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The role of ESG performance in firms' resilience during the COVID-19 pandemic: Evidence from Nordic firms☆

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ABSTRACT

Firms' corporate social responsibility and environmental sustainability issues have been documented to provide a competitive advantage that enhances financial performance, especially in tightened economic situations. Similarly, studies on countries' economic performance during the COVID-19 pandemic show a significant effect of movement restriction (lockdown) as a spread-containment strategy. This paper analyses the exogenous effect of lockdown on firm performance during the COVID-19 pandemic and the role of firms' sustainability in resilience to the pandemic. This study uses a difference-in-differences analysis on data of publicly listed Nordic firms, showing a positive and significant difference in revenue and profitability for firms listed in lockdown countries compared with those in the country without a lockdown. Further analysis shows that sustainability provides resilience for firms during the COVID-19 pandemic, as firms' environmental and social performances are positively related to revenue, profitability, and valuation. This finding supports the conclusion that customer and investor preferences enhance sustainable firms' performance.

1. Introduction

According to Maillard and Gonzalez (Maillard & Gonzalez, 2006), biodiversity loss results from human impact, which seriously threatens sustainable development and could lead to pandemics through epidemic outbreaks. As such, the COVID-19 pandemic has further stressed the importance of environmental sustainability in firms. Furthermore, as economies struggle to overcome the health crisis, the pandemic threatens the financial performance of firms through stiff economic conditions that affect earnings and stock returns. Financial crises have been the most studied disasters in the corporate social responsibility (CSR) literature on firm financial performance, the most recent being the global financial crisis (GFC) of 2008–2009. An example of such studies is Lins et al. (Lins, Servaes, & Tamayo, 2017), which shows that firms with high social capital could absorb the GFC shock better than those with low social capital as measured by the intensity of CSR. In contrast, the COVID-19 crisis differs from typical financial crises in that it caused an unexpected shock to the global stock market resulting from an economic lockdown. The shock is also mainly from health concerns,

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not economic conditions Albuquerque et al. (Albuquerque, Koskinen, Yang, & Zhang, 2020), indicating firms had little time to respond to the challenges of the crisis as it unfolded.

Recently, many studies on environmental, social, and governance (ESG) relationship with firm performance have focused on the relevance of firms' sustainability during the stock market crash during COVID-19 (Albuquerque et al. (Albuquerque et al., 2020); Broadstock et al. (Broadstock, Chan, Cheng, & Wang, 2021); Ferriani and Natoli (Ferriani & Natoli, 2021); Lööf et al. (Lööf, Sahamkhadam, & Stephan, 2022); Singh (Singh, 2020); Pástor and Vorsatz (Pástor & Vorsatz, 2020); Pavlova and de Boyrie (Pavlova & de Boyrie, 2022)). Often, the focus has been on the impact on the investment strategy based on ESG considerations. Other studies (Hwang et al. (Hwang, Kim, & Jung, 2021); Zhang et al. (Zhang, Wang, & Dong, 2022)) have considered the impact of the pandemic on the sustainability and financial performance of the firms. A third category of the studies has considered both stock and operating performance (Albuquerque et al. (Albuquerque et al., 2020)); however, the results of these studies have differed. For example, Singh (Singh, 2020), Albuquerque et al. (Albuquerque et al., 2020), and Pástor and Vorstaz (Pástor & Vorsatz, 2020), all find better performance for ESG strategy during the COVID-19 pandemic, whereas Demers et al. (Demers, Hendrikse, Joos, & Lev, 2020), Döttling and Kim (Döttling & Kim, 2022), and Pavlova and de Boyrie (Pavlova & de Boyrie, 2022) all document contrary evidence.

Overall, the mixed results are due to the nature of the crisis and the characteristic differences between countries. COVID-19 is a global health crisis, implying that it has a long-term impact on economic, political, environmental, and social conditions. The impact differs across countries as the approaches to tackle the crisis differ. As a result, studies (Ke and Hsiao (Ke & Hsiao, 2022)) have shown that specifics regarding containment strategies, such as movement restrictions (lockdown) and the number of cases (Hu and Zhang (Hu & Zhang, 2021)), should be taken into consideration. Similarly, firms may react differently to the health crisis. As a result, both country and company-level differences should be considered. This approach means that in the analysis of the effect of COVID-19 on firms' profitability and valuation, countries' economic response is as essential as firms' sustainability in understanding how firms navigate through the crisis and the relationship between ESG performance and firm performance.

This study focuses on the implication of movement restriction (lockdown) during the COVID-19 pandemic on firms' financial, nonfinancial, and sustainability performance using data on the Nordic countries. This data provides us with a unique opportunity (Lueg and Pesheva (Lueg & Pesheva, 2021)) to examine the differences in the economic shock in lockdown vs. no-lockdown situations from a cross-border perspective. This approach allows us to understand firms' resilience in times of crisis and examine the effect of the exogenous shock given varying economic, health, and social responses. This study considers the profitability measure (ROA) and valuation (Tobin's Q) to capture the present performance of firms during the crisis and the investment prospects for the future. Furthermore, the revenue (sales), as Wagenhofer (Wagenhofer, 2014) suggested, provides insights into understanding the sources of firm profitability and value generation during the period under study. Like Albuquerque et al. (Albuquerque et al., 2020), the environmental and social performance (E and S of ESG scores) of firms are the proxies for sustainability aimed at establishing the absorbing strength of "sustainable firms" to the COVID-19 pandemic. The experience of the GFCs has shown that crises pass, but the lessons remain and are essential tools for future planning. Furthermore, the progress recorded in firms' sustainability in the last decade is an incentive to provide helpful information for stakeholders on the relevance of sustainability for firms, also in times of crisis.

This study's results show a significant difference in firm revenue and profitability with the lockdown treatment during the COVID-19 pandemic. This finding implies that the shock of COVID-19 though severe, the impact on financial performance is not negative. The positive financial performance despite the lockdown treatment is explainable by the positive environmental and social performance of the firms. The analysis of sustainability impact on firm performance during the COVID crisis shows that the ESG performance of firms is positively related to revenue, profitability, and firm valuation. We compare ESG firms[1] and nonESG firms,[2] finding that the ESG firms were less profitable in the year of COVID-19 lockdown. Furthermore, the positive economically significant relationship between firms' environmental and social performance and profitability in the postlockdown COVID-19 year (2021) is an encouragement on the path to recovery for the firms. Contrarily, firm valuation positively relates to ESG performance during the lockdown and postlockdown years.

This study provides the following contributions. First, we focus on identifying the exogenous effect of the lockdown shock on economies brought about by COVID-19, which helps establish whether it significantly impacts a firm's financial and nonfinancial performance. Second, this study considers the impact of ESG on firm performance during the crisis (especially in the lockdown and postlockdown years), as earlier studies claiming resilience in sustainable firms suggest. Finally, this study's approach is unique in the opportunity the data provide as we can compare the performance of firms in countries with or without lockdowns to isolate the effect of sustainability on firm performance during the COVID-19 pandemic.

The rest of the article is organized as follows. Section 2 presents the literature review and hypothesis development, while the research design is discussed in Section 3. In Section 4, the main empirical results and additional considerations are presented and discussed with intuitions, while the final section presents the conclusions and offers suggestions for further research.

2. Literature review and hypothesis development

2.1. COVID-19 pandemic, the Nordic experience, and impact on firm performance

A market-wide financial crisis began in early 2020 due to a novel coronavirus pandemic, later named COVID-19, first identified in

[1] ESG firms are firms that have ESG score(s) in the Thomson Reuters Refinitiv database.

[2] NonESG firms are firms that have no ESG score(s) in the Thomson Reuters Refinitiv database.

Wuhan, China. The number of cases in Wuhan proliferated up to about 60,000 within a month and was transmitted across national borders by travelers who tested positive before China imposed a lockdown. Public-health experts moved to curtail the spread of the pandemic locally and internationally by imposing travel bans and movement restrictions (lockdown). To the world's surprise, Sweden, through the recommendation of her public-health experts, approached the pandemic unorthodoxly by allowing residents to decide whether to take precautions, such as using facemasks and restricting their movement (lockdown) for much of 2020.

According to Yarmol-Matusiak et al. (Yarmol-Matusiak, Cipriano, & Stranges, 2021), despite the healthcare infrastructure, population demographics, and economic similarities between four Nordic countries (Norway, Sweden, Finland, and Denmark), the health recommendation of the individual country governments, the intensity of the implementation, and public adherence to the recommendation resulted in different outcomes in each country. Sweden's approach suggested that only the vulnerable would prefer to stay home. At the same time, healthy people could continue with their economic activities with the possibility of having mild COVID-19 cases, leading to the collective immunity of the country's population and ensuring the economy did not suffer. Unfortunately, this approach was unsuccessful, as a report in the Insider on August 21, 2021, presented relative figures that showed higher COVID-19 per capita cases than the UK and Italy.[3] According to the same report, the COVID-19 deaths recorded is about 145 per 100,000 persons, 3 times higher than Denmark, 8 times higher than Finland, and almost 10 times higher than Norway.

The consequences of Sweden's approach are shown in the effect of the health crisis on the country, and the economic impact is obvious. Like most other countries, Sweden witnessed the largest quarterly fall in its history in 40 years, with the economy shrinking by 8.6% from April to June 2020, a figure higher than what is recorded by Denmark (7.4%), Norway (5.1%), and Finland (3.2%). Furthermore, Finland, Denmark, and Norway all witnessed a smaller rise in unemployment of around 1% point on average; however, Sweden recorded an unprecedented rise from 6.6% in March 2020 to 9.5% in March 2021[4] The rare opportunity to test the externality of economic shock through Sweden's different approach (no lockdown) contributes to the literature on firm performance in crisis, particularly in testing the resilience theory of sustainable firms in turbulent times. These statistics confirm the study by Yarmol-Matusiak et al. (Yarmol-Matusiak et al., 2021) conducted to verify infection, recovery, and mortality rates. The economic implication of COVID-19 is understandably different for Sweden, which had a less restrictive and slower implementation due to a higher incidence rate across all ages and especially a higher COVID-19 death rate. Like Ke and Hsiao (Ke & Hsiao, 2022), we know what happens to firm performance in countries that implement lockdowns. To understand what could happen without a lockdown, we can study the performance of firms in a country(s) with similar population demographics and economic and healthcare infrastructure. Therefore, following the economic decline witnessed in Sweden as a result of the no-lockdown decision, this study hypothesizes that.

Hypothesis 1 (H1a). Firms in lockdown countries have better financial performance than firms in no-lockdown countries during the COVID-19 pandemic.

The disruption caused to the global economy during the COVID-19 pandemic decreased profits and profitability for firms (Meirun et al. (Meirun, Lockey, Blenkinsopp, Yueyong, & Ling, 2022)); thus, a negative relationship exists between the COVID-19 pandemic and firm performance (Shen et al. (Shen, Fu, Pan, Yu, & Chen, 2020)). Thus, this begs the question of how firms in countries with a lockdown (potentially more tightened economic situation) would have better financial performance than firms in no-lockdown countries. Furthermore, the COVID-19 pandemic is a challenging period for businesses that engage in CSR (He and Harris (He & Harris, 2020)); firms struggle to balance protecting their business and stakeholders' interest Asante Antwi et al. (Asante Antwi, Zhou, Xu, & Mustafa, 2021). The pressure of balancing these interests may result in some firms prioritizing gains in the short term while reducing investment in CSR activities to survive turbulent times. This possibility is confirmed by the need for firms affected by disasters to reduce their investment in CSR to contain costs in the absence of slack resources Lee et al. (Lee, Singal, & Kang, 2013).

Nevertheless, the pandemic has presented businesses with a chance to transform their CSR initiatives and use them to tackle pressing environmental and social issues globally (He and Harris (He & Harris, 2020); Qiu et al. (Qiu, Jiang, Liu, Chen, & Yuan, 2021)). For example, companies have combated the COVID-19 spread by protecting their employees, customers, and communities despite intense financial pressure (Mao et al. (Mao, He, Morrison, & Andres Coca-Stefaniak, 2021)), and hotels around the world offered free rooms to medical staff and rooms for self-isolation at discount prices (Walker (Walker, 2020)). This study predicts that firms' activity in sustainability (measured in the E and S issues of ESG) and especially social performance is significantly different for countries with lockdowns from those without a lockdown. The resulting influence of such improved CSR performance explains the better financial performance of firms in lockdown countries, as Youn et al. (Youn, Song, Lee, & Kim, 2016) argued that positive CSR could lead to a higher valuation. Franco et al. (Franco, Caroli, Cappa, & Del Chiappa, 2020) also concluded that stakeholders reward companies with high CSR. Thus, the following hypothesis is proposed.

Hypothesis 1 (H1b). Firms in lockdown countries have better ES performance than firms in no-lockdown countries during the COVID-19 pandemic.

2.2. COVID-19 spread-containment and the impact on firm performance

Many studies on COVID-19 focused on the impact on the economy through the financial market, where stock market volatility

[3] The UK and Italy are in the top ten highest number of COVID-19 cases in the world according to the World Health Organization statistics (WHO) at the end of 2020.

[4] Statistics are available on individual countries' national databases on COVID-19 and the economy.

(Baek et al. (Baek, Mohanty, & Glambosky, 2020); Narayan et al. (Narayan, Phan, & Liu, 2021)), liquidity (Just and Echaust (Just & Echaust, 2020)), risks (Rizwan et al. (Rizwan, Ahmad, & Ashraf, 2020)), and returns (Narayan et al. (Narayan et al., 2021); Shen et al. (Shen et al., 2020)) have been researched (Hu and Zhang (Hu & Zhang, 2021)). Fewer studies have focused on the firm-level analysis of the real impact due to data limitations; the general opinion is that economic downturn and low firms' financial performance during the COVID-19 pandemic are due to obstruction in the supply chain, halted production and distribution (Hu and Zhang (Hu & Zhang, 2021); Ke and Hsiao (Ke & Hsiao, 2022)). Additionally, the lower disposable income of customers had an equal or more significant impact (Eichenbaum et al. (Eichenbaum, Rebelo, & Trabandt, 2021)). Many employees were laid off, and others had to cut pay; business owners, especially small and medium enterprises whose personal finance is still primarily connected to the company, have struggled with living expenses. The resulting lower disposable income leads to reduced revenue from sales and patronage in both product and service firms. Diewert and Fox (Diewert & Fox, 2020) concluded that the unprecedented nature of the COVID-19 pandemic, especially in lockdown countries, means that key economic indicators, such as the consumer price index, are challenging to construct and can only be done through continuous consumer expenditure surveys.

Similarly, in the face of the ongoing debate about the economic implication of different pandemic spread-containment strategies (Eichenbaum et al. (Eichenbaum et al., 2021; Eichenbaum, Rebelo, & Trabandt, 2022); Diewert and Fox (Diewert & Fox, 2020)), Ke and Hsiao (Ke & Hsiao, 2022) documented evidence of a counterfactual gross domestic product (GDP) growth rate during and outside of lockdown in China. They confirm that though the lockdown in Q1 of the year 2020 reduced the spread of COVID-19 in the country, the economic implication was severe, as would be seen in the quick general economic recovery (except for the slow transportation sector recovery) after the restriction in the movement was lifted in April of the same year.

The theory of customer preference explains the possible difference in firms' financial performance during COVID-19 Albuquerque et al. (Albuquerque et al., 2020). Albuquerque et al. (Albuquerque, Koskinen, & Zhang, 2019) discuss the customer preference theory around firm ESG activities as a product differentiation strategy, i.e., for firms with clear ESG policy, their product is set apart from others in choice available to customers (especially those keen on sustainability issues). The implication is that in customers' tightened economic situations, such as during the pandemic, ESG firms benefit through customer loyalty and the lower price elasticity of product demand. These firms have resiliency and better performance where COVID-19 shock affects consumer demands due to higher profit margins from the ability to charge higher prices. Thus, firms are incentivized to increase ESG performance during a crisis, especially where more stringent conditions like lockdowns, which could affect sales and revenue, are in place as a way of product differentiation, at the very least. Thus, this study proposes the following hypothesis:

Hypothesis 2 (H2a). Firms' environmental and social performance positively relates to firms' revenue and profitability during the COVID-19 pandemic.

Similarly, from the investor preference theory perspective, Renneboog et al. (Renneboog, Ter Horst, & Zhang, 2011) argues that sustainable and responsible investment (SRI) can explain the link between ESG and firm financial performance. Their argument aligns with studies in the SRI literature (Bollen (Bollen, 2007)) suggesting less sensitivity for investors who prefer ESG stocks in SRI funds' performance than conventional mutual funds' performance. This finding implies that the COVID-19 shock may affect an investor's attitude to risk, leading to some investors divesting their holdings; ESG investors can resist the pressure of selling compared to other stock investors. This study expects that firm valuation is enhanced with increased ESG performance during the COVID-19 pandemic as a result of accompanying shareholder's engagement from ESG disclosure that reduces agency costs and information asymmetry, thereby improving investors' trust (Cheng et al. (Cheng, Ioannou, & Serafeim, 2014)). Thus, the following hypothesis is proposed:

Hypothesis 2 (H2b). Firms' environmental and social performance positively relates to firms' valuation during the COVID-19 pandemic.

3. Research design

3.1. Data

This study uses both the financial and ESG rating data of publicly listed firms on a Nordic (Finland, Sweden, Norway, Denmark, and Iceland) stock exchange downloaded from the Thomson Reuters Eikon database on November 19, 2021,[5] from 2017 to 2021. The significance of sustainability in company practices goes beyond the size and status of a firm. To this end, this study ensured that all publicly listed firms during the sample period in the region are covered by including leading stock exchanges (Nasdaq Helsinki Ltd., Nasdaq Stockholm AB, Nasdaq Copenhagen A/S operated exchanges in Finland, Sweden, and Denmark respectively, and the Oslo Børs ASA in Norway) as well the multilateral trading facilities (MTF).[6] Overall, 1775 Nordic firms are in the sample, and 530 (69 in Finland, 7 in Iceland, 103 in Norway, 84 in Denmark, and 267 in Sweden) firms[7] have ESG data for the period.

[5] Updated in June 2022 to include 2021 firm financial and ESG data to examine the postlockdown COVID years performance of firms.

[6] The MTFs are commonly used by growth companies in their early stages of growth and develop. They are First North Sweden, First North Finland, and Nordic SME.

[7] Models were re-estimated with banks and Insurance firms excluded for robustness and the results are similar.

3.2. Empirical design

To study the effect of the economic shock imposed by the lockdown, this study compares the treatment effect of the COVID-19 spread measure, i.e., restricted movement on firms in countries (Finland, Denmark, Norway, and Iceland) that imposed lockdowns during the COVID-19 year with a country (Sweden) that had no defined restriction in movement.[8] Sales is the revenue measure, and return on assets measures firms' profitability during the pandemic. This study focuses on the environmental (E) and social (S) pillar scores of ESG and derives a combined score ES, the equally weighted average score for the environmental and social pillars. These pillar scores are the two expected to be relevant to the COVID-19 period resilience of sustainable firms Albuquerque et al. (Albuquerque et al., 2020). The focus on these two pillars also avoids capturing the governance effect. This effect stems from the fact that the governance score is based on the relative performance and materiality of ESG factors at the country level, unlike the environmental and social scores based within the firm sector. Firm performance during the COVID-19 pandemic years is measured using revenue (sales), profitability (ROA), and valuation (Tobin's Q). These variables have been widely used as measures of firm performance in earlier studies, Sales (Armstrong et al. (Armstrong, Davila, Foster, & Hand, 2011); Wagenhofer (Wagenhofer, 2014)), ROA (Fatemi et al. (Fatemi, Glaum, & Kaiser, 2018); Velte (Velte, 2017)), and Tobin's Q (Ahsan and Qureshi (Ahsan & Qureshi, 2021); Tang et al. (Tang, Chiara, & Taylor, 2012)).

As controls for firm-level differences, this study employs the natural logarithm of total assets as a measure of firm size (Buallay (Buallay, 2019)) and the debt-to-equity ratio as a measure of firm leverage (Grewal et al. (Grewal, Chakravarty, Ding, & Liechty, 2008)). The cash and short-term investments over total assets are used to capture firms' cash holding, and property, plant, and equipment over total assets represent firm tangibility (Hu and Zhang (Hu & Zhang, 2021)). To ensure the country effect is not in play in our analysis, we include GDP growth to isolate the externality of the shock to the economy during the period under study (Buallay (Buallay, 2019)).

In the difference-in-difference regressions, the treatment effect test of lockdown on firm financial performance, valuation, and sustainability in crisis is carried out as below:

$$FirmPerformance_{it} = \beta_0 + \beta_1 LDtreatment_{it} + \beta_2 LockdownYR_t + \beta_3 LDtreatment_{it} \times LockdownYR_t + \gamma Controls_{it} + \delta_{it} + \varepsilon_{it} \quad (1)$$

Firm performance proxies with *ROA* (a profitability measure), i.e., a company's net income during a particular year over the book value of assets (equity and debt) at the end of the year, *LnSales* (as a measure of firm revenue), i.e., natural logarithm of firm sales during the year, or sustainability measures (the *ES* score, *E*, and *S* pillar scores). *LDtreatment* is a dummy variable that equals one for firm *i* if its listing location is in any of the countries that imposed lockdown during year *t* and zero otherwise. $LockdownYR_t$ is a dummy that equals one if there is any form of movement restriction in the country during that year of COVID-19 (in this study 2020) and zero otherwise. *Firm Size* is the natural logarithm of the book value of total assets of firm *i* at time *t*. *Leverage* is total debt divided by total equity in percentage *i* at time *t*. *Cash Holding* is cash and short-term investments over total assets in percentage *i* at time *t* and *Tangibility* is tangible assets (property, plant, and equipment) over total assets in percentage *i* at time *t*. *GDP growth* is a country-level control to capture the economic performance in the country where the company is domiciled. Regressions with or without industry-fixed and country-fixed effects are used in different models.

Next, this study considers the revenue, profitability, and valuation of ESG firms during COVID-19 to confirm the customer and investor preference theory that has been said to benefit socially responsible businesses in the literature. These sets of the regression model are described in the following:

$$FirmPerformance_{it} = \beta + \beta_1 ES_i + \beta_2 ES_{it} \times COVIDYR_t + \gamma Controls_{it} + \delta_{it} + \varepsilon_{it} \quad (2)$$

where firm performance is *Sales*, *ROA*, or *Tobin's Q* (the market valuation of a company divided by its assets' replacement cost, where replacement costs have typically been proxied by equity book value plus the liabilities book value) as the dependent variables in the different models. β is the common constant, and ES_i is the equally weighted average score for the environmental and social pillars for firm *i* in the year *t*. Pillar scores analysis is done using the ESG's sub-category scores by replacing the ES score with a pillar score for environmental E_t and social S_t, $COVIDYR_t$ is a dummy that equals one if the year is a year of COVID-19 (in this study 2020 and 2021) and zero otherwise, other variables in the models are as defined earlier. In the additional model, this study examines ESG firms' performance in crisis by considering if it differs significantly from non-ESG firms (i.e., firms without ESG scores), which is an interaction between $ESFirms_{it}$ dummy (1 if a firm has ESG ratings at time *t* and zero otherwise) and CovidYears dummy. All explanatory variables are lagged by one year except in analysis considering the contemporaneous effect of ES performance of firms during the COVID-19 pandemic.

Firms' ESG performance could be due to several reasons, including country policy, which would mean that before the COVID-19 pandemic, firms' performance differed across borders due to economic and social characteristics and interests. To this effect, the role of the ESG performance of firms and lockdown containment approach on firm sales, profitability, and valuation is explored. The model is based on eq. (2) but with the addition of the interaction term $ES_i \times CountryTreated$, where *CountryTreated* is a dummy variable that is equal to 1 if a firm is in any of the countries that had lockdown treatment during the year 2020 or zero otherwise. The model is re-estimated by replacing ES_i with the E_i and S_i pillar scores.

[8] Lockdown in this study is not considering the time of year or how long or the stringency of enforcing it. ESG performance and financial performance are typically reported as an aggregate of activities during the year for which obstruction like lockdown would have an effect in any case.

Finally, the impact of the lockdown on the financial performance and valuation of firms is considered by evaluating the post-lockdown ESG scores' effect on firm performance. The analysis is done on the 2020 and 2021 subsample periods in which a dummy variable *PostLockdownYear* is 1 for observations in 2021 and 0 for 2020 observations.

4. Empirical results

4.1. Descriptive statistics

Table 1 shows the summary statistics and the covariance matrix for the variables in this study. As shown in panel A, the ES score is 47.14 on average, with the environmental and social pillar scores having an average of 42.61 and 51.52, respectively. Comparable mean and standard deviation statistics of ESG firms only are provided in the last two columns with asterisks (*). The most notable difference from the overall sample is the positive and higher average return on assets of the ESG firms. Panel B presents the correlation coefficients of all continuous variables. The ES score and individual pillar scores' correlation with return on assets (a measure of profitability) are positive, while a negative correlation exists between these variables and Tobin's Q (a valuation measure). Most variables have less than a 0.90 Pearson correlation coefficient except for the correlation of the environmental and social scores with the weighted average ES scores. This result shows no multicollinearity between variables Hair et al. (Hair, Black, Babin, Anderson, & Tatham, 2006).

To show the performance of firms over time, especially during the COVID-19 years in the sample, we plot a graph of the equally weighted average of the E and S scores (i.e., ES scores) for firms in different countries. Fig. 1 shows that overall, the ES[9] performance of firms has been declining for firms in most of these countries except Denmark. There was even deeper performance between 2019 and 2020; however, the graph shows a slight upward (or less steep) improvement in 2021 (when most companies were recovering from the shock of COVID-19).

4.2. The treatment effect of lockdown on firm performance

As a baseline analysis, the differences/similarities in the firms' environmental, social, and financial performance between the treatment and control groups are considered to ensure a valid setting for a difference-in-difference (DiD) analysis. Table 2 presents the result of a sample *t*-test comparing the performance of firms in the treatment and control group for the whole sample period 2017 to 2021 and the pre-event (COVID-19) period, i.e., 2017 to 2019. The result shows that significant differences exist on average across firms' environmental, social, and financial performance, especially in revenue and profitability; however, the important factor relevant for the subsequent analysis of the treatment and control group is the observable pattern in the difference in the whole sample and the preCOVID sample. This pattern shows that firms in both groups have a similar trend in and out of the sample. The result shows that the control group, on average, is not necessarily less performing before the COVID-19 event, which is evident in the average profitability of control group firms.

Furthermore, pre-parallel trend analysis ascertaining a relatively constant difference between the treatment and control group is shown in Figs. 2 to 5 The trend across the revenue, profitability, environmental, and social performance for both treatment and control groups are approximately parallel before the event of COVID-19, suggesting that the pre-treatment trends are relatively similar, which supports the parallel trends assumption. In other words, the observation supports the parallel trends assumption, a fundamental premise in DiD analysis. This finding strengthens the validity of the DiD methodology employed to assess the impact of the treatment effect of lockdown during COVID-19 on the financial, environmental, and social performance outcomes.

Thus, the above tests provide a good setup to test the effect of the external shock (lockdown) on the revenue, profitability, and sustainability performance of firms during COVID-19 using the DiD approach to separate treated firms (i.e., firms in countries that had lockdown during 2020) from untreated firms (i.e., firms in Sweden without any pronounced lockdown during 2020).

The results in Table 3 show a significant difference in firm revenue in countries with lockdown and those without a lockdown during the COVID year 2020 in models with or without industry controls. The treatment effect impacts firm revenue from sales during the lockdown, indicating that despite restriction of movement that may lead to fewer sales (revenue) due to lower patronage, especially for firms in industries that require physical presence (e.g., leisure and airlines), customer loyalty as the customer preference suggests may override the inability of customers to patronize their preferred businesses (sustainable firms) as often. Similarly, Models 3 and 4 consider the difference in firms' profitability in countries with and without lockdowns during the pandemic, showing a significant difference between firms in countries with and without lockdowns.

The economic significance lies in the resilience firms demonstrate in the face of adversity. Despite lockdown-induced operational challenges, firms that have managed to maintain or even improve their revenue and profitability profiles in the COVID-19 year are likely to possess valuable qualities, such as effective adaptation strategies, strong customer loyalty, or unique market positioning. This outcome does inform the necessity to examine how the sustainability performance of firms differs with the treatment during COVID-19.

Table 4 presents firms' ES performance differences in lockdown and no-lockdown countries during COVID-19. The intuition is to examine if, as pointed out by He and Harris (He & Harris, 2020), firms are using the pandemic to address important ES issues through

[9] The graph is not different when the governance score is included in the ESG performance plot.

Table 1
Sample descriptive statistics and correlation matrix.

Panel A: Descriptive Statistics

	N	Mean	St.dev.	Min	Median	Max	Mean*	St. Dev.*
ES	1699	47.144	23.949	0.458	47.000	95.000	47.144	23.949
Env	1693	42.612	27.271	0.000	40.655	98.480	42.612	27.271
Soc	1724	51.521	23.667	0.600	53.115	95.954	51.521	23.667
Ln(Tobin's Q)	5304	1.032	1.226	−5.528	0.670	12.730	0.682	0.798
ROA	5279	_ 0.114	0.575	−31.527	0.011	1.562	0.037	0.155
Firm Size	5769	18.275	2.768	7.754	18.173	27.089	20.866	2.080
Leverage	2571	0.012	0.227	−1.743	0.003	10.985	0.018	0.300
Cash Holding	2821	13.719	718.635	−0.019	0.097	38,169.090	0.146	0.201
Tangibility	3006	0.731	30.266	0.000	0.087	1659.526	0.201	0.218
LnSales	5124	17.277	3.250	−0.015	17.644	25.450	19.984	2.216

Panel B: Pearson correlation matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)ES									
(2)Env	0.948 ***								
(3)Soc	0.930 ***	0.765 ***							
(4)Ln(Tobin's Q)	−0.216***	−0.226***	−0.184***						
(5)ROA	0.182***	0.158***	0.182***	−0.189***					
(6)FirmSize	0.634 ***	0.620 **	0.572 ***	−0.525***	0.358 ***				
(7)Leverage	0.002	−0.012	0.020	−0.027	−0.026	0.015			
(8)CashHolding	−0.259 ***	−0.258 **	−0.237 ***	0.398 **	−0.370 ***	−0.099 ***	−0.008		
(9)Tangibility	0.181 ***	0.202 **	0.134 ***	−0.219 ***	0.069 ***	−0.091 ***	0.051 **	0.021 ***	
(10)LnSales	0.679 **	0.637 **	0.642 ***	−0.497 *	0.523 ***	0.853 ***	0.004	−0.447	0.250 ***

This table shows the descriptive statistics (Number of observations, mean, standard deviation maximum, and minimum), mean and standard deviation of ESG firms in the columns with an asterisk (*) and the Pearson correlation matrix of sustainability variables: environmental, social, as well as the average of the environmental and social scores combined and the financial variables: Return on assets (ROA), Tobin's Q, Size (natural log of total assets), leverage, cash holding, tangibility, and LnSales (Revenue).

more investment in related issues. The result of the DiD analysis on the treatment effect of lockdown on the equally weighted average of the environmental and social pillar scores (ES) shows a significant difference in sustainability performance (captured in ES scores) of firms in countries with lockdown and those in countries without lockdown. The Model is re-estimated to include industrial control to avoid the influence of industry differences, and the same evidence is found (as shown in model 2). In Models 3 to 6, similar analyses with and without industry control are conducted on the environmental and social pillar scores of ESG. The result shows that the environmental and social pillar of ESG differs significantly for firms in countries with lockdown compared with firms in Sweden without any defined movement restriction during the year. These Models are estimated with firm and year-fixed effects to avoid the influence of unobserved heterogeneity in firm revenue and profitability.

The economic significance of these results is even more important, indicating that firms have seemingly recognized the unique circumstances presented by the pandemic as an opportunity to intensify their efforts in addressing critical ES issues. Even during a crisis, this proactive approach to ESG dimensions underscores the growing importance of CSR and environmental stewardship.

4.3. Role of sustainability in firm performance during a crisis

This study estimates the interaction effect of the E and S scores and COVID-19 on firm sales to understand the link between firms' environmental (E) and social (s) performance and the revenue from sales during the COVID-19 pandemic. The result is presented in Table 5. As visible in Models 1 to 6, there is a positive and significant influence on firms' E and S performance during and before the COVID-19 pandemic. This finding implies that firms are encouraged to strive for a more sustainable approach to operations and related issues even under stringent economic conditions. A closer look at the impact of ESG score relevance is presented in Model 7. This study tests the difference between firms with ESG and those without ESG scores' revenue generation during the COVID-19 pandemic. The result shows that ESG scores are associated with significantly higher revenue during the pandemic. The economic significance of these findings is substantial as it presents how firms that have actively incorporated ESG considerations into their business strategies contribute to broader sustainability and societal goals and enhance their financial resilience. The positive relationship between ESG performance and revenue during the pandemic underscores the value of embracing sustainability as a competitive advantage.

Next, a similar analysis as in Table 6 is carried out on firm profitability to ascertain if increased revenue generation associated with ESG scores translates to profit and profitability. The result of this examination is presented in Table 5. The equally weighted average environmental and social (ES) score is positively related to firm profitability in Models 1 and 2 with industry or country-fixed effects. Models 3 to 6 estimating the pillar scores (ES) show similar relations. In Model 7, a comparison of ESG and nonESG firms shows that ESG firms have higher financial performance when compared with nonESG firms during the COVID-19 years. The economic

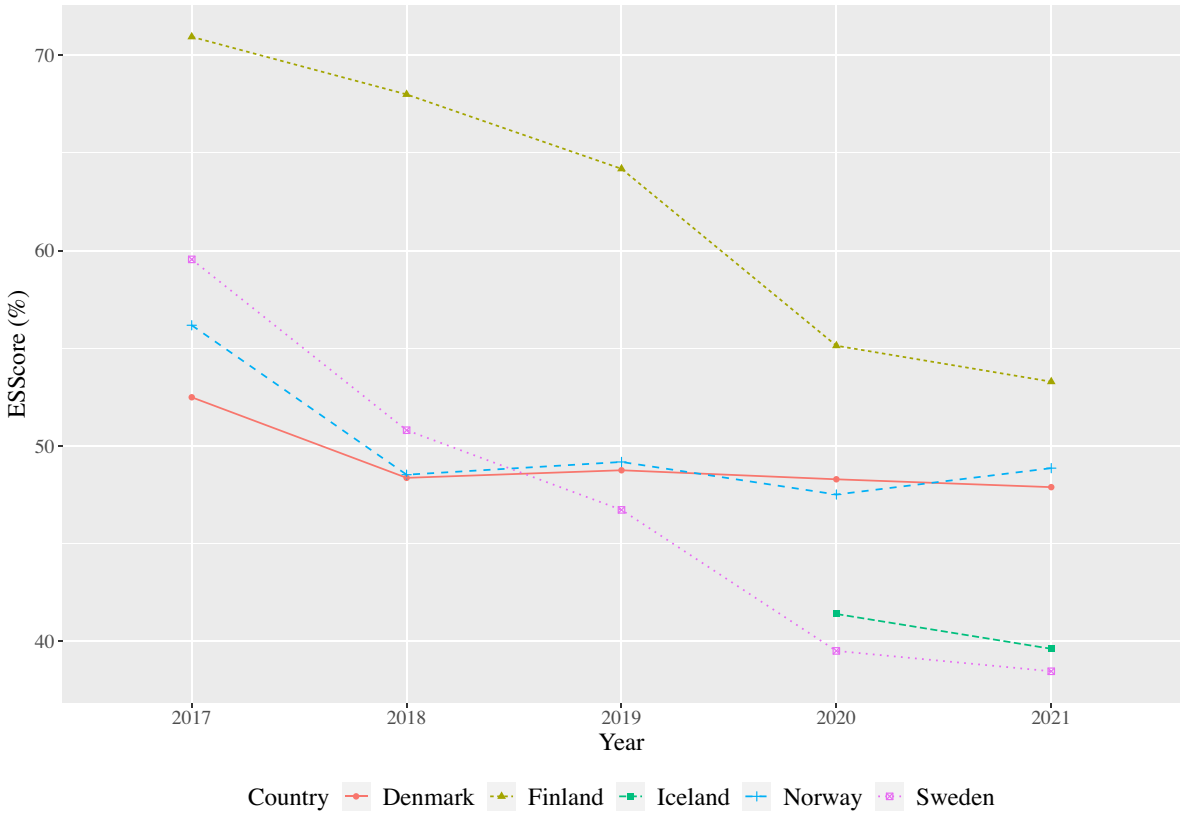

Fig. 1. ES Score performance of firms by country 2017–2021.

Table 2
Test of difference/similarity between treatment and control group.

	Full-Sample 2017–2021			Pre-COVID Sample 2017–2019		
	Treatment	Control	Diff in means (1)–(2)	Treatment	Control	Diff in means (4)–(5)
	(1)	(2)	(3)	(4)	(5)	(6)
N.of Obs.	597	572		340	317	
ES	57.30	51.00	6.30***	58.30	52.80	5.50***
			(4.86)			(3.23)
Env	53.40	45.70	7.70***	54.40	47.20	7.20***
			(5.15)			(3.60)
Soc	61.20	56.40	4.80***	62.10	58.40	3.70*
			(3.76)			(2.25)
ROA	0.055	0.059	−0.004	0.059	0.073	−0.014*
			(−0.63)			(−1.83)
Firm_Size	21.40	21.10	0.30***	21.70	21.30	0.40***
			(3.72)			(3.21)
Leverage	0.03	0.007	0.037	0.045	0.005	0.04
			(1.20)			(1.20)
Tangibility	0.29	0.16	0.13***	0.302	0.154	0.148***
			(11.10)			(9.49)
CashHolding	0.111	0.113	−0.002	0.102	0.092	0.01
			(−0.197)			(1.15)
LnSales	21.10	20.40	0.70***	21.30	20.80	0.50***
			(6.17)			(4.52)

This table shows the difference in means t-test of the treated (lockdown) group and the control (no-lockdown) group. ES is the equal-weighted average score of the environmental (Env) and social pillars (Soc), and Env and Soc are the respective pillars. ROA is net income over the total assets of the firm, Firm_Size is the natural logarithm of total assets, Leverage is the debt-to-equity ratio, Tangibility is the plant, property, and equipment scaled by total assets, CashHolding is the value of cash and short-term investment scaled by total assets, and LnSales is the natural logarithm of sales.

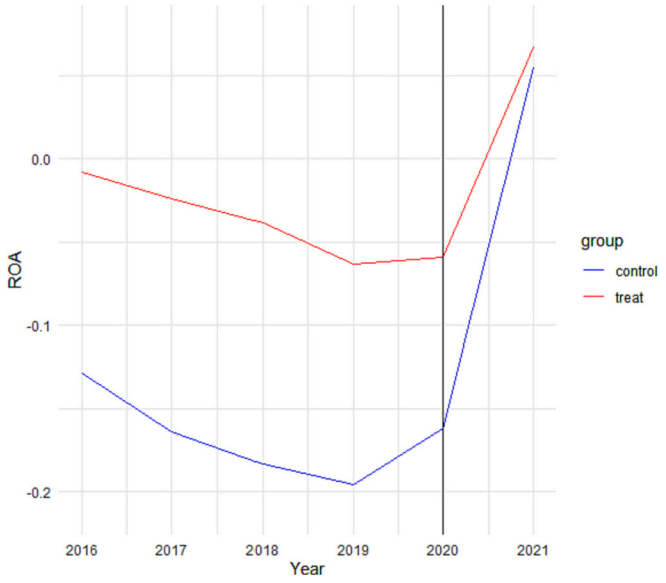

Fig. 2. Parallel trend for firm profitability.
Parallel trend analysis for treatment and control group.

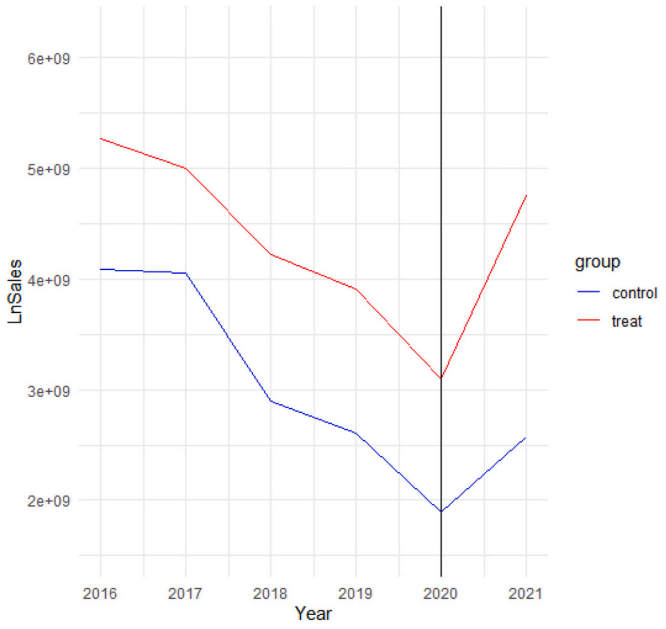

Fig. 3. Parallel trend for firm revenue.
Parallel trend analysis for treatment and control group.

implications of these findings are profound. Firms that prioritize and excel in ES responsibility contribute positively to society and the environment and reap tangible financial rewards. The positive correlation between ES performance and profitability suggests that businesses that embrace sustainability and social responsibility tend to be more resilient and adaptive during turbulent times.

A repeat of similar analyses using the measure of firm valuation (Tobin's Q) is done. Table 7 shows that sustainability (in both pillar scores and the weighted average, ES scores) positively enhances firm valuation during the COVID-19 pandemic. Our result suggests that in times of market uncertainty, this nonfinancial performance measure, i.e., ESG, provides stakeholders with a useful tool for informed decisions. The positive association between ESG and firm valuation implies that investors and market participants increasingly recognize the significance of sustainability and social responsibility as indicators of a firm's long-term value and resilience. Furthermore, as shown in Model 7, comparing ESG and nonESG firm valuation during COVID-19 shows that ESG ratings

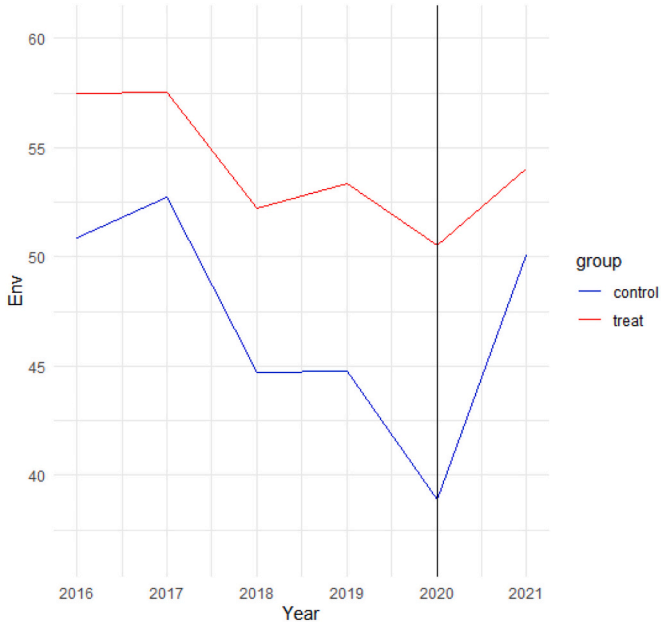

Fig. 4. Parallel trend for environmental score.
Parallel trend analysis for treatment and control group.

Fig. 5. Parallel trend for social score.
Parallel trend analysis for treatment and control group.

improve the valuation of the firms with environmental and social performance. This finding accentuates the economic significance of ESG ratings and their potential to enhance a firm's market perception and attractiveness. ESG-rated firms are better positioned to weather market disruptions and benefit from enhanced market valuation, which can have cascading effects on their access to capital, investor interest, and overall competitiveness.

4.4. Test of robustness and additional consideration

As an additional analysis, we examine the relationship between the ES scores and the performance of firms in the countries with and

Table 3
Firm revenue and profitability in lockdown vs. no-lockdown countries.

	LnSales		ROA	
	(1)	(2)	(3)	(4)
Lockdown× CovidYears	0.303***	0.142*	0.024*	0.012
	(0.115)	(0.075)	(0.013)	(0.013)
Lockdown	0.107	0.112**	−0.009	0.002
	(0.079)	(0.057)	(0.009)	(0.010)
Firm Size	0.821***	0.952***	−0.001	0.001
	(0.018)	(0.014)	(0.002)	(0.002)
Leverage	−0.089	−0.010	−0.044***	−0.026***
	(0.083)	(0.056)	(0.010)	(0.010)
Cash Holding	−0.522***	−0.277**	−0.126***	−0.131***
	(0.178)	(0.131)	(0.021)	(0.022)
Tangibility	0.381***	−0.084	−0.066***	−0.052**
	(0.142)	(0.146)	(0.016)	(0.025)
GDP Growth	3.046***	1.794***	0.331***	0.148
	(0.937)	(0.621)	(0.108)	(0.107)
Industry control	No	Yes	No	Yes
Firm FE	Yes	No	Yes	No
Year FE	Yes	Yes	Yes	Yes
Observations	1169	1169	1169	1169
Adjusted R^2	0.690	0.874	0.062	0.149

This table shows the results of a DiD analysis on firm revenue and profitability in countries during the COVID-19 pandemic with the lockdown treatment effect. This analysis is done using the whole sample period between 2017 and 2021 with 2020 as the treatment (i.e., lockdown) year. LnSales is the revenue the firm generates from sales in a year, and ROA is net income over the firm's total assets. Lockdown is a treatment dummy that takes one if a firm belongs to one of the countries that had a lockdown during the COVID-19 year 2020 and zero otherwise. CovidYears is a time dummy that takes 1 for the year there was a lockdown (2020) and zeros otherwise. Lockdown×CovidYears is the interaction diff-in-diff analysis that shows the treatment effect. Firm Size is the natural logarithm of the book value of a firm's total assets. Leverage is the debt-to-equity ratio of the firm. Cash Holding is the ratio of cash and short-term investments to total assets in percentage, Tangibility is tangible assets (property, plant, and equipment) over total assets in percentage, and GDP growth is a country's GDP change. The last rows include the industry control, Firm and Year-fixed effects, the number of observations in the models estimated, and adjusted R^2. Firm-level clustered standard errors are given in parentheses, and *** (**, *) denotes significance at the 1% (5%, 10%) level (two-sided test).

Table 4
Firms' ES performance during the COVID-19 crisis.

	ES		Env		Soc	
Lockdown×CovidYears	0.040*	0.035**	0.040	0.037*	0.040*	0.033*
	(0.021)	(0.017)	(0.025)	(0.021)	(0.022)	(0.019)
Lockdown	0.003	−0.0002	0.007	0.002	−0.0001	−0.002
	(0.014)	(0.013)	(0.017)	(0.016)	(0.015)	(0.014)
Firm Size	0.083***	0.094***	0.090***	0.096***	0.076***	0.092***
	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)	(0.004)
Leverage	0.008	0.0002	−0.008	−0.008	0.024	0.008
	(0.015)	(0.013)	(0.018)	(0.016)	(0.016)	(0.014)
Cash Holding	0.049	0.018	0.031	0.006	0.067**	0.031
	(0.032)	(0.030)	(0.039)	(0.036)	(0.034)	(0.033)
Tangibility	0.050*	0.031	0.120***	0.045	−0.019	0.017
	(0.026)	(0.034)	(0.031)	(0.040)	(0.027)	(0.037)
GDP Growth	0.511***	0.396***	0.568***	0.469***	0.454**	0.322**
	(0.170)	(0.143)	(0.204)	(0.171)	(0.177)	(0.157)
Industr control	No	Yes	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1169	1169	1169	1169	1169	1169
Adjusted R^2	0.391	0.601	0.361	0.584	0.315	0.502

This table shows the results of a DiD analysis considering the impact of lockdown on a firm's ES performance. This analysis is done using the whole sample period between 2017 and 2021 with 2020 as the treatment (i.e., lockdown) year. ES is the equally weighted average environmental (Env) and social pillars (Soc) score. Lockdown is a treatment dummy that takes one if a firm belongs to one of the countries that had a lockdown during the COVID-19 year 2020 and zero otherwise. CovidYears is a time dummy that takes 1 for the year there was a lockdown (2020) and zero otherwise. Lockdown × CovidYears is the interaction diff-in-diff analysis that shows the treatment effect. Firm Size is the natural logarithm of the book value of a firm's total assets. Leverage is the debt-to-equity ratio of the firm. Cash Holding is cash and short-term investment over total assets in percentage. Tangibility is tangible assets (property, plant, and equipment) over total assets in percentage, and GDP growth is a country's GDP change. The last rows include the industry control, Firm and Year-fixed effects, the number of observations in the models estimated, and adjusted R^2. Firm-level clustered standard errors are given in parentheses, and *** (**, *) denotes significance at the 1% (5%, 10%) level (two-sided test).

Table 5
ESG performance impact on firm revenue during the COVID-19 pandemic.

	LnSales						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ES_1	0.539***	0.439**					
	(0.199)	(0.199)					
Env_1			0.525***	0.443***			
			(0.165)	(0.166)			
Soc_1					0.135	0.074	
					(0.190)	(0.189)	
ESGFirm							0.036
							(0.035)
CovidYears							0.019
							(0.050)
ES_1 × CovidYears	0.512**	0.485*					
	(0.205)	(0.254)					
Env_1 × CovidYears			0.340*	0.322*			
			(0.175)	(0.174)			
Soc_1 × CovidYears					0.681***	0.634***	
					(0.210)	(0.209)	
ESGFirm×CovidYears							0.121**
							(0.057)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	No	No	Yes	No	Yes	Yes
Country FE	No	Yes	Yes	No	Yes	No	No
Observations	932	932	932	932	940	940	2196
Adjusted R^2	0.850	0.852	0.849	0.851	0.844	0.847	0.705

This table shows the model estimation results of firms' ES performance relationship with sales during the COVID-19 pandemic. LnSales is the natural logarithm of total sales of a firm i in year t. The main explanatory variables are the individual pillar scores (environmental and social) of ESG, and ES is the equally weighted average score for the environmental and social pillars. The Env, Soc, and ES coefficients are scaled up by 100 for reporting. ESGFirm is a dummy that is one if a firm has an ESG score during the period in our sample or zeros otherwise. CovidYears is a dummy variable that takes 1 for COVID-19 years 2020 and 2021 and zeros otherwise. The control variables: Firm Size is the natural logarithm of the book value of a firm's total assets, and Leverage is the firm's debt-to-equity ratio. Cash Holding is cash and short-term investment over total assets in percentage. Tangibility is tangible assets (property, plant, and equipment) over total assets in percentage, and GDP growth is a country's GDP change. All explanatory variables are lagged by one year. This analysis uses the sample period between 2017 and 2021, with 2020 and 2021 as the COVID-19 years. The last rows include the fixed effects, the number of observations in the models estimated, and adjusted R^2. Country and firm-level clustered standard errors are given in parentheses, and *** (**, *) denotes significance at the 1% (5%, 10%) level (two-sided test).

without lockdown. The aim is to isolate the impact of the lockdown, and the results of this analysis are presented in Table 8.

Although statistically insignificant, the economic significance of the result shows that the weighted average of ES scores) and social pillar scores of firms in countries with lockdown treatment during COVID-19 are decreasing profitability. This finding contradicts the assumption that consumer preference for ESG (sustainable) products is attributed to customer inelastic demand that allows these firms to charge relatively higher prices. The result is not surprising given that movement restriction is country-wide, affecting customer visits to shops or service outlets, and as such, the cost of ESG activities is not immediately repaid in customer patronage through sales and revenue. Furthermore, the social activities, including community and employee support during the lockdown year, are enormous and can temporarily drive down the financial performance of already strained firms.

Conversely, it is encouraging to see that firms' activities, especially in the social pillar of ESG, are rewarded with an improved firm valuation during the lockdown year of COVID-19. This result implies that investors value such practices even more during the COVID-19 crisis, especially in countries with lockdowns. These could be due to two reasons. First, investors view firms with better social scores during this period as responsible, particularly as the COVID-19 and lockdown spread-containment measures affected people's health and economic conditions. Thus, companies' support for employees and the community is not unnoticed by investors. Second, investors' assessment of such companies is that they demonstrate invaluable goodwill during a challenging atmosphere imposed by lockdown despite reduced earnings, as shown in the ESG and profitability relationship. Generally, our result supports Hartzmark and Sussman (Hartzmark & Sussman, 2019) claim that there are nonpecuniary motives (such as rationale that stems from an individual's commitment to the environment and social issues) as well as the guarantee of better risk-adjusted return for stakeholders in sustainable firms.

As a second analysis, we analyze the postlockdown period after the year 2020, which represented the height of the COVID-19 pandemic across different countries around the globe. While the pandemic continued to impact public health and the economy in 2021, the pace allowed for adjustments and a gradual recovery. As a result, this study investigates the influence of firm sustainability at the onset of this recovery year, 2021. In this two-year subsample analysis, we estimate the interaction between ES performance and a dummy variable that is one for firm data in the year 2021. The results are shown in Table 9.

The results suggest that sustainability performance is positively related to firm profitability in the recovery year 2021. The positive relationship improves the hostile relationship during the lockdown, as shown in Table 8. This improvement in the relationship is a significant finding that implies that as the global economy began to rebound and adjust to the challenges posed by the pandemic, firms

Table 6
ESG performance impact on firm profitability in the COVID-19 pandemic.

	ROA						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ES_1	0.039	0.038					
	(0.027)	(0.026)					
Env_1			0.043*	0.044*			
			(0.023)	(0.023)			
Soc_1					0.039	0.033	
					(0.027)	(0.027)	
ESGFirm							0.011
							(0.011)
CovidYears							0.004
							(0.015)
ES_1 × CovidYears	0.081***	0.079**					
	(0.030)	(0.038)					
Env_1 × CovidYears			0.057**	0.056**			
			(0.026)	(0.026)			
Soc_1 × CovidYears					0.075**	0.074**	
					(0.034)	(0.033)	
ESGFirm×CovidYears							0.038**
							(0.017)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	No	No	Yes	No	Yes	Yes
Country FE	No	Yes	Yes	No	Yes	No	No
Observations	791	791	791	791	806	806	2061
Adjusted R^2	0.129	0.130	0.129	0.130	0.135	0.143	0.092

This table shows the model estimation results of firms' ES performance relationship with profitability (ROA) during the COVID-19 pandemic. ROA is net income over the total assets of the firm. The main explanatory variables are the individual pillar scores (environmental and social) of ESG, and ES is the equally weighted average score for the environmental and social pillars. The Env, Soc, and ES coefficients are scaled up by 100 for reporting. ESGFirm is a dummy that is one if a firm has an ESG score during the period in our sample or zeros otherwise. CovidYears is a dummy variable that takes 1 for COVID-19 years 2020 and 2021 and zeros otherwise. Firm Size is the natural logarithm of the book value of a firm's total assets. Leverage is the debt-to-equity ratio of the firm. Cash Holding is cash and short-term investment over total assets in percentage. Tangibility is tangible assets (property, plant, and equipment) over total assets in percentage, and GDP growth is a country's GDP change. All explanatory variables are lagged by one year. The analysis uses the sample period between 2017 and 2021, with 2020 and 2021 as the COVID-19 years. The last rows include the fixed effects, the number of observations in the models estimated, and adjusted R^2. Country and firm-level clustered standard errors are given in parentheses, and *** (**, *) denotes significance at the 1% (5%, 10%) level (two-sided test).

with more substantial ES performance profiles appeared to fare better in terms of profitability. This finding highlights the adaptability and resilience of firms prioritizing sustainability, as they may have been better positioned to seize emerging opportunities in the recovering market.

5. Discussion

The positive and significant difference in firm financial performance in countries with and without lockdowns could indicate that other factors (ESG) related to firm existence are important in firm performance. According to Dai et al. (Dai, Rau, & Tan, 2020), a firm's reaction to uncertainty matters in ensuring good performance and such reactions include CSR investments. Similarly, Albuquerque et al. (Albuquerque et al., 2020), showed that the COVID-19 pandemic is a unique (health) crisis that differs from the typical (financial) crisis and indicates that other activities that are valued by stakeholders, including ES performance, can stair the firms out of the stiff financial environment. Invariably, the lockdown treatment is an exogenous shock from a health crisis that may be influenced by other factors that can economically steady the performance of firms even with little time to respond to the crisis's challenges, including adjusting the business models where possible or leveraging on other nonfinancial performances such as social responsibility. Therefore, this study tests the significant difference in firms' ES performance during the COVID-19 pandemic to identify possible drivers of the financial performance of firms in lockdown countries.

The COVID-19 pandemic had a social and economic impact on the world. The environmental impact during the pandemic is significant. As such, more investment went into ES issues (including firms' workforce, human rights, community, and product responsibility). The improvement in social performance is particularly reasonable because firms, especially those in countries with lockdowns, do more to support their employees and the community during the COVID-19 pandemic. Such employee support can be the provision and support for work-life balance like remote working. Though our approach is different, the significant difference in treatment effect supports findings that document higher sustainability to be associated with better performance during COVID-19 (Pástor and Vorsatz (Pástor & Vorsatz, 2020)) and the conclusion that SRI funds outperform conventional funds during the crisis (Nofsinger and Varma (Nofsinger & Varma, 2014)). The consumer preference and loyalty theory suggests that firms' activity in ESG is a product differentiation strategy capable of ensuring lower price elasticity of demand, especially in tightened economic situations. Overall, the finding supports the conclusion of Qiu et al. (Qiu et al., 2021) that firms can use the pandemic to transform their CSR

Table 7
ESG performance impact on firm valuation in the COVID-19 pandemic.

	Ln(Tobin's Q)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ES_1	0.271*	0.323**					
	(0.164)	(0.157)					
Env_1			0.375***	0.318**			
			(0.136)	(0.135)			
Soc_1					0.070	0.087	
					(0.152)	(0.152)	
ESGFirm							0.112***
							(0.029)
CovidYears							0.241***
							(0.040)
ES_1 × CovidYears	0.364**	0.353*					
	(0.168)	(0.199)					
Env_1 × CovidYears			0.269*	0.280*			
			(0.142)	(0.143)			
Soc_1 × CovidYears					0.303*	0.293*	
					(0.168)	(0.167)	
ESGFirm×CovidYears							0.111**
							(0.046)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	No	No	Yes	No	Yes	Yes
Country FE	No	Yes	Yes	No	Yes	No	No
Observations	939	939	939	939	947	947	2229
Adjusted R^2	0.418	0.424	0.426	0.418	0.416	0.422	0.210

This table shows the model estimation results of firms' ES performance relationship with firm valuation during the COVID-19 pandemic. Tobin's Q is the firm's market value divided by the asset replacement cost. The main explanatory variables are the individual pillar scores (environmental and social) of ESG, and ES is the equally weighted average score for the environmental and social pillars. The Env, Soc, and ES coefficients are scaled up by 100 for reporting. ESGFirm is a dummy that is one if a firm has an ESG score during the period in our sample or zeros otherwise. CovidYears is a dummy variable that takes a value of one for COVID-19 years 2020 and 2021 and zero otherwise. Firm Size is the natural logarithm of the book value of a firm's total assets. Leverage is the debt-to-equity ratio of the firm. Cash Holding is cash and short-term investment over total assets in percentage. Tangibility is tangible assets (property, plant, and equipment) over total assets in percentage, and GDP growth is a country's GDP change. All explanatory variables are lagged by one year. This analysis uses the sample period between 2017 and 2021, with 2020 and 2021 as the COVID-19 years. The last rows include the fixed effects, the number of observations in the models estimated, and adjusted R^2. Country and firm-level clustered standard errors are given in parentheses, and *** (**, *) denotes significance at the 1% (5%, 10%) level (two-sided test).

initiatives.

Michael (Michael, 1980) argued that there is a tendency for firms to reward revenue performance where a "prospector" business strategy is followed. The "prospector" strategy is based on the keen interest of firms to lead through new product development and innovation, which gains them a significant market share that translates to increased sales. Thus, the positive and significant impact of firms' ES performance with key elements, such as innovation and product responsibility on revenue, can be understood from this prospector's perspective. More recently, studies have identified issues including innovative capabilities, apt customer service, CSR, and environmental performance as essential factors for firms' enhancing their sales (Ahmad et al. (Ahmad et al., 2021); Li et al. (Li, Liao, & Albitar, 2020)). The effect of the firm's activities in these factors is a successful competitive advantage developed and sustained through innovation (Rauter et al. (Rauter, Globocnik, Perl-Vorbach, & Baumgartner, 2019)). Increasing sales from new products and services or frequency of new product launches have been used as measures of firms' innovative performance (Sofka and Grimpe (Sofka & Grimpe, 2010)); however, it is not an all-informative measure since revenue does not directly amount to profit or value to the company and shareholders. Thus, it is important to consider general performance outlooks such as profitability and valuation (Canh et al. (Canh, Liem, Thu, & Khuong, 2019)).

CSR and now ESG has been said to be capable of influencing customers' opinion (Wang (Wang, 2020); Yuen et al. (Yuen, Thai, & Wong, 2016)) and eventually loyalty (Aramburu and Pescador (Aramburu & Pescador, 2019); Inoue et al. (Inoue, Funk, & McDonald, 2017)) to brands and companies. Similar to Albuquerque et al. (Albuquerque et al., 2020), who evaluate ES performance impact on stock returns during the COVID-19 pandemic, this study confirms the importance of customer loyalty importance with the positive relationship of the environmental and social with profitability. This finding is based on the conclusion that firms can charge relatively higher prices for goods or services due to lower price elasticity of demand. This results from firms' investment in ESG as a product differentiation strategy. In addition, the result of comparison in firms' profitability due to ESG reporting confirms the assertion of Albuquerque et al. (Albuquerque et al., 2019) that the ESG activities of firms are a product differentiation strategy capable of delivering improved financial performance. This study documents significantly higher profitability in firms with ESG scores during the COVID-19 pandemic. This result contradicts the finding of Hu and Zhang (Hu & Zhang, 2021), which suggests a drop in the average ROA of firms as the number of COVID-19 cases skyrockets; however, this study's finding aligns with the extant literature (Statman et al. (Statman, Glushkov, et al., 2009); Torugsa et al. (Torugsa, O'Donohue, & Hecker, 2012)) emphasizing a positive impact of CSR on firm profitability.

Table 8
ESG and firm performance in lockdown countries.

	ROA			Ln(Tobin's Q)		
	(1)	(2)	(3)	(4)	(5)	(6)
ES	0.073***			0.046		
	(0.025)			(0.121)		
Env		0.067***			0.186*	
		(0.017)			(0.102)	
Soc			0.040*			−0.151
			(0.023)			(0.109)
Treated_Firm	0.012	0.007	0.017	−0.137	−0.056	−0.176
	(0.028)	(0.027)	(0.029)	(0.143)	(0.122)	(0.151)
ES × Treated_Firm	−0.017			0.422*		
	(0.046)			(0.239)		
Env × Treated_Firm		−0.006			0.288	
		(0.040)			(0.209)	
Soc × Treated_Firm			−0.024			0.468*
			(0.046)			(0.239)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1025	1025	1025	1190	1190	1190
Adjusted R^2	0.122	0.124	0.117	0.409	0.410	0.409

This table shows the results of the relationship between the ES performance of firms with firm profitability and valuation during the COVID-19 pandemic in lockdown vs. no-lockdown countries. ROA is net income over the firm's total assets, and Tobin's Q is the firm's market value divided by the asset replacement cost. The main explanatory variables are the individual pillar scores (environmental and social) of ESG, and ES is the equally weighted average score for the environmental and social pillars. The Env, Soc, and ES coefficients are scaled up by 100 for reporting. Treated_Firm is a dummy that is 1 for observations of firms in a country that had lockdown during 2020 and zeros otherwise. The last rows include firm-level and country controls (Firm Size is the natural logarithm of the book value of a firm's total assets, Leverage is the firm's debt-to-equity ratio, Cash Holding is cash and short-term investment over total assets in percentage. Tangibility is tangible assets (property, plant, and equipment) over total assets in percentage, and GDP growth is the change in GDP in a country), the industry-fixed effect, the number of observations in the models estimated, and adjusted R^2. The analysis is done using the whole sample period between 2017 and 2021 with 2020 as the lockdown year (449 Obs. in the lockdown year 2020). Country and firm-level clustered standard errors are given in parentheses, and *** (**, *) denotes significance at the 1% (5%, 10%) level (two-sided test).

Table 9
ESG performance impact on firm recovery postCOVID-19.

	ROA			Ln(Tobin's Q)		
	(1)	(2)	(3)	(4)	(5)	(6)
ES_1	−0.019			−0.077		
	(0.041)			(0.210)		
Env_1		0.002			0.137	
		(0.029)			(0.181)	
Soc_1			−0.047			−0.265
			(0.038)			(0.190)
ES_1 × PostLockdownYear	0.127*			0.354*		
	(0.074)			(0.196)		
Env_1 × PostLockdownYear		0.100			0.049	
		(0.069)			(0.260)	
Soc_1 × PostLockdownYear			0.104			0.154*
			(0.075)			(0.094)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	354	354	355	502	502	506
Adjusted R^2	0.235	0.235	0.229	0.403	0.404	0.401

This table shows the results of the subsample (2020 and 2021) models estimation of firms' ES performance relationship with firm valuation during the COVID-19 pandemic in lockdown vs. no-lockdown countries. ROA is net income over the firm's total assets, and Tobin's Q is the firm's market value divided by the asset replacement cost. The main explanatory variables are the individual pillar scores (environmental and social) of ESG, and ES is the equally weighted average score for the environmental and social pillars. The Env, Soc, and ES coefficients are scaled up by 100 for reporting. PostLockdownYear is a dummy that is 1 for observations of firms during the year 2021 and zeros for 2020. The last rows include firm-level and country controls (Firm Size is the natural logarithm of the book value of a firm's total assets, Leverage is the firm's debt-to-equity ratio, Cash Holding is cash and short-term investment over total assets in percentage. Tangibility is tangible assets (property, plant, and equipment) over total assets in percentage, and GDP growth is the change in GDP in a country), the industry-fixed effect, the number of observations in the models estimated, and adjusted R^2. All explanatory variables are values lagged by one year. Country and firm-level clustered standard errors are given in parentheses, and *** (**, *) denotes significance at the 1% (5%, 10%) level (two-sided test).

Similarly, the significant impact of firm ES performance on firm valuation is consistent with the findings of Hwang et al. (Hwang et al., 2021) that investment in social capital creates trust and bonds between firms and stakeholders. This informs an investment preference for shareholders as stressed by Heinkel et al. (Heinkel, Kraus, & Zechner, 2001) that SRI (that can be likened to ESG) investors are less likely to flee the market when others do, thereby keeping the price of ESG stocks relatively stable. The improved valuation shown in firms with ES scores as those without during the COVID-19 pandemic strengthens the conclusion of Bollen (Bollen, 2007), suggesting less sensitivity in crisis for investors with a preference for ESG stocks. The conclusion stems from the documented evidence that SRI funds outperform conventional mutual funds. Investors can value firms highly where high performance is shown in ESG issues as studied (Jackson and Singh (Jackson & Singh, 2015)) documents a revenue boost for companies that successfully resolve environmental challenges. Specifically, ESG rating sets firms apart from their counterparts without ESG ratings for reasons including responsibility and economic performance.

6. Summary and conclusion

Since the start of 2020, when the COVID-19 pandemic broke out, the world has witnessed a change in human activities. Individuals have adjusted how they interact with each other, firms have redefined their businesses to accommodate the need for reduced contacts, and the government has initiated a policy to save lives and the economy. Despite the adjustments, all of these agents (individuals, firms, and governments) have struggled to cope with the crisis in aspects that concern them, be it depression for isolated individuals, firms' earnings struggle, or the strained economy imposed by government lockdown measures in times of the increasing number of infection cases.

This study examines the treatment effect of lockdown on the financial and non-financial performance of firms using data on publicly listed firms in the Nordic countries between 2017 and 2021. This study contributes to the knowledge of the impact of a crisis, especially one that is not economical to firm performance. Our study provides rare information on the impact differences of the shock imposing treatment of lockdown on most economies during the first months of the COVID-19 outbreak. This paper explores the significance of firms' sustainability in mitigating or limiting the impact of the crisis during the COVID-19 year.

This study documents evidence that the lockdown treatment is a healthcare crisis that may improve firm performance where corporate social responsibilities are the highest; thus, firm sustainability is positively related to the lockdown treatment. This finding implies that in countries where lockdown was implemented, firms are found to have increased social activities captured in the social pillar scores of ESG during the lockdown. This is particularly positive given the importance of social support required during the pandemic, especially in the lockdown countries where many residents lost jobs, and others took pay cuts and took pay cuts as companies navigate the financial challenges whilst providing material support to communities.

Generally, this study's results support the earlier findings that suggest sustainable firms have resilience in times of crisis as it established that they have relatively better financial performance and increased valuation during the COVID period. Hwang et al. (Hwang et al., 2021) and Albuquerque et al. (Albuquerque et al., 2020) support the finding that the ability of sustainable firms to charge relatively higher prices is due to the inelasticity of customer demands as a result of loyalty to socially responsible brands. Similarly, sustainable firms enjoy higher or at least stable valuations due to investors' preference for ESG stocks, which have less investor exit during the crisis due to the guarantee of better risk-adjusted return for investors Hartzmark and Sussman (Hartzmark & Sussman, 2019).

Nonetheless, this study has a few limitations. First, ESG ratings are annual data that do not allow monthly or quarterly analysis; hence, the data do not allow for exact period analysis that could take care of the exact months or quarters of lockdown in countries. Nevertheless, this study provides a good measure of the disruption in earnings that can affect firm performance. Second, the COVID-19 pandemic saw firms receive support funds from the government. It is unclear which firms receive what, and these could affect firms' operations and performance, though it is believed that most support goes to small and medium enterprises, which are very few in our sample. Future research can consider the performance of firms during the recovery years beyond 2021 when activities have returned to "normal" in economies worldwide. Furthermore, the effect of COVID-19 on firms' capital structure will be interesting to research.

Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

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Data availability

Data will be made available on request.

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