosure settings. These studies considering the relationship between ESG and financial performance (FINP) are identified and summarized in Table 3.

Table 3. Empirical Research on The Impact of ESG on Financial performance

Summary table of empirical studies on the impact of ESG on financial performance discussed in Section 3.2.

Researchers (year)	**Time period**	**Population**	**ESG relation to FINP**	**Interpretation**
Velte (2017)	2010-2014	Germany	+, 0	ESG performance has a positive impact on ROA and no impact on Tobin's Q.
Friede et al. (2015)	1970-2014	International	+, (-) Negative	Second-order meta-analysis of about 2200 individual studies.
Eccles et al. (2012)	1993-2010	USA	+	Firms with environmental and social policies outperform those without policies, in terms of annual abnormal performance, ROA and ROE.
Landi & Sciarelli (2019)	2007-2015	Italy	0	No implications of firms with high ESG scores gaining excess market returns were found.
Garcia et al. (2017)	2010-2012	BRICS	(-) Negative, 0	Environmental performance has a negative impact on firms' profitability. No other implications were found.

Velte (2017) investigated the impact of ESG performance on financial performance, where the financial performance was measured by using both an accounting-based and market-based factor. More specifically, Tobin's Q was used as a dependent variable to estimate the market performance while ROA was used to estimate the performance from the accounting perspective. Moreover, systematic risk (Beta) and unsystematic risk (Debt), firm size, R&D expenses and a dummy variable for industry were used as control variables. The results from the regression analysis suggested that ESG performance has a positive and statistically significant relationship with ROA. However, no relationship between Tobin's Q and the ESG scores could be found. Additionally, G performance seemed to have a stronger impact on financial performance compared to E and S. Finally, Velte (2017) found evidence of a negative relationship between systematic- and unsystematic risk and the ESG-, E-, S- and G performance. Moreover, Eccles et al. (2012) found evidence that High Sustainability firms significantly outperform Low Sustainability firms over the long-term, both in terms of market-based measurements with significantly higher annual abnormal performance and accounting-based measurements, such as ROA and ROE. However, the evidence suggests that the benefit of a sustainable corporate culture is stronger in sectors where firms sell products to individuals or firms in need of large amounts of natural resources. In this study, the High Sustainability companies are represented by 90 firms which have adopted policies guiding their impact on

the society and the environment, while the Low Sustainability companies are represented by another 90 firms which have not adopted these policies.

Landi and Sciarelli (2019) investigated whether companies with high ESG scores tend to gain excess market return. A regression analysis of ESG scores and compounded abnormal log-returns was performed, where the control variables were accounting-based, such as, EBITDA to equity, debt to equity, financial leverage, total assets and reinvestment rate. However, no implications of firms with high ESG scores gaining excess market returns were found, although no implications of underperformance compared to the market were found either. The control variables on the other hand imply that market investors pay attention to accounting-based risk factors such as financial leverage. Moreover, Garcia et al. (2017) investigated the relationship between ESG performance and firms' financial profitability using data from so-called BRICS[8] countries. The results suggest that, even when firm-size and the geographical location of the firm are controlled for, companies in environmentally sensitive industries present higher ESG scores than companies from cleaner or non-sensitive sectors to protect their reputation as they are more likely to cause damage to society. Furthermore, the results indicate that firms' profitability is associated with only the environmental performance of the firm and the sign of this relationship is negative. In addition, Garcia et al. (2017) show that there is a maximum value for ESG performance due to finding a U-shaped association between the firms' systematic risk and ESG performance. The authors highlight the importance of the role of investors and regulatory agents. If investors ignore the ESG risks arising from, e.g., climate change, gender inequality and poor labour standards, these risks will seem irrelevant in the eyes of the regulatory agents.

A considerable number of studies on the relationship between ESG and firm-risk have shown significant negative association between these two variables (Hoepner et al., 2020; Sassen et al., 2016; Verheyden et al., 2016). These studies are identified and summarized in Table 4. According to Hoepner et al. (2020), shareholders' engagement in ESG related topics can reduce firms' downside risk without significantly diminishing returns, which is primarily driven by the environmental portion of ESG due to climate changes. Sassen et al. (2016) argue that high Corporate Social Performance (CSP) is connected with lower financial-market risk. Sassen et al. (2016) further argue that companies with high CSP often have stable relations

[8] BRICS is the group denoting the world's five leading emerging countries, Brazil, Russia, India, China and South Africa (Garcia et al., 2017).

with governments and investors, higher brand value and better possibilities to retain high-quality workforce.

Table 4. Empirical Research on The Impact of ESG on Firm-Risk

Summary table of empirical studies on the impact of ESG on firm-risk discussed in Section 3.2.

Researchers (year)	**Time period**	**Population**	**ESG relation to firm-risk**	**Interpretation**
Hoepner et al. (2020)	2005-2010	International	Higher ESG leads to lower firm-risk	Engagement in ESG topics reduces downside risk.
Sassen et al. (2016)	2002-2014	Europe	Higher ESG leads to lower firm-risk	ESG factors have a decreasing effect on market-based firm-risk.
Verheyden et al. (2016)	2010-2015	International	Higher ESG leads to lower firm-risk	ESG screening reduces tail-risk.

Sassen et al. (2016) provide evidence for a negative association between CSP, measured by ESG factors, and market-based firm-risk. Sassen et al. (2016) further show that social performance has a significantly decreasing effect on all three risk measurements, systematic-, idiosyncratic- and total risk. Environmental performance has a decreasing effect on idiosyncratic risk, nevertheless, systematic- and total risk are only affected by the environmental score in environmentally sensitive industries. Finally, no significant effect of governance performance on the risk measurements is found. Moreover, Hoepner et al. (2020) report results for the impact of shareholders' ESG engagement on firms' downside risk. Engagement in ESG topics reduces the two measurements of downside risk, lower partial moment and value at risk. Furthermore, Hoepner et al. (2020) explain the main reason behind reduced downside risk by the effects from environmental topics, rather than governance and social factors. Verheyden et al. (2016), present findings on the effect of ESG screening on rate of return, downside risk and portfolio diversification by comparing the performance of a global portfolio that has not been screened for any ESG criteria with a global portfolio where two different ESG screens have been applied. The results indicate that ESG screening not only improves risk-adjusted returns and average annual performance, but also reduces tail-risk.

Most of the studies mentioned above highlight the difference in impact of the separate components of the ESG score on firm performance. However, the outcome of the firm performance could also depend on other factors, such as which industry and/or country the

company is active in. The environmental and social risk exposure of a certain company is often associated with specific industry sectors, while governance risk is more related to the geographical location of the company due to different laws and regulations being involved in different countries (Qiu et al., 2016). Hence, the effect of each individual component of ESG on financial performance and firm-risk appears to vary among industries and geographies. This highlights the importance of controlling for the differences among industry sectors and countries, when evaluating the impact of ESG on financial performance and firm-risk.

3.2.1 Potential Mechanisms and Hypotheses Development of ESG

According to Koller et al. (2019), ESG activities create value and investment returns by allowing companies to allocate resources to more favourable and sustainable projects. One of the mechanisms that could explain why ESG activities improve financial performance is that high ESG scores contribute to an increased customer-base. This argument is supported by Lo (2009) who states that firms that are not engaged in social and environmental issues need to lower their prices in order to stay competitive. Thus, it could be suggested that ESG activities attract consumers, which in turn enhances the growth in revenue. Contrarily, the top-line growth could face a downturn if the firm is unsuccessful in gaining consumer trust regarding ESG aspects. Eccles (2012) further argues that business-to-customer firms which have adopted sustainable policies are rewarded with a greater financial performance compared to other firms. However, Tommaso and Thornton's (2020) findings imply that banks with high ESG scores are valued at a lower level compared to banks with lower scores. This result is in turn explained by the fact that investments in ESG activities are affecting the profitability negatively in the banking sector. This highlights the variation in the effect of ESG performance on financial performance across industries.

According to shareholder theory, managers primarily should focus on maximizing the returns of the shareholders (Tse, 2011). This theory further explains the importance of creating value to the shareholders as they entirely bear the firm-risk and should be compensated for it. Therefore, spending resources on other aspects such as corporate social responsible activities are not completely in the best interest of the shareholders and are considered to be agency costs. Hence, it could be argued that ESG activities are associated with increased costs, which would have a negative impact on the financial performance as the profitability would decrease. On the other hand, this might be a short-term effect, as investments in ESG activities could contribute to savings in the long run. Xie et al. (2019) support this argument, as their findings imply that ESG activities that are cost-cutting have a positive impact on financial performance

in the long-term. For instance, if capital is invested into more sustainable solutions, it could contribute to cost-reductions in the future. This is in line with the stakeholder theory, which recognizes both the importance of creating financial performance and taking the individuals and the groups affected by the firms' actions into consideration (Pfarrer, 2010). The stakeholder theory explains that taking all stakeholders into consideration will benefit the shareholders in the long-run since firms will generate more stable growth when considering both financial performance and the firms' ESG activities (Eccles et al., 2014).

According to Flammer (2013), there has been an increased external pressure on firms to act sustainable. As a consequence, companies that behave in a non-eco-friendly way are punished by investors to a greater extent compared to before. At the same time, the reward for eco-friendly initiatives is not as high as it used to be. This implies that the market expects firms to behave in a sustainable way and it can therefore be argued that social pressure has an indirect impact on a firm's financial performance. Moreover, Wang and Sarkis (2017) argue that the financial performance is not directly affected by CSR. Instead, a difference between symbolic and rigorous approaches towards CSR is highlighted, where symbolic approaches strive to improve the corporate image without strategically allocating any resources (Wang & Sarkis, 2017). On the other hand, rigorous approaches are characterized by actively allocating resources in order to incorporate CSR into the business. Firms that only implement CSR symbolically could face a lower level of legitimacy. Wang and Sarkis (2017) further argue that a higher level of legitimacy, which comes from superior CSR, will contribute to an increase in the financial performance. Hence, CSR could have an indirect impact on financial performance as it contributes to legitimacy.

According to Chang et al. (2014), firm-risk can generally be explained as the possibility of losing firm-value due to the uncertainty that surrounds the outcomes of future events. Sassen et al. (2016) argues that CSP has an impact on shareholder value if it affects firm-risk. According to the stakeholder theory, high engagement in ESG activities can be associated with lower firm-risk as it reduces regulatory and legal interventions (Sassen et al., 2016). Unnecessary ESG-risk exposure can lead to regulatory limitations and reduction in the governments' trust in companies, leading to increased firm-risk (Koller et al., 2019). Moreover, investors are usually more likely to allocate capital to companies with higher levels of CSR engagement as these companies have better reputation and higher brand value (Chang et al., 2014). CSR activities can lead to better workplace qualities and companies can therefore attract and retain skilled employees, lowering employee turnover and the likelihood of company crisis (Chen et al., 2018; Sassen et al., 2016). Even in times of crisis, firms that engage in CSR

activities are less likely to lose shareholder value as CSR engagement plays an important role in preserving economic value (Gofrey et al., 2009).

Sassen et al. (2016) further argues that there is not always a negative association between CSR performance and firm-risk measurements. Managerial incentives for short-term results can lead to underinvestment in ESG activities during times of superior financial performance and overinvestment in times of poor financial performance to justify the results. Additionally, managers who focus on pursuing their private goals by gaining shareholders' support tend to overinvestment in CSP to pretend to be eco-friendly and eventually, increasing the firm-risk (Sassen et al., 2016).

ESG performance on an aggregated level is considered to impact the firm-risk positively, where incorporating ESG factors as a part of a firm's management strategy will lead to firm-risk reduction (Sassen et al., 2016). However, the separated components of ESG seem to affect firm-risk ambiguously. Koller et al. (2019) argues that specifically environmentally sensitive industries are exposed to regulatory limitations or bans which makes it crucial for these companies to consider repurposing assets instantly. Bouslah et al. (2013) further argues that the broken-down components of the consolidated ESG score could impact the firm-risk differently. This is often due to the fact that stakeholders usually have different concerns regarding ESG, which could lead to companies' firm-risk being affected in different ways (Godfrey et al., 2009).

In addition, Velte (2017) finds that the separate components of ESG could have different impacts on companies' financial performance, and derives this result from stakeholders valuing the components of ESG differently. For instance, Fatemi et al. (2018) found that investors are punishing firms to a greater extent when governance concerns are present compared to environmental and social concerns. The main reason behind this discrepancy is explained by the fact that governance factors are easier to verify as they are often based on regulations and policies, and are mandated to disclose. Social and environmental concerns are on the other hand more difficult to verify as they are often voluntary. In order to capture the impact of the three components of ESG, the aggregated ESG score should be divided into environmental score (ES), social score (SS) and governance score (GS). Several studies have implemented this method and separated the ESG score into its components E, S and G (Fatemi et al., 2018; Velte, 2017; Sassen et al., 2016).

Moreover, many researchers have investigated the association between ESG and financial performance or firm-risk (Velte, 2017; Friede et al., 2015; Eccles et al., 2012). This research will investigate the impact of aggregated ESG score and as separated components on

financial performance with recent data. However, despite the results from previous studies and mostly positive relationship between the two factors, given the inconsistent empirical results and limited studies covering the Nordic area, the hypotheses will be phrased as non-directional to any presumptions. Accordingly, the second hypothesis is stated as following:

Hypothesis 2a: Aggregated *ESG score does not have an impact on financial performance.*
Hypothesis 2b: Separated *Environmental, Social, and Governance scores do not have an impact on financial performance.*

Previous studies have shown that there is a negative relationship with ESG performance and firm-risk (Hoepner et al., 2020; Sassen et al., 2016; Verheyden et al., 2016). However, no previous study appears to have evaluated the relationship in the Nordic countries. Thus, this research will investigate the impact of aggregated ESG score and as separated components on firm-risk with recent data in the Nordic countries. Accordingly, the third non-directional hypothesis is stated as following:

Hypothesis 3a: Aggregated *ESG score does not have an impact on firm-risk.*
Hypothesis 3b: Separated *Environmental, Social, and Governance scores do not have an impact on firm-risk.*

4. Sample and Data Description

This section presents a brief description of the ESG data and the data collection process for retrieving the sample of interest in order to evaluate the research questions of this research.

4.1 Environmental, Social and Governance data

ESG scores refer to firms' relative performance in regard to non-financial practices across environmental, social and governance factors. Hence, the ESG score is a combined score based on environmental, social and governance pillar scores. The environmental pillar score (ES) aims to measure a firm's engagement towards contributing to an environmentally sustainable society. The environmental score further captures a firm's impact on the environment, which includes the firm's commitment towards reducing climate change, carbon emissions, pollution and water withdrawal (Sassent et al., 2016). The social pillar score (SS) measures a company's performance of the management's engagement and commitment towards creating a safe,

diverse and equal workplace with development opportunities and providing value-added and liable products and services (Sassen et al, 2016). The social score further covers activities in questionable industries, animal testing, child labor as well as engagement in human rights, human capital and fair-trade policies (Refinitiv, 2021). The governance pillar score (GS) aims to capture the policies and processes within a firm in order to assure that the management acts in the best interest of the shareholders. By accounting for aspects such as anti-corruption, board diversity and management compensation policies, both the commitment and the efficiency regarding established governance principles of the management is measured (Sassen et al., 2016).

Thomson Reuters database has often been used for research purposes within the field of ESG (Eccles et al., 2012; Sassen et al., 2016; Velte, 2017; Landi & Sciarelli, 2019). Thomson Reuters ESG data contains an aggregate overall ESG score based on ESG's three components (E, S and G), which are available in a 0-100 score range (Refinitiv, 2021). According to Thomson Reuters's Refinitiv (2021) data collection process, the ESG components are a combined and weighted value of 186 indicators in the three pillars, environmental, social and governance given in Table 5. The data for each company is manually collected from annual reports, CSR reporting, non-governmental organizations websites and company websites to guarantee the standardization of the information and its comparability among different companies. Most of the ESG reported data is refreshed once a year or more often in line with companies' own reporting or significant ESG news reported by global media.

Table 5. The Three Pillars of ESG

A brief overview of the factors included in the three pillars of the aggregated ESG Score, Environmental, Social and Governance (Refinitiv, 2021).

ESG Score	**Environmental**	**Social**	***Governance***
Categories	Resource use	Workforce	Management
	Emissions	Human rights	Shareholders
	Innovation	Community and product responsibility	CSR strategy

4.2 Data Collection

Thomson Reuters Eikon database provides ESG scores of 278 public companies (Small-, medium- and large-capitalized) in the Nordic countries, Sweden (Nasdaq OMX Stockholm), Norway (Oslo Børs), Finland (Nasdaq OMX Helsinki) and Denmark (Nasdaq OMX Copenhagen). No observations were found on Iceland in the database and therefore this country will be excluded in this research, which could be considered to be a limitation of this study.

Furthermore, this study is delimited by collecting ESG data from no other rating agencies than Thomson Reuters and, hence, this study does not cover all firms listed on the Nordic stock exchanges. Thomson Reuters has a standardized procedure when scoring companies, and other rating agencies might have other routines. Thus, choosing to collect data from Thomson Reuters can help avoid the problem with biased results due to different scoring models from different rating agencies.

The data collection process starts by screening for Nordic companies in Thomson Reuters database that have at least one ESG score reported during the time period between 2011 and 2019. This implies that the data has both a cross-sectional and a time dimension. According to Stock and Watson (2015) panel data is suitable when the data have two dimensions. The cross-sectional units are represented by Nordic and control firms. To efficiently collect the data, an identification number (RIC) for each of the companies is retrieved from Thomson Reuters Software. The RICs are then downloaded into Excel, where the aggregated ESG score and the separated E, S and G scores are obtained using the add-in functions Thomson Reuters Eikon and DataStream in Excel. In the same manner, the data representing the control and dependent variables is collected. More specifically, the dependent variables representing firm-risk are calculated manually based on stock and market excess returns. Stock i's excess returns and market excess returns are retrieved from Thomson Financial DataStream, where the stock market index for Nordic firms used here is the MSCI Nordic Countries Index. All other variables are obtained from Thomson Reuters Eikon. In order to investigate the difference in change in financial performance and firm-risk subsequent to the EU Directive, data from controlling firms that are not affected by mandatory non-financial reporting is retrieved. Here, the US firms are considered as control firms since the US has relatively fewer ESG disclosure regulations compared to other countries (Ioannou & Serafeim, 2017). When screening for US firms in the Thomson Reuters database, the RICs of all public US companies meeting the criteria of having an ESG score during at least one year of the sample period, are obtained and downloaded into excel. This results in a data set containing ESG scores of 3,135 public US firms. The stock market index for US firms is Dow Jones U.S. Total Stock Market Index. Finally, the same procedure previously explained is then applied for US firms to retrieve all the variables of interest.

4.3 Dependent Variables

In order to evaluate the impact of mandatory non-financial disclosure and ESG score on financial performance, two dependent variables are constructed to represent the financial

performance. One of the variables is based on accounting-data while the other is based on market-data. This approach is in line with the analysis performed by Velte (2017), who argues that accounting variables are interesting since these often capture earnings management decisions. Return on Assets (ROA) is used as a dependent variable from the accounting perspective, which could be considered a representation of firms' profitability relative to their total assets. ROA is commonly used in this type of research when considering financial performance (Velte, 2017). The main dependent variable representing the financial performance from a market perspective is an approximation of Tobin's Q, which is retrieved manually using formula (1). This is the same proxy used by Chen et al. (2018) when the impact of mandatory CSR disclosure on financial performance was evaluated. Price to Book value per Share (P/B Ratio) given by formula (2) is used as an alternative dependent variable representing the market-based financial performance factor. Using an alternative dependent variable similarly calculated as Tobin's Q is an approach to assess the robustness of the results (Chen et al., 2018).

$$Tobin's\ Q = \frac{TA - BE + ME}{TA} \tag{1}$$

Where,

TA = Total assets

BE = Book value of equity

ME = Market value of equity

$$P/B\ Ratio = \frac{Market\ Value\ per\ Share}{Book\ Value\ per\ Share} \tag{2}$$

When testing the impact of mandatory non-financial disclosure and ESG score on firm-risk, three different dependent variables are used. Two of the variables account for the systematic and the total risk, while a third variable accounts for the downside risk. The systematic risk is represented by beta (β) in formula (3), where beta is calculated for each year in the sample. The annualized volatility of the stock returns represents the total risk (σ_i) presented in formula (4). This is the same proxy as Sassen et al. (2016) used when estimating the total risk. The

downside risk is calculated using the proposed measurement of downside beta (β^{-}) by Bawa and Lindenberg (1977). The calculation of downside beta is displayed in formula (5).

$$\beta = \frac{cov(r_i, r_m)}{var(r_m)} \tag{3}$$

$$\sigma_i = \sqrt{var(r_i)} \tag{4}$$

$$\beta^{-} = \frac{cov(r_i, r_m | r_m < \mu_m)}{var(r_m | r_m < \mu_m)} \tag{5}$$

Where,

r_i = *Security i's excess return*

r_m = *Market excess return*

μ_m = *Average market excess return*

4.4 Independent Variables

When evaluating the impact of mandatory non-financial disclosure on financial performance and firm-risk, three independent variables are used. The first two variables of interest are dummy variables representing the post-treatment period and the treatment firms. The third independent variable is an interaction term between the first two independent variables. In this case, the interaction term is considered to be the most important variable, as it captures the differences in change in outcome between the treatment and control firms.

When evaluating the impact of ESG score on financial performance and firm-risk, four independent variables are used, one for the overall aggregated ESG score and three representing a breakdown of the ESG score into E, S and G. The main reason behind breaking down the ESG score into separate components is the variation in the impact of each component E, S and G on financial performance or firm-risk examined by previous studies (Fatemi et al., 2018; Velte, 2017; Sassen et al., 2016). In addition, Velte (2017) argues that ESG activities will not have an immediate impact on financial performance or firm-risk. Therefore, time lags of one year between the companies' ESG score and their financial performance and firm-risk is included in the models. In other words, the regression analyses compare the financial performance or firm-risk variables of the year t with the ESG score or E, S and G scores of the year t-1.

4.5 Control Variables

A company's financial performance and firm-risk are not only affected by enforcement of mandatory non-financial disclosure or ESG score, but it could also be affected by other factors. According to Drempetic et al. (2017) larger companies tend to gain a higher ESG score compared to smaller firms. Hence, a control variable for firm-size will be included in all regression models to isolate the effect of the size of the company. The firm-size is retrieved by taking the natural logarithm of the total assets, which is in line with the study performed by Velte (2017). In addition, R&D and financial leverage are commonly used in previous research when evaluating financial performance and firm-risk (Sassen et al., 2016; Velte, 2017). In this research, financial leverage is included in the regression analyses as a control variable, while R&D is excluded due to too few observations in the data set.[9] The financial leverage is calculated by dividing total debt with total assets. When evaluating the association between the mandatory non-financial disclosure and ESG score on financial performance, beta as a measurement of systematic risk, is also included in the regressions as control variable. The reason for this is that firm risk tends to have an impact on financial performance as lower/higher firm risk is associated with lower/higher costs of debt capital (Velte, 2017). Moreover, when investigating the impact of mandatory non-financial disclosure and ESG score on firm-risk, the regression models are controlled for ROA. Finally, when evaluating the impact of mandatory non-financial disclosure on financial performance and firm-risk the aggregated ESG score is added as a control variable. The main reason behind this is to control for the impact of the ESG score on the outcome when evaluating the impact of the mandatory non-financial disclosure on financial performance and firm-risk.

4.6 Fixed Effects

The control variables presented in the previous section are considered to be time-variant, however, there also exist time-invariant factors within the cross-sectional units that are unobserved. Tommaso and Thornton (2020) argue that the impact of ESG scores on financial performance and firm-risk among different companies could vary depending on their industry group. Qui et al. (2016) further argues that the environmental and social concerns of a certain company are often related to the company's industry group. Using industry fixed effects (FEs) helps control for the time-invariant characteristics across industries that might affect the

[9] The number of R&D firm-year observations equals 394 as given in Table 6. Excluding R&D from the regression analyses should not be an issue in this case, since industry effects will be controlled for which arguably captures similar effects as R&D due to different industries being associated with different levels of R&D expenses.

independent variables (Chen et al., 2018). In addition to industry FEs, year FEs are added to the regression analyses to control for changed economic conditions during the time period that might have an impact on financial performance or firm risk (Sassen et al., 2016). Furthermore, country FEs are used to control for the time-invariant characteristics of the different countries.

4.7 Descriptive Statistics and Correlation Coefficients

In order to evaluate the characteristics of the data, a summarizing table was collected representing the number of observations, mean, standard deviation and min- and max value of the variables of interest. When evaluating Panel A in Appendix B, there appears to exist outliers within the data due to some variables having high (low) maximum (minimum) values while having a large standard deviation in relation to the mean. For instance, the variable ROA has a minimum value of -59.01, a mean of 6.604 and a standard deviation of 10.40. In order to reduce the effect of possible outliers, a winsor (Stata Command) approach is used. The winsor approach does not remove these extreme values at the tail of the distribution, but it replaces an existing value with a less extreme value (Puspam et al., 2017). In this case, a less extreme value refers to replacing the five percent of the highest values with the 95th percentile-value and replacing the five percent of the lowest values with the 5th percentile-value. This results in the summary table presented by Table 6, where the number of observations (N) are displayed. The ESG, E, S and G scores range from 0 to 100, where a higher score indicates a stronger performance. In the final sample, the mean (standard deviation) of the ESG, E, S and G scores are 55.40 (17.26), 52.56 (23.56), 60.31 (20.14) and 49.71 (21.83), respectively. In Panel C of Appendix B, a summarizing table of the US firms after adjusting for extreme values are presented. Comparing the two summary descriptive tables, it is noticeable that the mean of the ESG, E and S scores of the Nordic firms are higher than the US firms, while the G scores of the Nordic firms are slightly lower than the US firms.

Table 6. Descriptive Statistics (Nordic Firms)

A summarizing descriptive statistics table after adjusting for extreme values. The table shows the number of firm-year observations, mean value, standard deviation, minimum and maximum value of each variable of interest.

VARIABLES	(1) N	(2) Mean	(3) Std. Dev	(4) Min	(5) Max
Dependent variables					
ROA	956	6.378	9.272	-40.83	31.17
Tobin's Q	913	2.532	1.681	1.008	9.963
P/B	956	3.673	5.323	-20.81	33.82
Total Risk	821	0.0848	0.0423	0.0290	0.302
Systematic Risk	821	0.846	0.851	-1.118	3.078
Downside Risk	824	0.875	1.761	-5.012	5.144
Independent variables					
ESG Score	958	55.40	17.26	5.903	91.01
E Score	958	52.97	23.56	0.307	95.10
S Score	958	60.31	20.14	5.732	96.08
G Score	958	49.71	21.83	2.061	97.54
Control variables					
Firm Size	958	10.00	1.305	6.911	13.85
Financial Leverage	924	0.230	0.151	0.00209	0.945
Market Cap.	948	58,911	104,254	1,070	1.016e+06
R&D	394	2,057	5,751	4.145	49,745
Total Debt	924	12,187	25,759	0.145	288,468
Total Assets	958	52,702	108,795	217.1	1.034e+06
Year	958	2016	2.524	2011	2019

A correlation matrix is retrieved to evaluate the correlation coefficients between the variables of interest and to investigate possible multicollinearity-problems. Table 7 shows that the variable representing firm size is positively correlated with the ESG score (0.523), the environmental score (0.537), the social score (0.434) and the governance score (0.263). This implies that larger companies usually have both higher aggregated and separated ESG scores. Moreover, including independent variables that are highly correlated in the same model could lead to problems with multicollinearity. In order to assure that the models performed in this study do not suffer from multicollinearity problems, the variance of inflation (VIF) is calculated. A VIF exceeding 10 implies severe multicollinearity problems (Sassen et al., 2016). However, the highest VIF retrieved in any of the models performed in this study is 3.31, implying no problem with multicollinearity within the models.

Table 7. Correlation Table (Nordic Firms)

A correlation coefficient matrix displays the linear relationship between each variable of interest with another variable. Each cell in the table represents a correlation coefficient.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) ROA	1.000											
(2) Tobin's Q	0.423	1.000										
(3) P/B	0.294	0.756	1.000									
(4) Total Risk	-0.072	0.009	-0.002	1.000								
(5) Systematic Risk	-0.026	-0.043	-0.048	0.387	1.000							
(6) Downside Risk	-0.039	-0.051	-0.085	0.148	0.489	1.000						
(7) ESG Score	0.108	-0.038	-0.009	-0.007	-0.025	0.013	1.000					
(8) E Score	0.062	-0.106	-0.061	-0.039	-0.023	-0.001	0.820	1.000				
(9) S Score	0.183	0.032	0.052	0.022	-0.032	0.035	0.860	0.643	1.000			
(10) G Score	-0.025	-0.050	-0.038	-0.012	0.010	0.012	0.641	0.278	0.307	1.000		
(11) Firm Size	0.034	-0.328	-0.187	-0.059	-0.034	0.034	0.523	0.537	0.434	0.263	1.000	
(12) Financial Lev.	-0.143	-0.336	-0.219	0.058	0.040	-0.036	-0.051	-0.042	-0.096	0.046	0.121	1.000

5. Methodology

This section presents a brief description of processing the retrieved data. Furthermore, the Difference-in-Difference and Ordinary-Least-Square research methods and the Fixed Effects model conducted in this research is presented.

5.1 Data Processing

The aim of this research is to investigate the impact of mandatory non-financial disclosure and ESG score on financial performance and firm-risk. In order to evaluate the difference in change in financial performance and firm-risk between the Nordic firms and the control firms, a Difference-in-Difference (DiD) research method is conducted. The Nordic companies represent the treatment firms affected by the mandatory non-financial disclosure, while the US companies represent the control firms not affected by any mandatory non-financial disclosure. The time period between 2014 and 2016 represents the pre-period and 2017 to 2019 represent the post-period, as the EU Directive 2014/95/EU was brought into force in 2017. In order to evaluate the association between the aggregated ESG score and its separated components on financial performance and firm-risk, Ordinary-Least-Squares (OLS) regression analyses will be performed. The OLS regression analyses will be based on data ranging over the time period 2014 to 2019. Hence, the time period between 2014 and 2019 is the main sample period in this research. The time period between 2011 and 2013, on the other hand, is only used as an alternative pre-period in order to perform robustness checks.

The data retrieved from Thomson Reuters is not initially suitable for panel data analysis. Therefore, the firm-identification variable (RIC) and the year-identifying variable (year) are determined as the logical observation and sub-observation, respectively, to organize the data. The data is then converted from wide form to long form in Stata going from 3,413 firm-observations to 30,717 firm-year observations. By doing this, the data set is transformed into a panel data set. Moreover, observations associated with companies active in the financial industry are excluded from the data set due to the industry being highly regulated and subject to different trading market mechanisms. This approach is commonly used in studies evaluating financial performance and firm-risk (Velte, 2017; Chen et al., 2018; Sassen et al., 2016). In addition, the data set includes Nordic firms that are not affected by the EU Directive but are voluntarily reporting CSR information. However, one could argue that some of these companies are indirectly affected by the regulation due to being close to the threshold of becoming mandated. Therefore, the companies close to fulfilling the requirements of being mandated are kept in the data set, while companies further away from the threshold are identified and removed from the data set. These changes result in a data set of 2,804 firm-observations and 25,236 firm-year observations, of which 239 Nordic firm-observations and 2,151 Nordic firm-year observations.

The data set is an unbalanced panel due to missing values. Missing values is not necessarily a problem, however, problems arise when the missing values are non-randomly (Wooldridge, 2010). The ESG, E, S and G scores of certain companies are not observed for certain years which could lead to problems with non-randomly missing values. In order to address the potential issues due to the absence of the ESG data, the firm-year observations with missing values are removed. This is the same approach Sassen et al. (2016) used when transforming unbalanced data into balanced. Moreover, the reduction of missing values results in a final sample of 958 Nordic firm-year observations and 6,255 US firm-year observations. As a robustness check, regression analyses are performed based on both balanced and unbalanced panel data. The non-reported results based on the unbalanced panel suggest that findings remain mainly unchanged when owing to the missing values and that the findings are unchanged even in a smaller sample.

5.2 DiD Estimation

A Difference-in-Difference (DiD) analysis is conducted to estimate the impact of the EU Directive regarding non-financial disclosure and diversity information on Nordic companies' financial performance and firm-risk. The aim with a DiD analysis is to capture the difference

between the change in outcomes before and after a shock in a treatment group relative to a control group, as presented below (Goodman-Bacon, 2018):

$$(\bar{y}_{Treat}^{Post} - \bar{y}_{Treat}^{Pre}) - (\bar{y}_{Control}^{Post} - \bar{y}_{Control}^{Pre})$$

In this case, the outcomes are financial performance and firm-risk, the shock is the mandatory disclosure and the treatment and control groups are Nordic and US firms, respectively. In the perfect scenario, the treatment and control groups would have the exact same characteristics besides being affected by a shock (Lechner, 2011). Hence, in order to capture the true impact of the mandatory non-financial disclosure, no difference in change in financial performance or firm-risk between the groups should exist without the mandatory disclosure shock during the evaluated time period. The choice of US firms as control firms could therefore be questioned, as there arguably exist several differences between the countries representing the treatment and control group. However, it could be argued that it is unrealistic to find a geographical area that has exactly the same characteristics as the Nordic area. The US is therefore a suitable benchmark as the country has few regulations in regard to ESG (Ioannou & Serafeim, 2017). US firms are also commonly used as a control group when evaluating the impact of an introduction of a mandatory disclosure (Ioannou & Serafeim, 2017).

Moreover, an appropriate matching between the treatment firms and control firms is crucial when using a DiD estimation (Goodman-Bacon, 2018). In order to reduce the concern with having a biased sample, a Propensity-Score-Matched (PSM) method is used to match the treatment firms with control firms. When applying a DiD PSM approach, the treatment firms and control firms become more comparable on the chosen characteristics (Ioannou & Serafeim, 2017). Hence, the aim with the matching is to find control firms that have similar characteristics as the treatment firms. The chosen characteristics for matching the treatment firms with control firms are firm size, market capitalization and industry. The procedure starts by running a logit regression to estimate the probability of being a treatment firm using the pre-period (2014-2016) data. The results are presented in Panel A of Appendix C, and show that being a treatment firm is negatively associated with firm size, market capitalization and industry. Finally, each treatment firm is matched to a control firm using nearest neighbor matching technique with no replacement and setting caliper to 0.1 standard error of the propensity score. Panel B of Appendix C shows the results from testing the effectiveness and comparability of the matching process. The results suggest that there is a statistically significant difference in the characteristics between the treatment and control firms prior to the matching, while no

statistically significant difference in the characteristics could be found between the groups after the matching procedure. Hence, the test implies that the matching procedure is successful.

In the balanced panel, the dependent variables of interest still contain missing values, and due to the discrepancy of the missing values between these variables, it is appropriate to perform the matching procedure separately for each outcome. Therefore, the matching procedure is conducted six times resulting in six different PSM samples of firm-years observations, divided between treatment firm-years and control firm-years observations. The different PSM sample sizes are presented in Table 8.

Table 8. The PSM Sample Size
An overview of the number of observations in the overall PSM samples and the number of treatment and control firm-year observations used in the DiD regression analyses to evaluate the impact of the mandatory non-financial disclosure on financial performance and firm-risk.

Outcome	**PSM sample (firm-years observations)**	**Treatment firm-years observations**	**Control firm-years observations**
ROA	7,120	946	6,174
Tobin's Q	6,407	904	5,503
P/B	7,067	948	6,119
Total Risk	6,810	811	5,999
Systematic Risk	6,810	811	5,999
Downside Risk	6,825	814	6,011

5.3 Fixed Effects Model

It is difficult to determine whether all the relevant control variables have been included in the regression models and, as a consequence, unobserved factors can lead to occurrence of omitted variables bias as the regression model fails to control for the time-invariant characteristics (Wooldridge, 2010). The assumption for performing fixed effects regressions on panel data is fulfilled when the time-invariant characteristics for each cross-sectional unit, in this case each firm, is correlated with the independent variables (Gardiner et al., 2009). Therefore, a fixed effects regression model could be considered suitable which is given by following specification containing $n - 1$ dummy variables (Stock & Watson, 2015):

$$Y_{it} = \beta_0 + \beta_1 X_{1,it} + \cdots + \beta_k X_{k,it} + \gamma_2 D2_i + \gamma_3 D3_i + \ldots + \gamma_n Dn_i + \varepsilon_{it}$$

, where i = 1, …, n, t = 1, …, T and $D2_i$, $D3_i$, …, Dn_i are dummy variables. Adding fixed effects, as group dummies, in the DiD and OLS regression estimations will therefore help eliminate omitted variable bias by controlling for the unobservable factors that are time-invariant, such as the industry, year and country. As a robustness check, fixed effects regression models are performed with alternative FEs and cluster-robust standard errors at industry level. The robustness check shows that the findings remain mainly unchanged when adding different FEs and different combinations of FEs to the regressions (Panel A-F of Appendix D).

6. Empirical Results

In order to explore the impact of mandatory non-financial discourse on financial performance and firm-risk, the model specification (I) and (IV) are used. In model (IV) total risk, systematic risk and downside risk are used as dependent variables while ROA and Tobin's Q are used for model (I). In both models, the dependent variables are separately regressed on a dummy variable indicating whether the period is post-period (Post), a dummy variable indicating whether the firm is affected by the EU Directive (Treatment firms), and their interaction term (Post x Treatment firms). Moreover, in order to evaluate the impact of ESG score, both as an aggregated score and as separate components, on financial performance and firm-risk, model specification (II), (III), (V) and (VI) is used. In model (II) and (III), ROA and Tobin's Q are used as dependent variables, while in model (V) and (VI) total risk, systematic risk and downside risk are used as dependent variables. Furthermore, cluster-robust standard errors at industry level are used in all regression models. In all tables, ***, **, * indicate significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

6.1 Results of Financial Performance

The results from the DiD regression analyses using the PSM samples are presented in Panel A of Table 9. The variable of interest in model (I) is the coefficient on the interaction term, β_3, which capture the difference in change in financial performance between the treatment firms and control firms subsequent to the mandatory disclosure shock. A positive (negative) sign on the coefficient of the interaction term indicates that the treatment firms experience an increase (decrease) in financial performance after the enforcement of the directive. A positive (negative) coefficient on Post indicates that the control firms have higher (lower) financial performance subsequent to the mandatory disclosure shock. A positive (negative) coefficient on Treatment

firms indicates that the treatment firms have higher (lower) financial performance than the control firms before the mandatory disclosure shock.

$$FINP\ (ROA, Tobin's\ Q) = \beta_0 + \beta_1 Post + \beta_2 Treatment\ firms + \beta_3 Post\ x\ Treatment\ firms\ + \beta_4 ESG + \beta_5 Beta + \beta_6 Finlev + \beta_7 FirmSize\ + \sum_{q=2}^{123} \gamma_q\ Industry_q + \sum_{r=2}^{6} \delta_r\ Year_r + \sum_{s=2}^{5} \theta_s\ Country_s + \varepsilon \quad (I)$$

q = Represents each industry
r = Represents each year
s = Represents each country

When evaluating the impact of the mandatory non-financial disclosure on ROA, the result from the DiD regression analysis shows a positive and statistically significant coefficient on the interaction term Post x Treatment firms, which implies that the treatment firms have experienced an increase in ROA relative to the control firms subsequent to the mandatory disclosure. However, the result from the regression analysis with Tobin's Q as the dependent variable is not statistically significant. Hence, no implications of any differences in change between the treatment firms and control firms regarding Tobin's Q subsequent to the mandatory disclosure shock is found. In addition, Panel A of Table 9 shows the results from the DiD regression analysis using an alternative dependent variable for financial performance, the P/B ratio. The estimated coefficient on the interaction term when evaluating the impact of the mandatory non-financial disclosure on P/B shows a negative and statistically significant coefficient. This implies that the treatment firms have experienced a decrease in P/B ratio relative to the control firms subsequent to the mandatory disclosure directive. These results are economically significant, where ROA (P/B) increases (decreases) by 55% (41%).[10]

Table 9. The Impact of ESG Score and Mandatory Non-Financial Disclosure on Financial Performance

Panel A of this table shows the results from the DiD regression analyses using the PSM samples. Panel B reports the results from the OLS regression analyses using the final sample. All coefficients are estimated using cluster-robust standard errors (at industry level) which are presented in the parentheses. Appendix A reports the definition of all variables. In all tables, *** p<0.01, ** p<0.05, * p<0.1 indicate significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

[10] 55% = 3.506/6.378, where 3.506 is the coefficient of Post x Treatment firms in column (1) in Panel A of Table 9, and 6.378 is the mean of ROA for Nordic firms in Table 6. 41% = -1.518/3.673, where -1.518 is the coefficient of Post x Treatment firms in column (3) in Panel A of Table 9, and 3.673 is the mean of P/B for Nordic firms in Table 6.

Panel A: FINP (and alternative depend variable) DiD regression results, PSM sample

VARIABLES	(1) ROA	(2) Tobin's Q	(3) P/B
Post	-2.508***	-0.259	-0.0318
	(0.952)	(0.171)	(0.802)
Treatment firms	-0.0221	0.540**	2.640***
	(1.371)	(0.244)	(0.893)
Post x Treatment firms	**3.506*** **	**0.0575**	**-1.518****
	(0.912)	**(0.156)**	**(0.709)**
ESG Score	0.0331*	0.0108***	0.00731
	(0.0171)	(0.00235)	(0.0101)
Financial Leverage	-7.860***	-1.516***	-3.064**
	(1.969)	(0.279)	(1.558)
Firm Size	0.616*	-0.351***	-0.254
	(0.319)	(0.0420)	(0.159)
Systematic Risk	-0.261	-0.0917*	-0.214
	(0.387)	(0.0473)	(0.201)
Constant	-1.571	5.904***	6.092***
	(3.217)	(0.434)	(1.696)
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Observations	1,345	1,391	1,366
R-squared	0.121	0.323	0.091

Panel B: FINP (and alternative depend variable) OLS regression results, final sample

VARIABLES	(1) ROA	(2) ROA	(3) Tobin's Q	(4) Tobin's Q	(5) P/B	(6) P/B
One-year lagged ES		**-0.00585**		**0.00668***		**0.000445**
		(0.0218)		**(0.00362)**		**(0.0128)**
One-year lagged SS		**0.131*** **		**0.0117****		**0.0411****
		(0.0278)		**(0.00458)**		**(0.0164)**
One-year lagged GS		**-0.0426****		**-0.00163**		**-0.0171**
		(0.0183)		**(0.00355)**		**(0.0136)**
One-year lagged ESG	**0.0869*** **		**0.0166*** **		**0.0260***	
	(0.0299)		**(0.00421)**		**(0.0151)**	
Financial Leverage	-9.311***	-7.977**	-3.045***	-2.852***	-7.244***	-6.710**
	(3.220)	(3.275)	(0.485)	(0.493)	(2.724)	(2.776)
Firm Size	-0.0369	-0.314	-0.339***	-0.368***	-0.378	-0.476*
	(0.452)	(0.443)	(0.0812)	(0.0799)	(0.263)	(0.274)
Systematic Risk	0.123	0.184	-0.0118	-0.0122	-0.116	-0.0982
	(0.459)	(0.459)	(0.0645)	(0.0655)	(0.198)	(0.199)
Constant	1.311	2.938	5.752***	5.915***	10.15***	10.72***
	(5.590)	(5.330)	(0.963)	(0.961)	(3.203)	(3.223)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	503	503	497	497	503	503
R-squared	0.205	0.243	0.440	0.448	0.248	0.261

In order to evaluate the impact of ESG score on financial performance, the regression models (II) and (III) are performed.

$$FINP_{it}\ (ROA, Tobin's\ Q) = \beta_0 + \beta_1 ESG_{it-1} + \beta_2 Beta_{it} + \beta_3 FinLev_{it} + \beta_4 FirmSize_{it} + \sum_{q=2}^{123} \gamma_q\ Industry_{qi} + \sum_{r=2}^{6} \delta_r\ Year_{ri} + \sum_{s=2}^{4} \theta_s\ Country_{si} + \varepsilon_{it} \quad \text{(II)}$$

$$FINP_{it}\ (ROA, Tobin'sQ) = \beta_0 + \beta_1 ES_{it-1} + \beta_2 SS_{it-1} + \beta_3 GS_{it-1} + \beta_4 Beta_{it} + \beta_5 FinLev_{it} + \beta_6 FirmSize_{it} + \sum_{q=2}^{123} \gamma_q\ Industry_{qi} + \sum_{r=2}^{6} \delta_r\ Year_{ri} + \sum_{s=2}^{4} \theta_s\ Country_{si} + \varepsilon_{it} \quad \text{(III)}$$

i = Represents the number of companies
t = Represents the time
q = Represents each industry
r = Represents each year
s = Represents each country

In model (II), the coefficient of interest is β_1, which estimates the impact of the aggregated ESG score on financial performance. The estimated coefficient, $\widehat{\beta_1}$, is interpreted as the change in financial performance from a unit increase in ESG score, all other variables held constant. Hence, a positive (negative) coefficient on $\widehat{\beta_1}$ indicates an increase (decrease) in financial performance from a unit increase in ESG score. The results from this regression model are presented in Panel B of Table 9. The outcome from evaluating ROA (1) and Tobin's Q (3), show a statistically significant and positive $\widehat{\beta_1}$. Hence, the results imply that a unit increase in the aggregated ESG score increases financial performance.

In model (III), three independent variables are included, one for each separated component of the ESG score, which are the environmental score (ES), social score (SS) and governance score (GS). Hence, in this model all three coefficients, β_1, β_2 and β_3 are of interest. The outcome from evaluating ROA (2) shows that the SS has a positive and statistically significant coefficient, while GS has a negative and statistically significant coefficient. The ES has a statistically non-significant coefficient. The outcome from evaluating Tobin's Q (4), shows that the ES and SS have positive and statistically significant coefficients, while GS has a statistically non-significant coefficient. In addition, Panel B of Table 9 shows the results of the OLS regression analysis using an alternative dependent variable for financial performance, the P/B ratio. The outcome from evaluating the impact of the aggregated ESG score on P/B (5)

shows a positive and statistically significant coefficient. Moreover, when evaluating the impact of each separated component of the ESG score on P/B, the results show that the SS has a positive and statistically significant coefficient, while ES and GS have statistically non-significant coefficients, which is mainly in line with the results from Tobin's Q.

6.2 Results of Firm-risk

The results from the DiD regression analyses using the PSM samples are presented in Panel A of Table 10. The variable of interest in model (IV) is the coefficient on the interaction term, β_3, which captures the difference in change in firm-risk between the treatment firms and control firms subsequent to the mandatory disclosure shock. A positive (negative) sign on the coefficient of the interaction term indicates that the treatment firms experience an increase (decrease) in firm-risk after the enforcement of the directive. A positive (negative) coefficient on Post indicates that the control firms have higher (lower) firm-risk subsequent to the mandatory disclosure shock. A positive (negative) coefficient on Treatment firms indicates that the treatment firms have higher (lower) firm-risk than the control firms before the mandatory disclosure shock. As mentioned before, firm-risk is measured by systematic risk, total risk and downside risk.

$$FirmRisk\ (Total\ Risk, Systematic\ Risk, Downside\ Risk) = \beta_0 + \beta_1 Post + \beta_2 Treatment\ firms + \beta_3 Post\ x\ Treatment\ firms\ + \beta_4 ESG + \beta_5 ROA + \beta_6 Finlev + \beta_7 FirmSize\ + \sum_{q=2}^{123} \gamma_q\ Industry_q + \sum_{r=2}^{6} \delta_r\ Year_r + \sum_{s=2}^{5} \theta_s\ Country_s + \varepsilon \quad \text{(IV)}$$

q = Represents each industry
r = Represents each year
s = Represents each country

When evaluating the impact of the mandatory non-financial disclosure on systematic and downside risk, the results from the DiD regression show negative and statistically significant coefficients on Post x Treatment firms. The results imply that the treatment firms, relative to control firms, experience a decrease in systematic risk and downside risk subsequent to the mandatory disclosure shock, as the coefficients on the interaction term reported in column (2) and (3) in Panel A of Table 10 are statistically significant and negative. These results are economically significant, where systematic and downside risk is reduced by 27% and 46%, respectively.[11] Column (1) shows a statistically non-significant coefficient on the interaction

[11] 27% = -0.230/0.846, where -0.230 is the coefficient of Post x Treatment firms in column (2) in Panel A of Table 10, and 0.846 is the mean of systematic risk for Nordic firms in Table 6. 46% = -0.402/0.875, where -0.402 is the coefficient of Post x Treatment firms in column (3) in Panel A of Table 10, and 0.875 is the mean of downside risk for Nordic firms in Table 6.

term, suggesting that there is no difference in change in total risk between treatment firms and control firms subsequent to the enforcement of the EU Directive.

Table 10. The Impact of ESG Score and Mandatory Non-Financial Disclosure on Firm-risk

Panel A of this table shows the results from the DiD regression analyses using the PSM samples. Panel B reports the results from the OLS regression analyses using the final sample. All coefficients are estimated using cluster-robust standard errors (at industry level) which are presented in the parentheses. Appendix A reports the definition of all variables. In all tables, *** p<0.01, ** p<0.05, * p<0.1 indicate significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Panel A: Firm-risk DiD regression results, PSM sample

	(1)	(2)	(3)
VARIABLES	Total Risk	Systematic Risk	Downside Risk
Post	0.0308***	0.400***	1.416***
	(0.00497)	(0.0936)	(0.277)
Treatment firms	-0.000792	0.617***	1.201***
	(0.00601)	(0.103)	(0.251)
Post x Treatment firms	**-0.00739**	**-0.230*** **	**-0.402***
	(0.00498)	**(0.0861)**	**(0.219)**
ESG Score	-3.47e-05	0.000559	-0.00251
	(8.54e-05)	(0.00163)	(0.00336)
Return on Assets	-0.00105***	-0.00518	-0.00487
	(0.000212)	(0.00321)	(0.00614)
Financial Leverage	0.0306***	0.146	-0.322
	(0.00954)	(0.149)	(0.340)
Firm Size	-0.00527***	-0.0400*	0.0150
	(0.00134)	(0.0242)	(0.0504)
Constant	0.129***	0.702***	-1.060*
	(0.0137)	(0.239)	(0.565)
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Observations	1,264	1,264	1,273
R-squared	0.223	0.108	0.112

Panel B: Firm-risk OLS regression results, final sample

VARIABLES	(1) Total Risk	(2) Total Risk	(3) Systematic Risk	(4) Systematic Risk	(5) Downside Risk	(6) Downside Risk
One-year lagged ES		**-0.000160**		**0.00322**		**-0.00167**
		(0.000114)		**(0.00274)**		**(0.00578)**
One-year lagged SS		**0.000349****		**-0.00259**		**0.00930**
		(0.000135)		**(0.00291)**		**(0.00600)**
One-year lagged GS		**-0.000220*****		**0.000596**		**-0.00317**
		(8.23e-05)		**(0.00195)**		**(0.00400)**
One-year lagged ESG	**4.12e-06**		**0.00134**		**0.00398**	
	(0.000119)		**(0.00303)**		**(0.00610)**	
Return on Assets	9.43e-05	-5.81e-05	0.00142	0.00223	0.00204	-0.00149
	(0.000298)	(0.000295)	(0.00535)	(0.00560)	(0.0117)	(0.0121)
Firm Size	-0.00314	-0.00380*	-0.00853	-0.00576	-0.0191	-0.0417
	(0.00202)	(0.00205)	(0.0444)	(0.0450)	(0.0883)	(0.0908)
Financial Leverage	0.0449***	0.0470***	0.671**	0.708**	-0.0871	-0.0408
	(0.0150)	(0.0154)	(0.311)	(0.320)	(0.619)	(0.631)
Constant	0.0935***	0.0987***	0.758*	0.735	0.680	0.815
	(0.0212)	(0.0211)	(0.450)	(0.452)	(0.937)	(0.956)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	503	503	503	503	505	505
R-squared	0.123	0.142	0.047	0.050	0.065	0.070

In order to evaluate the impact of ESG score on firm-risk, the regression models (V) and (VI) are performed.

$$FirmRisk_{it}\ (Total\ Risk, Systematic\ Risk, Downside\ Risk) = \beta_0 + \beta_1 ESG_{it-1} + \beta_2 ROA_{it} + \beta_3 FinLev_{it} + \beta_4 FirmSize_{it} + \sum_{q=2}^{123} \gamma_q\ Industry_{qi} + \sum_{r=2}^{6} \delta_r\ Year_{ri} + \sum_{s=2}^{4} \theta_s\ Country_{si} + \varepsilon_{it} \quad (V)$$

$$FirmRisk_{it}\ (Total\ Risk, Systematic\ Risk, Downside\ Risk) = \beta_0 + \beta_1 ES_{it-1} + \beta_2 SS_{it-1} + \beta_3 GS_{it-1} + \beta_4 ROA_{it} + \beta_5 FinLev_{it} + \beta_6 FirmSize_{it} + \sum_{q=2}^{123} \gamma_q\ Industry_{qi} + \sum_{r=2}^{6} \delta_r\ Year_{ri} + \sum_{s=2}^{4} \theta_s\ Country_{si} + \varepsilon_{it} \quad (VI)$$

i = Represents the number of companies
t = Represents the time
q = Represents each industry
r = Represents each year
s = Represents each country

In model (V), the estimated $\widehat{\beta_1}$ is the coefficient of interest and is interpreted as the change in firm-risk from a unit increase in ESG score, all other variables held constant. A positive (negative) coefficient is then interpreted as an increase in ESG score by one unit increase (decrease) in firm-risk. The results from this regression model are presented in Panel B of Table 10. When regressing the aggregated ESG score on total risk (1), systematic risk (3) and downside risk (5), the results show statistically non-significant $\widehat{\beta_1}$-coefficients. In model (VI), the coefficients, β_1, β_2 and β_3, are of interest. The outcome from evaluating total risk (2) shows that the SS has a positive and statistically significant coefficient, while GS has a negative and statistically significant coefficient. The ES has a statistically non-significant coefficient. Finally, the outcomes from evaluating systematic risk (4) and downside risk (6), show statistically non-significant coefficients on ES, SS and GS.

7. Discussion

The results from this research are primarily of interest for policymakers, investors and managers. The results from the DiD regression analyses implies that Nordic firms experience an increase in ROA and decrease in systematic and downside risk subsequent to the mandatory non-financial disclosure shock. From an investor perspective, the EU Directive signifies a higher level of transparency which in turn could be interpreted as uncertainty reduction in the reporting firms (Chen et al., 2018). As a consequence, increased financial performance and/or reduced firm-risk could be expected. Accordingly, investors should consider investing in reporting firms as these firms appear to have higher profitability and lower risk. From a policy maker perspective, the results indicate that pushing firms towards sustainability encourages investors to finance sustainable firms to a greater extent. Prior research shows that the financial performance is negatively affected by mandating disclosure of CSR information, where the findings are derived from higher costs associated with the regulation (Chen et al, 2018; Grewal et al., 2017). However, it could be argued that firms with higher ESG scores prior to the directive, as the Nordic firms, do not necessarily need to increase their expenses as much as those with lower scores. Moreover, our findings do not capture any difference in change in total risk between the Nordic firms and the US firms subsequent to the EU Directive.

The results from this research do not capture any difference in change in Tobin's Q between the Nordic firms and the US firms subsequent to the EU Directive. Since Nordic firms on average have higher ESG scores, this result is not in line with Grewal et al. (2017) findings suggesting that market reactions to mandatory non-financial disclosure are less negative for

firms with higher ESG scores prior to a mandate. However, this discrepancy could possibly be explained by the fact that the announcement of the EU directive occurred previous to the evaluated time period and, hence, the market was already aware of the directive and did not react subsequently. This explanation is also supported by the results from evaluating the alternative market-based dependent variable P/B ratio, as it does not capture a positive effect on financial performance subsequent to the mandatory disclosure.

The results from the OLS regression analyses suggest that increased ESG score leads to an improvement in both accounting and market-based measurements of financial performance. These findings are supported by the importance of recognizing both financial profitability and taking actions towards sustainable development. Some previous studies argue that ESG activities are associated with higher costs and lower financial performance (Friede et al., 2015; Garcia et al., 2017), however, ESG activities could enhance stable growth and cost-cuts in the long run (Xie et al., 2019). Hence, our results imply that the Nordic firms, as a part of a mature market regarding ESG topics, have reached the long-run benefits of incorporating ESG into their operation where an increase in ESG score is associated with higher financial performance. However, no statistical evidence to support a relationship between the aggregated ESG score and the three firm-risk measurements is found.

Evaluating the separate components of ESG, the results implies that a higher social score contributes to higher financial performance. The social pillar of the ESG score is associated with human rights, firms' product responsibility and the firms' engagement in creating a better workplace for their employees (Refinitiv, 2021). It could be argued that these factors are in turn related to increased customer-base and lower costs connected to employee turnover, leading to increased financial performance (Koller et al., 2019; Sassen et al., 2016). Additionally, this research shows that higher social score is associated with higher total risk. This result could be explained by managerial incentives for justifying poor financial performance in the short-term by overinvestment in social activities (Sassen et al., 2016). By only accounting for social concerns symbolically, the firm could face a lower level of legitimacy (Wang & Sarkis, 2017), which in turn could increase the firm-risk.

Furthermore, the findings show that higher governance score leads to lower ROA and reduces total risk. The governance pillar of the ESG score includes the firms' CSR strategies. Therefore, performing ESG activities and CSR reporting can be considered a governance activity which influences firms' governance score. It is known that ESG activities and CSR reporting are often costly and require large investments. A higher governance score could therefore be associated with lower financial performance. Additionally, investors punish firms

to a greater extent regarding governance concerns rather than environmental and social concerns (Fatemi et al., 2018). Moreover, a higher governance score could indicate less risk exposure in regard to legal interventions, bans and regulatory limitations leading to lower firm-risk. Finally, our findings show statistical evidence to support a positive relationship between the environmental score and market-based financial performance. According to Flammer (2013), firms are not awarded to as great extent for being green as previously due to the high expectations of companies to behave environmentally-friendly. However, this result implies that firms still are awarded to some extent for acting environmentally-friendly in the Nordic region.

7.1 Robustness Checks

Several checks have been conducted to assess the robustness of the results. Observations from the year 2020 is excluded from this research to improve the robustness of the data. There are two main reasons why this year could contribute to disturbance in the data. Firstly, Thomson Reuters had not updated the ESG scores for most of the Nordic companies in 2020 when the data for the purpose of this research was retrieved. Hence, most of the reported scores for the year 2020 were the latest scores reported, e.g. scores from 2019, which could lead to biasedness in the data. Secondly, the stock market volatility and the uncertain economic conditions due to the COVID-19 pandemic could lead noise in the data.

All fixed effect regression models with cluster-robust standard errors at industry level are performed on both balanced and unbalanced panel data. An unbalanced panel due to certain firms missing data for certain years is not necessarily a problem and most of the time the models can still be performed. However, in this case, the absence of ESG, E, S and G scores for certain firms and years is not random. There is a clear trend in the data where the number of firms reporting ESG scores is increasing with years, specially, after the enforcement of the EU Directive. Performing regression on both balanced and unbalanced data helps to check the robustness of the results when changes are made to the data. The non-reported results on the unbalanced panel suggest mainly the same findings as the reported results in Table 9 and 10. This robustness check shows that the results remain mainly unchanged with a smaller sample. However, all regression analyses in this research are based on the balanced sample to reduce the potential impact of non-random absence of ESG data.

In order to evaluate the robustness of the results in the DiD and OLS regression analyses where Tobin's Q is the dependent variable, P/B ratio is used as an alternative dependent variable. Furthermore, in order to evaluate the presence of heteroscedasticity in the data, a

Breusch-Pagan test is performed immediately after each regression. These tests show that all regression models suffer from heteroscedasticity and in order to solve this problem cluster-robust standard errors (at industry level) are used throughout the regression analyses. The cluster-robust standard errors also contribute to mitigation of serial correlation within cross-sectional units and years.

For the purpose of this research, industry, year and country FEs have been added to the regression analyses to control for the unobservable factors that are time-invariant. In order to assess the robustness of the results from adding FEs, the regression analyses are performed with different combinations of FEs. The first combination of the models is performed with industry FEs only, the second combination includes industry and year FEs, the third combination includes industry and country FEs and the fourth combination includes industry, year and country FEs. The results from the DiD regression analyses and FEs combination one to three are reported in Panel A-B of Appendix D and the results from the OLS regression analyses and FEs combination one to three are presented in Panel C-F of Appendix D. The results from the fourth FEs combination are reported in Table 9 and 10. This robustness check shows that the findings remain mainly unchanged when adding different FEs and FEs combinations to the models. However, all regression analyses in this research are performed with industry, year and country fixed effects to reduce the impact of potential omitted variable biases due to unobservable and time-invariant characteristics.

Lastly, as a robustness check, an alternative pre- and post-period is used when evaluating the impact of mandatory non-financial disclosure on financial performance and firm-risk. The time period between 2011 and 2013 represents the pre-period and the time period from 2017 to 2019 represents the post-period, since the EU Directive was announced in 2014 and was brought into force in 2017. The results from the DiD regression analyses are presented in Panel G of Appendix D. This robustness check confirms that the findings are sensitive to the choice of the pre- and post-period, where the alternative pre- and post-period do not result in similar findings. In turn, these findings could support the main results that there is a difference in change in financial performance and firm-risk subsequent to the EU Directive during 2014 to 2019, but not necessarily during other periods of time.

8. Conclusion and Further Research

We have performed fixed effects regression analyses with cluster-robust standard errors at industry level to investigate the impact of mandatory non-financial disclosure and ESG score on Nordic firms' financial performance and firm risk during 2014-2019. Our findings suggest that Nordic firms experience an increase in accounting-based financial performance and decrease in firm-risk subsequent to the EU Directive 2014/95/EU. In regard to the relationship between aggregated ESG scores and financial performance, we found that increased ESG score leads to an increase in both accounting and market-based financial performance. However, no relationship between ESG score and firm-risk was found. Evaluating the separate components of ESG, the results implies that higher social score leads to higher accounting and market-based financial performance and lower firm-risk, while higher environmental score leads to higher market-based financial performance. On the other hand, higher governance score leads to lower accounting-based financial performance and lower firm-risk.

This study has focused on the Nordic market, which consists of companies with relatively high ESG scores and sustainability awareness, and the results might not be applicable to regions with on average lower ESG scores. Hence, it might be of interest to investigate other markets affected by the EU Directive. In addition, this study is restricted to reported ESG scores provided by Thomson Reuters Database, which has been frequently used in previous research and is considered as reliable and qualified. However, other databases provided by other rating agencies could be used to challenge the accuracy of our findings. Future research should also consider using other measurements of financial performance and/or firm-risk as dependent variables in their studies to assess the robustness of our results.

Despite other future research perspectives within the field of ESG, our findings highlight the importance of ESG reporting to achieve potential firm performance. This research contributes to a greater understanding and provides a comprehensive analysis of the impact of mandatory non-financial disclosure and ESG score on financial performance and firm-risk.

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Appendix A. Variable Definitions

Variables of Interest

Post	A dummy variable that takes on the value 1 if a firm-year observation falls in the post-period, i.e. 2017-2019, and 0 otherwise.
Treatment firms	A dummy variable that takes on the value 1 if the firm is mandated by the EU Directive 2014/95/EU (a Nordic firm), and 0 otherwise (a US firm).
Post x Treatment firms	An interaction term that takes on the value 1 if a Nordic firm falls in the post-period, and 0 otherwise.
Dependent variables	
ROA (Return on Assets)	The ratio of the income after taxes for the fiscal period and the average total assets.
Tobin's Q	Total assets plus market value of equity minus book value of equity divided by total assets.
P/B	Price to Book Value Per Share. Market value per share divided by book value per share.
Total Risk	The standard deviation of security i's excess return.
Systematic Risk	The covariance between security i's and market excess return divided by the variance of security i's excess return.
Downside Risk	The covariance of security i's and market excess return when market excess return is smaller than average market excess return divided by the variance of market excess return when market excess return is smaller than the average market excess return.
Independent variables	
ESG Score	Thomson Reuters's combined ESG score in year t.
Environmental Score	Thomson Reuters's Environmental pillar score in year t.
Social Score	Thomson Reuters's Social pillar score in year t.
Governance Score	Thomson Reuters's Governance pillar score in year t.
One-year lagged ESG	Thomson Reuters's ESG combined score in year t-1.
One-year lagged ES	Thomson Reuters's Environmental pillar score in year t-1.
One-year lagged SS	Thomson Reuters's Social pillar score in year t-1.
One-year lagged GS	Thomson Reuters's Governance pillar score in year t-1.
Control variables	
Financial Leverage	Total Debt divided by Total Assets.
Firm Size	Natural logarithm of Total Assets.
Fixed effects	
Industry	Indicating dummy variables for each of the 123 industries based on TRBC Industry code.
Year	Indicating dummy variables for each of the six years in the sample.
Country	Indicating dummy variables for each of the five countries in the sample.
Other variables	
Year	Calendar year of the observation.
Total Assets	Total assets of a company at the end of fiscal period, MSEK.
R&D	Research & Development expenses at the end of fiscal period, MSEK.
Total Debt	Total Debt at the end of fiscal period, MSEK.
Market Cap	Company Market Capitalization at the end of fiscal period, MSEK.
TRBC Industry Code	Thomson Reuter's Refinitiv Business Classification (TRBC) Industry Code classifying companies across sectors in detail.

Appendix B. Descriptive Statistics

Panel A shows a summarizing descriptive statistics table of the Nordic firms' data before adjusting for extreme values. Panel B and C show a summarizing descriptive statistics table of the US firms' data before and after adjusting for extreme values, respectively. The tables show the number of firm-year observations, mean value, standard deviation, minimum and maximum value of each variable of interest.

Panel A: Summarizing table before adjusting for extreme values (Nordic firms)

VARIABLES	(1) N	(2) Mean	(3) Std. Dev	(4) Min	(5) Max
Dependent variables					
ROA	956	6.604	10.40	-59.01	75.18
Tobin's Q	913	2.714	3.659	0.995	87.34
P/B	956	8.814	157.0	-91.54	4,849
Total Risk	821	0.0863	0.0562	0.0201	0.911
Systematic Risk	821	0.856	1.037	-5.166	10.41
Downside Risk	824	0.860	2.156	-19.47	10.40
Independent variables					
ESG Score	958	55.40	17.26	5.903	91.01
E Score	958	52.97	23.56	0.307	95.10
S Score	958	60.31	20.14	5.732	96.08
G Score	958	49.71	21.83	2.061	97.54
Control variables					
Firm Size	958	9.992	1.335	5.380	13.85
Financial Leverage	924	0.230	0.152	3.02e-05	0.968
Market Cap.	948	58,907	104,256	28.89	1.016e+06
R&D	394	2,057	5,751	-44.38	49,745
Total Debt	924	12,187	25,759	0.145	288,468
Total Assets	958	52,702	108,795	217.1	1.034e+06
Year	958	2016	2.524	2011	2019

Panel B: Summarizing table before adjusting for extreme values (US firms)

VARIABLES	(1) N	(2) Mean	(3) Std. Dev	(4) Min	(5) Max
Dependent variables					
ROA	6,226	3.691	13.80	-263.3	259.3
Tobin's Q	5,551	2.485	5.479	0.991	392.8
P/B	6,141	1.586	131.4	-10,037	1,029
Total Risk	6,024	0.0962	0.0904	0.00586	3.545
Systematic Risk	6,024	0.534	0.852	-19.90	16.45
Downside Risk	6,035	0.238	2.155	-16.81	87.91
Independent variables					
ESG Score	6,255	43.74	18.93	4.613	94.76
E Score	6,255	33.76	25.88	0.0726	96.86
S Score	6,255	45.49	20.85	1.522	97.28
G Score	6,255	51.14	22.42	1.154	98.72
Control variables					
Firm Size	6,254	10.45	1.500	3.103	16.65
Financial Leverage	5,815	0.350	0.579	1.19e-05	21.77
Market Cap.	6,194	134,731	411,421	3.632	8.641e+06
R&D	2,279	4,769	15,183	0.00820	255,277
Total Debt	5,815	43,029	187,034	0.274	4.735e+06
Total Assets	6,254	119,145	467,962	22.27	1.697e+07
Year	6,255	2016	2.512	2011	2019

Panel C: Summarizing table after adjusting for extreme values (US firms)

VARIABLES	(1) N	(2) Mean	(3) Std. Dev	(4) Min	(5) Max
Dependent variables					
ROA	6,226	3.971	9.269	-40.83	31.17
Tobin's Q	5,551	2.390	1.374	1.008	9.963
P/B	6,141	3.370	5.726	-20.81	33.82
Total Risk	6,024	0.0934	0.0502	0.0290	0.302
Systematic Risk	6,024	0.529	0.671	-1.118	3.078
Downside Risk	6,035	0.215	1.560	-5.012	5.144
Independent variables					
ESG Score	6,255	43.74	18.93	4.613	94.76
E Score	6,255	33.76	25.88	0.0726	96.86
S Score	6,255	45.49	20.85	1.522	97.28
G Score	6,255	51.14	22.42	1.154	98.72
Control variables					
Firm Size	6,254	10.45	1.456	6.911	13.99
Financial Leverage	5,815	0.331	0.190	0.00209	0.945
Market Cap.	6,194	118,300	254,647	1,070	1.633e+06
R&D	2,279	4,254	11,026	4.145	66,714
Total Debt	5,815	43,029	187,034	0.274	4.735e+06
Total Assets	6,254	119,145	467,962	22.27	1.697e+07
Year	6,255	2016	2.512	2011	2019

Appendix C. The Procedure for Matching Treatment Firms with Control Firms

Panel A and B describe the propensity-score-matching process, where Panel A shows the results from estimating a logit regression to evaluate the probability of being a treatment firm in the pre-period 2014-2016. Each treatment firm is then matched to a control firm using nearest neighbor matching technique with no replacement and setting caliper to 0.1 standard error of the propensity score. Panel B assesses the comparability of the matching process, where T, C, U and M represent the treatment firms, control firms, before matching (Unmatched) and after matching (Matched), respectively. *, **, *** indicate significance at the 10%, 5%, and 1% levels (two-tailed), respectively.

Panel A: Logit model used to find propensity scores

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	ROA	Tobin's Q	P/B	Total Risk	Systematic Risk	Downside Risk
Firm Size	-0.1454***	-0.19053***	-0.142398***	-0.170763***	-0.170763***	-0.16963***
	(.031022)	(0.03345)	(0 .03109)	(0.034102)	(0.034102)	(0.034053)
Market Cap.	-1.14e-06***	-1.09e-06***	-1.19e-06***	-1.71e-06 ***	-1.71e-06***	-1.72e-06***
	(3.33e-07)	(3.44e-07)	(3.37e-07)	(4.46e-07)	(4.46e-07)	(4.47e-07)
Industry	-6.04e-08***	-5.76e-08***	-6.23e-08 ***	-4.20e-08 ***	-4.20e-08***	-4.26e-08***
	(1.20e-08)	(1.21e-08)	(1.21e-08)	(1.27e-08)	(1.27e-08)	(1.27e-08)
Observations	7,120	6,407	7,067	6,810	6,810	6,825
Pseudo R^2	0.0226	0.0278	0.0232	0.0276	0.0276	0.0276

Panel B: Test of the effectiveness of the propensity score matching

		ROA			Tobin's Q			P/B		
VARIABLES		T	C	Diff.	T	C	Diff.	T	C	Diff.
Firm size	U	10.00	10.45	-0.45***	10.00	10.45	-0.45***	10.00	10.45	-0.45***
	M	10.01	10.06	-0.05	10.08	10.14	-0.06	10.01	10.04	-0.03
Market Cap.	U	58,911	1.2e+05	-61,089***	58,911	1.2e+05	-61,089***	58,911	1.2e+05	-61,089***
	M	59,025	53,627	5,398	59,017	54,807	4,210	58,911	52,700	5,398
Industry	U	5.4e+07	5.4e+07	.***	5.4e+07	5.4e+07	.***	5.4e+07	5.4e+07	.***
	M	5.4e+07	5.4e+07	.	5.4e+07	5.4e+07	.	5.4e+07	5.4e+07	.

		Total Risk			Systematic Risk			Downside Risk		
VARIABLES		T	C	Diff.	T	C	Diff.	T	C	Diff.
Firm size	U	10.00	10.45	-0.45***	10.00	10.45	-0.45***	10.00	10.45	-0.45***
	M	9.94	9.96	-0.02	9.94	9.96	-0.02	9.94	10.00	-0.06
Market Cap.	U	58,911	1.2e+05	-61,089***	58,911	1.2e+05	-61,089***	58,911	1.2e+05	-61,089***
	M	51,981	48,720	3,261	51,981	48,720	3,261	51,864	57,507	5,643
Industry	U	5.4e+07	5.4e+07	.***	5.4e+07	5.4e+07	.***	5.4e+07	5.4e+07	.***
	M	5.4e+07	5.4e+07	.	5.4e+07	5.4e+07	.	5.4e+07	5.4e+07	.

Appendix D. Robustness Checks

Panel A-B show the results from the DiD regression analyses and alternative FEs combinations. Panel C-F show the results from the OLS regression analyses and alternative FEs combinations. Panel G shows the impact of mandatory non-financial disclosure on financial performance and firm-risk from the DiD regression analyses using the PSM samples and an alternative pre- and post-period, where the time period between 2011 and 2013 represents the pre-period and the time period between 2017 to 2019 represents the post-period. All coefficients are estimated using cluster-robust standard errors (at industry level) which are presented in the parentheses. Appendix A reports the definition of all variables. *, **, *** indicate significance at the 10%, 5%, and 1% levels (two-tailed), respectively.

Panel A: FINP DiD regression results with alternative FEs, PSM sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	ROA	ROA	ROA	Tobin's Q	Tobin's Q	Tobin's Q	P/B	P/B	P/B
Post	-1.387**	-2.552***	-1.377**	-0.146	-0.268	-0.151	0.0338	-0.0584	0.0357
	(0.593)	(0.950)	(0.592)	(0.106)	(0.172)	(0.105)	(0.517)	(0.799)	(0.517)
Treat. firms	-1.033	-1.171	0.137	-0.146	-0.165	0.573**	1.005	0.952	2.709***
	(0.860)	(0.875)	(1.352)	(0.136)	(0.137)	(0.244)	(0.676)	(0.664)	(0.901)
PostxTreat.f	**3.181*** **	**3.352*** **	**3.347*** **	**-0.0222**	**0.0179**	**0.0220**	**-1.679** **	**-1.610** **	**-1.582** **
	(0.901)	**(0.917)**	**(0.897)**	**(0.160)**	**(0.160)**	**(0.156)**	**(0.724)**	**(0.719)**	**(0.715)**
ESG Score	0.0333*	0.0339*	0.0326*	0.0100***	0.0103***	0.0106***	0.00489	0.00627	0.00603
	(0.0172)	(0.0173)	(0.0170)	(0.00237)	(0.00235)	(0.00236)	(0.0101)	(0.0101)	(0.0101)
Fin.Lev.	-7.961***	-7.909***	-7.902***	-1.707***	-1.675***	-1.540***	-3.381**	-3.356**	-3.076**
	(1.974)	(1.984)	(1.959)	(0.287)	(0.285)	(0.281)	(1.559)	(1.567)	(1.550)
Firm Size	0.641**	0.619*	0.635**	-0.332***	-0.341***	-0.343***	-0.217	-0.231	-0.243
	(0.316)	(0.319)	(0.316)	(0.0425)	(0.0425)	(0.0421)	(0.158)	(0.159)	(0.158)
Sys.Risk	-0.275	-0.224	-0.305	-0.101**	-0.0754	-0.113**	-0.192	-0.171	-0.228
	(0.374)	(0.389)	(0.373)	(0.0473)	(0.0476)	(0.0471)	(0.199)	(0.200)	(0.201)
Constant	-2.937	-1.851	-2.628	5.633***	5.778***	5.766***	5.479***	5.751***	5.817***
	(3.174)	(3.215)	(3.175)	(0.413)	(0.434)	(0.414)	(1.493)	(1.673)	(1.511)
Industry FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Year FE	**No**	**Yes**	**No**	**No**	**Yes**	**No**	**No**	**Yes**	**No**
Country FE	**No**	**No**	**Yes**	**No**	**No**	**Yes**	**No**	**No**	**Yes**
Observations	1,345	1,345	1,345	1,391	1,391	1,391	1,366	1,366	1,366
R-squared	0.112	0.114	0.120	0.298	0.303	0.319	0.079	0.082	0.089

Panel B: Firm-risk DiD regression results with alternative FEs, PSM sample

VARIABLES	(1) Total Risk	(2) Total Risk	(3) Total Risk	(4) Sys. Risk	(5) Sys. Risk	(6) Sys. Risk	(7) Down. Risk	(8) Down. Risk	(9) Down. Risk
Post	0.00600	0.0303***	0.00615*	0.208***	0.400***	0.207***	0.416***	1.424***	0.415***
	(0.00374)	(0.00499)	(0.00373)	(0.0497)	(0.0937)	(0.0498)	(0.158)	(0.277)	(0.157)
Treat. firms	-0.00455	-0.00333	-0.00309	0.483***	0.488***	0.591***	0.855***	1.008***	1.073***
	(0.00436)	(0.00424)	(0.00619)	(0.0721)	(0.0728)	(0.104)	(0.204)	(0.194)	(0.260)
PostxTreat.f	**-0.00505**	**-0.00834***	**-0.00423**	**-0.199****	**-0.240*****	**-0.191****	**-0.254**	**-0.393***	**-0.265**
	(0.00517)	**(0.00503)**	**(0.00512)**	**(0.0860)**	**(0.0858)**	**(0.0863)**	**(0.226)**	**(0.218)**	**(0.227)**
ESG Score	1.34e-05	-1.38e-05	-4.82e-06	0.000858	0.000522	0.000924	-0.00192	-0.00316	-0.00121
	(8.59e-05)	(8.49e-05)	(8.66e-05)	(0.00167)	(0.00164)	(0.00167)	(0.00344)	(0.00335)	(0.00345)
ROA	-0.00107***	-0.00102***	-0.00110***	-0.00542*	-0.00478	-0.00573*	-0.00603	-0.00478	-0.00618
	(0.000216)	(0.000214)	(0.000214)	(0.00329)	(0.00320)	(0.00330)	(0.00632)	(0.00616)	(0.00630)
Fin.Lev.	0.0314***	0.0310***	0.0310***	0.137	0.125	0.156	-0.321	-0.372	-0.268
	(0.00964)	(0.00946)	(0.00974)	(0.149)	(0.148)	(0.150)	(0.353)	(0.341)	(0.352)
Firm size	-0.00655***	-0.00541***	-0.00644***	-0.0556**	-0.0386	-0.0571**	0.00167	0.0213	-0.00514
	(0.00134)	(0.00133)	(0.00135)	(0.0248)	(0.0243)	(0.0247)	(0.0508)	(0.0506)	(0.0506)
Constant	0.153***	0.129***	0.153***	0.829***	0.676***	0.852***	0.189	-1.107*	0.233
	(0.0136)	(0.0138)	(0.0136)	(0.233)	(0.241)	(0.231)	(0.516)	(0.567)	(0.516)
Industry FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Year FE	**No**	**Yes**	**No**	**No**	**Yes**	**No**	**No**	**Yes**	**No**
Country FE	**No**	**No**	**Yes**	**No**	**No**	**Yes**	**No**	**No**	**Yes**
Observations	1,264	1,264	1,264	1,264	1,264	1,264	1,273	1,273	1,273
R-squared	0.172	0.217	0.177	0.067	0.105	0.069	0.054	0.109	0.058

Panel C: FINP OLS regression results with alternative FEs, ESG Score, final sample

VARIABLES	(1) ROA	(2) ROA	(3) ROA	(4) Tobin's Q	(5) Tobin's Q	(6) Tobin's Q	(7) P/B	(8) P/B	(9) P/B
ESG_{t-1}	**0.0956*** (0.0300)**	**0.0949*** (0.0301)**	**0.0885*** (0.0299)**	**0.0146*** (0.00409)**	**0.0148*** (0.00413)**	**0.0163*** (0.00416)**	**0.0199 (0.0150)**	**0.0232 (0.0149)**	**0.0225 (0.0152)**
Fin.Lev.	-8.720***	-8.900***	-9.079***	-3.415***	-3.425***	-3.021***	-7.776***	-7.862***	-7.108**
	(3.218)	(3.243)	(3.200)	(0.516)	(0.518)	(0.478)	(2.878)	(2.816)	(2.787)
Firm Size	-0.108	-0.0425	-0.121	-0.304***	-0.308***	-0.337***	-0.288	-0.322	-0.352
	(0.440)	(0.443)	(0.447)	(0.0794)	(0.0808)	(0.0800)	(0.248)	(0.255)	(0.256)
Sys.Risk	0.131	0.139	0.117	0.0130	0.0160	-0.0148	-0.0790	-0.0551	-0.142
	(0.462)	(0.462)	(0.459)	(0.0648)	(0.0663)	(0.0631)	(0.202)	(0.201)	(0.201)
Constant	-0.118	-0.256	1.435	4.855***	4.869***	5.791***	5.504**	8.231***	7.635***
	(5.493)	(5.527)	(5.522)	(0.830)	(0.870)	(0.927)	(2.251)	(2.841)	(2.603)
Industry FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Year FE	**No**	**Yes**	**No**	**No**	**Yes**	**No**	**No**	**Yes**	**No**
Country FE	**No**	**No**	**Yes**	**No**	**No**	**Yes**	**No**	**No**	**Yes**
Observations	503	503	503	497	497	497	503	503	503
R-squared	0.180	0.190	0.194	0.410	0.413	0.437	0.205	0.234	0.221

Panel D: FINP OLS regression results with alternative FEs, Separated ESG Score, final sample

VARIABLES	(1) ROA	(2) ROA	(3) ROA	(4) Tobin's Q	(5) Tobin's Q	(6) Tobin's Q	(7) P/B	(8) P/B	(9) P/B
ES_{t-1}	**-0.0127**	**-0.00589**	**-0.0138**	**0.00534**	**0.00465**	**0.00709****	**0.00342**	**-0.00252**	**0.00547**
	(0.0206)	**(0.0204)**	**(0.0221)**	**(0.00346)**	**(0.00352)**	**(0.00360)**	**(0.0133)**	**(0.0121)**	**(0.0139)**
SS_{t-1}	**0.139*****	**0.136*****	**0.136*****	**0.00997****	**0.0108****	**0.0110****	**0.0292***	**0.0389****	**0.0320****
	(0.0270)	**(0.0276)**	**(0.0275)**	**(0.00443)**	**(0.00450)**	**(0.00453)**	**(0.0157)**	**(0.0163)**	**(0.0159)**
GS_{t-1}	**-0.0355****	**-0.0401****	**-0.0369****	**-0.000979**	**-0.000758**	**-0.00167**	**-0.0156**	**-0.0152**	**-0.0171**
	(0.0178)	**(0.0181)**	**(0.0179)**	**(0.00359)**	**(0.00362)**	**(0.00352)**	**(0.0131)**	**(0.0137)**	**(0.0130)**
Fin.Lev.	-7.802**	-7.858**	-7.915**	-3.274***	-3.308***	-2.812***	-7.320**	-7.506***	-6.497**
	(3.248)	(3.271)	(3.266)	(0.518)	(0.521)	(0.487)	(2.940)	(2.848)	(2.866)
Firm Size	-0.374	-0.309	-0.393	-0.326***	-0.329***	-0.368***	-0.364	-0.404	-0.446*
	(0.424)	(0.427)	(0.439)	(0.0768)	(0.0785)	(0.0786)	(0.256)	(0.262)	(0.269)
Sys.Risk	0.206	0.218	0.177	0.0152	0.0187	-0.0153	-0.0636	-0.0313	-0.132
	(0.459)	(0.461)	(0.458)	(0.0658)	(0.0674)	(0.0641)	(0.204)	(0.201)	(0.203)
Constant	0.806	1.000	2.715	4.942***	4.961***	5.951***	5.810**	8.619***	8.121***
	(5.246)	(5.227)	(5.331)	(0.825)	(0.864)	(0.927)	(2.282)	(2.854)	(2.649)
Industry FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Year FE	**No**	**Yes**	**No**	**No**	**Yes**	**No**	**No**	**Yes**	**No**
Country FE	**No**	**No**	**Yes**	**No**	**No**	**Yes**	**No**	**No**	**Yes**
Observations	503	503	503	497	497	497	503	503	503
R-squared	0.219	0.228	0.231	0.415	0.418	0.445	0.214	0.245	0.231

Panel E: Firm-risk OLS regression results with alternative FEs, ESG Score, final sample

VARIABLES	(1) Total Risk	(2) Total Risk	(3) Total Risk	(4) Sys. Risk	(5) Sys. Risk	(6) Sys. Risk	(7) Down. Risk	(8) Down. Risk	(9) Down. Risk
ESG_{t-1}	**6.82e-06**	**-4.32e-09**	**1.13e-05**	**0.000877**	**0.000551**	**0.00168**	**0.00318**	**0.00191**	**0.00512**
	(0.000119)	**(0.000117)**	**(0.000121)**	**(0.00296)**	**(0.00297)**	**(0.00302)**	**(0.00610)**	**(0.00603)**	**(0.00616)**
ROA	6.52e-05	0.000102	6.15e-05	0.00151	0.00160	0.00135	0.000870	0.00178	0.000666
	(0.000293)	(0.000297)	(0.000293)	(0.00533)	(0.00533)	(0.00534)	(0.0115)	(0.0116)	(0.0115)
Firm Size	-0.00350*	-0.00306	-0.00357*	-0.00248	0.000841	-0.0124	0.0198	0.00147	-0.000157
	(0.00206)	(0.00199)	(0.00209)	(0.0447)	(0.0449)	(0.0441)	(0.0895)	(0.0889)	(0.0890)
Fin.Lev.	0.0438***	0.0442***	0.0444***	0.574*	0.574*	0.673**	-0.322	-0.240	-0.184
	(0.0146)	(0.0142)	(0.0153)	(0.306)	(0.304)	(0.313)	(0.635)	(0.624)	(0.633)
Constant	0.109***	0.0910***	0.111***	0.569	0.534	0.804*	0.808	0.391	1.118
	(0.0208)	(0.0204)	(0.0220)	(0.433)	(0.455)	(0.428)	(0.862)	(0.926)	(0.884)
Industry FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Year FE	**No**	**Yes**	**No**	**No**	**Yes**	**No**	**No**	**Yes**	**No**
Country FE	**No**	**No**	**Yes**	**No**	**No**	**Yes**	**No**	**No**	**Yes**
Observations	503	503	503	503	503	503	505	505	505
R-squared	0.084	0.123	0.084	0.027	0.039	0.036	0.019	0.056	0.028

Panel F: Firm-risk OLS regression results with alternative FEs, Separated ESG Score, final sample

VARIABLES	(1) Total Risk	(2) Total Risk	(3) Total Risk	(4) Sys. Risk	(5) Sys. Risk	(6) Sys. Risk	(7) Down. Risk	(8) Down. Risk	(9) Down. Risk
ES_{t-1}	**-0.000177**	**-0.000160**	**-0.000179**	**0.00223**	**0.00251**	**0.00292**	**-0.00388**	**-0.00408**	**-0.00144**
	(0.000110)	**(0.000111)**	**(0.000114)**	**(0.00264)**	**(0.00267)**	**(0.00272)**	**(0.00549)**	**(0.00574)**	**(0.00558)**
SS_{t-1}	**0.000354*** **	**0.000340** **	**0.000363*** **	**-0.00244**	**-0.00298**	**-0.00204**	**0.0112** **	**0.00907**	**0.0113** **
	(0.000134)	**(0.000132)**	**(0.000137)**	**(0.00291)**	**(0.00298)**	**(0.00285)**	**(0.00565)**	**(0.00596)**	**(0.00572)**
GS_{t-1}	**-0.000207** **	**-0.000216*** **	**-0.000209** **	**0.000957**	**0.000835**	**0.000744**	**-0.00387**	**-0.00266**	**-0.00445**
	(8.21e-05)	(8.16e-05)	(8.30e-05)	(0.00190)	(0.00192)	(0.00192)	(0.00406)	(0.00398)	(0.00409)
ROA	-8.28e-05	-4.61e-05	-8.94e-05	0.00247	0.00262	0.00214	-0.00334	-0.00146	-0.00374
	(0.000294)	(0.000297)	(0.000291)	(0.00556)	(0.00558)	(0.00557)	(0.0119)	(0.0120)	(0.0119)
Firm Size	-0.00413**	-0.00368*	-0.00424**	0.00196	0.00596	-0.0105	-0.00368	-0.0165	-0.0297
	(0.00209)	(0.00203)	(0.00212)	(0.0453)	(0.0453)	(0.0450)	(0.0914)	(0.0911)	(0.0914)
Fin.Lev	0.0450***	0.0456***	0.0463***	0.591*	0.597*	0.705**	-0.311	-0.256	-0.0996
Constant	0.111***	0.0948***	0.115***	0.556	0.504	0.798*	0.890	0.485	1.268
	(0.0208)	(0.0204)	(0.0218)	(0.435)	(0.455)	(0.433)	(0.872)	(0.937)	(0.902)
Industry FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Year FE	**No**	**Yes**	**No**	**No**	**Yes**	**No**	**No**	**Yes**	**No**
Country FE	**No**	**No**	**Yes**	**No**	**No**	**Yes**	**No**	**No**	**Yes**
Observations	503	503	503	503	503	503	505	505	505
R-squared	0.103	0.141	0.103	0.029	0.041	0.038	0.026	0.060	0.036

Panel G: Alternative pre- and post-period, FINP and Firm-risk DiD regression results, PSM sample

VARIABLES	(1) ROA	(2) Tobin's Q	(3) P/B	(4) Total Risk	(5) Systematic Risk	(6) Downside Risk
Post	-2.257**	-0.0111	1.187*	0.00185	0.0648	0.193
	(1.000)	(0.173)	(0.652)	(0.00627)	(0.0875)	(0.212)
Treatment firms	2.292*	0.0193	0.342	-0.0121*	0.320***	0.695***
	(1.307)	(0.211)	(0.682)	(0.00630)	(0.108)	(0.220)
Post x Treatment firms	**1.103**	**0.374** **	**0.768**	**0.000739**	**-0.0114**	**0.0167**
	(0.996)	**(0.171)**	**(0.688)**	**(0.00582)**	**(0.0914)**	**(0.188)**
ESG	0.0128	0.0102***	-0.00390	3.92e-05	0.00280*	-0.00302
	(0.0170)	(0.00247)	(0.00877)	(9.09e-05)	(0.00163)	(0.00305)
Financial Leverage	-8.118***	-1.407***	-3.989**	0.0239**	0.0576	-0.395
	(2.139)	(0.293)	(1.592)	(0.0102)	(0.163)	(0.349)
Firm Size	0.772**	-0.323***	-0.195	-0.00575***	-0.0585**	0.0177
	(0.331)	(0.0460)	(0.149)	(0.00143)	(0.0257)	(0.0487)
Systematic Risk	-0.505	-0.114**	-0.212			
	(0.420)	(0.0536)	(0.208)			
Return on Asset				-0.00108***	-0.00881**	0.00309
				(0.000223)	(0.00342)	(0.00638)
Constant	-1.096	5.411***	5.349***	0.166***	1.244***	0.209
	(3.569)	(0.476)	(1.573)	(0.0154)	(0.252)	(0.515)
Industry FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Year FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Country FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Observations	1,209	1,189	1,184	1,110	1,110	1,115
R-squared	0.121	0.306	0.104	0.218	0.110	0.057