ESG RATINGS AND STOCK MARKET PERFORMANCE

EVIDENCE OF A SHIFT IN INVESTOR BEHAVIOUR DURING A PERIOD OF ECONOMIC DISTRESS IN SCANDINAVIA

JOHANNA HALLSTEDT

TIM NYLLINGE

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Abstract:

During the Covid-19 crisis, firms with high environmental, social, and governance (ESG) ratings traded within the Scandinavian markets had more significant pandemic-induced drops in stock returns than firms with low profiles in ESG. The difference was close to ten percentage points more severe for high-ESG compared to low-ESG firms. This evidence suggests that in a region with fundamentally high levels of ESG engagement, investors tend to ward off high-ESG firms when faced with a downturn in the real economy. We hence emphasize the need to recognize the unique effects of regions that deviate from a global trend and to extend the focus beyond financial capital when attempting to understand the determinants of firm-level performance during a crisis.

Keywords:

Socially responsible investing, ESG, sustainable investment, corporate resilience, financial risk.

Authors:

Johanna Hallstedt (25160)
Tim Nyllinge (25173)

Tutor:

Paula Roth, Postdoc Fellow, Department of Finance

Examiner:

Adrien d'Avernas, Assistant Professor, Department of Finance

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Stockholm School of Economics

Over the last two decades, ESG factors have become increasingly important to investors due to both an increase in regulation as well as social trends. However, previous research on sustainable investments, and in particular how investors change their preferences with regard to ESG during times of economic uncertainty is ambiguous. The Covid-19 crisis acts as an ideal setting to study this question due to its consequences on public health and subsequent quarantines and lockdowns, which significantly impacted the global economy and financial markets (Fahlenbrach, Rageth, and Stulz, 2021). While previous studies have examined the effect of firms' ESG investments on returns with a focus on the U.S. and global markets during past financial crises as well as the covid crisis (Ding, Levine, Lin, and Xie, 2021; Dottling and Kim, 2022; Lins, Servaes, and Tamayo, 2017), there is a need to recognize the unique effects of regions that deviate from the global trend. One such region is Scandinavia, where investor pressure on firms has led the region to become world-leading in ESG investments and ratings (Dyck, Lins, Roth, and Wagner, 2019). The objective of this paper is therefore to investigate how investor preferences shape stock returns of the highly sustainable firms traded on the Scandinavian markets in the face of economic distress.

We test whether firm-level sustainability is valued by investors during a period of economic uncertainty in Scandinavia, where it exists a high community belief in ESG. This is done by an investigation of the performance of 240 firms with ESG, financial, and accounting data available on the Refinitiv Eikon database retained over the crisis period. We make several discoveries in regressions that control for a wide variety of firm characteristics. The economic importance of our results in explaining investor assessment of a firm's ESG profile is similar to the effect of pre-crisis level of cash holdings and leverage, financial variables previously shown to affect crisis-period returns (Ding et al., 2021). First, firms with higher ESG ratings perform significantly worse in terms of both raw buy-and-hold and excess returns during the crisis period. Second, the effect of a firm's ESG rating on returns is more pronounced when quartile dummies are introduced than

when the ESG variable is used as a linear measure, with the strongest relationship found when the highest quartile is compared to the lowest. Third, we break down the firm's ESG activities into its three main components and find that firm investments in the environmental and social factors are the main drivers behind the significant negative impact on crisis-period returns. This is while the governance component lacks a significant relationship to both return measures. These results highlight the importance of extending the focus beyond financial capital when attempting to understand the determinants of firm-level performance during an economic crisis.

Our results as well as previous research suggest that the Covid-19 crisis differs substantially from earlier financial crises, such as the 2008-2009 financial crisis, which were driven by a lack of trust in firms and the financial system (Lins et al., 2017; Ding et al., 2021; Dottling et al., 2022). During the Covid-19 crisis, there was no such shock to the trust in the financial system but rather a negative shock to income and labor demand as a consequence of quarantines and lockdowns (Fahlenbrach et al., 2021). This had an immediate impact on the real economy, as well as increased the level of economic uncertainty experienced by investors. Alike previous research, our findings suggest that the income shock and increased economic uncertainty led investors to become more sensitive toward sustainable investments (Dottling et al., 2022). This in turn led to the pro-social motives that typically drive investments in ESG to be perceived as costly as investors liquidate their assets or shift their attention towards other firm characteristics which they believe can generate higher returns (Riedl and Smeets, 2017). Further, this development is not evident on a global scale (Ding et al., 2021), but may be distinctive to the Scandinavian region where investors are highly invested in ESG during normal times (Liang and Renneboog, 2017).

It's plausible that the negative effects found in our regressions are not unique to the crisis period, or that the Covid-19 crisis led to a permanent shift in investor preferences. To explore this, we employ fixed-effects models to investigate the relation between ESG

and returns during adjacent periods of economic growth and recovery. With time and firm fixed effects as well as industry dummies, we can eliminate any variations in firm traits that are time-varying or time-invariant, as well as industry variations that may impact stock returns during the pandemic. Additionally, using fixed effects allows us to isolate the distinctive impact of ESG on stock returns while considering firms' fundamental financial conditions. Applying difference-in-differences as a statistical technique, we show that the negative relationship between ESG and returns is exclusive during the period of high perceived economic uncertainty and that no relationship can be shown to endure thereafter.

While our focus is on the impact of firm sustainability on returns during a negative economic shock, our difference-in-differences regressions also allow us to mitigate typical endogeneity concerns that pose a challenge to the identification of how ESG activities impact firm value. Our natural experiment entails an exogenous financial shock that upsets the equilibrium while ESG levels remain static, at least in the short run. This allows us to directly observe how investors adjust their valuations of firms with varying ESG profiles. Thus, our study also contributes to the literature on whether ESG benefits shareholders or not. Nevertheless, we acknowledge that we lack exogenous fluctuation in ESG levels, which limits the conclusions we can draw regarding the impact of ESG on performance during normal circumstances.

The rest of the paper proceeds as follows. Section 2 describes the empirical setting and adjacent literature. Section 3 describes the data and variables. Section 4 presents and discusses the empirical findings. Section 5 concludes.

2 Theoretical Context

The emphasis on ESG has grown increasingly important over the last two decades, not only due to stricter regulation but also due to social trends and institutional investors that incorporate ESG commitments into their mandates (Baldauf, Garlappi, and Yannelis, 2020; Ilhan, Krueger, Sautner, and Starks, 2023; Krueger, Sautner, and Starks, 2020). Moreover, several studies have found that climate change which is part of a firm's ESG impact poses a growing source of risk for investors (Ilhan et al., 2023; Krueger et al., 2020), and have analyzed how climate change risk is priced by markets (Baldauf et al., 2020; Bernstein, Gustafson, and Lewis, 2019; Bolton and Kacperczyk, 2021), as well as how investors seek to hedge against this risk (Engle, Giglio, Kelly, Lee, and Stroebel, 2020). In addition, institutional investors are willing to accept lower returns when they invest in firms with high impact (Barber, Morse, and Yasuda, 2021), and retail investors are willing to pay a premium for socially responsible firms, even if the returns are lower (Bauer, Ruof, and Smeets, 2021). Studies also demonstrate how sin stocks, such as those in alcohol, tobacco, and gambling, as well as firms with high carbon emissions, generate higher returns. Nevertheless, many investors still avoid them due to their personal values, and others demand compensation for their exposure to social norms and carbon emission risk (Hong and Kacperczyk, 2009; Bolton et al., 2021).

Further, in the first quarter of 2020, the global economy was severely affected by the Covid-19 pandemic, which caused economies to suffer and in turn, almost all financial markets fell by 20 to 40% from their 2020 high to their 2020 low (Ding et al., 2021). The consequences of the outbreak on public health drastically changed the social, political, as well as economic environment worldwide. The virus created a great deal of uncertainty with regard to its potential spread and what measures would be necessary to control it. In turn, both politicians and individuals followed the development intensively. It is also evident that the Covid-19 crisis differed significantly from other recent financial crises as it originated outside of the financial sector and immediately affected the real economy

by its impact on consumption and business revenues through quarantine and lockdown measures (Fahlenbrach et al., 2021). As a result of the severity of the crisis, a growing body of research has investigated its impact on financial markets, for instance, which firm characteristics that provide better stock return resilience to the pandemic (Ding et al., 2021). Additionally, research has also explored how ESG factors specifically affect asset pricing during this time of economic distress (Dottling et al., 2022).

As a consequence of the Covid-19 crisis, many investors experienced an increase in economic constraints and hence had the tendency to become more averse towards socially responsible investments compared to normal times (Bansal, Wu, and Yaron, 2022). However, studies that examine the effect of the crisis on investor demand in regard to sustainable investments yield mixed results. On a global stock market level, investors appear to lean toward sustainable firms (Ding et al., 2021), whereas research on the fund market depicts that investors exhibit fragile demand for socially responsible investments during the Covid-19 crisis (Dottling et al., 2022). Previous research has also demonstrated that CSR can serve as a proxy for social capital and trust and linked it to resilient performance of firms with higher CSR ratings during negative shocks to the overall trust of financial systems (Lins et al., 2017). Nonetheless, ESG investments can also signal a firm's commitment to its relationships with internal and external stakeholders, which is a crucial factor in firm performance (Alchian and Demsetz, 2009). Thus, high ESG levels can likely contribute to better stock return resilience in a period of economic uncertainty.

Finally, it should be noted that many of the prior studies which examine the impact of ESG on financial markets have primarily focused on the U.S. market (Bolton et al., 2021; Dottling et al., 2022; Lins et al., 2017), or the global market (Ding et al., 2021). While the U.S. market has a similar, or slightly lower, ESG rating compared to the global market (Liang et al., 2017), these studies may fail to recognize the unique effects present in regions that deviate from the global trend. One such region is Scandinavia, which boasts the highest CSR ratings in the world (Liang et al., 2017). In addition,

the Scandinavian firm's high ESG ratings stem from investors' strong communal belief in the importance of CSR (Dyck et al., 2019). Thus, since the investor behavior of the region already differs in normal times, it is likely that the investor preferences also differ from the global norm during times of uncertainty and economic distress. Therefore, it is of interest to investigate how investor preferences can shape stock returns of the world-leading sustainability rated firms traded on the Scandinavian markets, in the face of economic constraints.

3 Sample and summary statistics

3.1 Sample construction

To compose our sample, we obtain firm-level accounting data and ESG ratings, stock price information, and data on the daily development of Covid-19 cases for each of the Scandinavian countries from Refinitiv Eikon. This database encloses a vast amount of firm data that has been used in previous studies examining the effects of firm-level Environmental, Social, and Governance ratings on firm performance (e.g. Ding et al., 2021). Refinitiv captures and calculates over 630 company-level ESG measures indicating the quality of ESG aspects on a firm level. It also provides access to industry-leading accounting, economic, and financial data.

The ESG ratings we obtain from Refinitiv measure the company's relative ESG performance, commitment, and effectiveness across ten main themes (emissions, green innovation, resource use, community, human rights, product responsibility, workforce, CSR strategy, management, and shareholders) based on verifiable reported data in the public domain. Refinitiv then group these ten themes to form three pillar scores that depict the environmental, social, and corporate governance dimensions of ESG, respectively. Compiled, the themes represent the overall *ESG Score* for a firm, which forms our primary explanatory variable. The three pillar scores are subsequently used in models for further

analysis of the main drivers of the impact of the ESG rating. We convert the overall score, as well as all underlying scores, to a scale of zero to one, in a similar manner as Ding et al., 2021.

Following previous literature examining socially responsible investments during periods of economic distress, the ESG scores are measured prior to the onset of the crisis (Ding et al., 2021; Dottling et al., 2022; Lins et al., 2017). We do this for two main reasons. First, to eliminate any concern that firms would adjust their ESG policies in anticipation of the crisis ahead. Second, because we want to investigate whether pre-crisis ratings affect the return during the crisis period rather than examine the effect of a variable rating.

As Dottling et al., 2022, we define the Covid-19 crisis as the period right prior to the stock market crash until the point in time when the economy started to rebound. For the Scandinavian region, the market indices crashed at the end of February 2020. This pandemic-induced market crash was followed by an eight-week period in which the world economy experienced a considerable downturn, and where the Scandinavian region started its recovery around the end of April, indicated by the month-on-month GDP growth rates of the region. Hence, we define these eight weeks as the Covid-19 crisis period for our analysis.

We retrieve stock price information from Refinitiv for the period March 2019 to April 2021 on a weekly basis. This information is used in several combinations to construct our dependent variables and is based on weekly stock returns, using dividend-adjusted closing prices on the last trading day of the week. First, we employ the variable *Raw Crisis-Period Return*, which is the firm's raw buy-and-hold return over the crisis-period from February to April 2020. Further, we assess the robustness of this measure with the variable *Abnormal Crisis-Period Return*, which is calculated as the raw buy-and-hold return less firm beta multiplied by the market return. Firm betas are provided by Refinitiv and are calculated based on five-year monthly data on value-weighted domestic

stock markets. There is substantial variation in the return measures across firms and industries, which indicates that firms varied in their degree of stock return resilience to the Covid-19 pandemic. To avoid issues stemming from outliers, we winsorize both return measures at the 1st and 99th percentiles. Moreover, a cumulative measure of total Covid-19 cases on a daily and country-specific level is also obtained from Refinitiv. This measure is then used to calculate the growth rate of the total number of Covid-19 cases for a specific week in the Scandinavian region. In order to be able to adequately match cases to the weekly stock return data, we calculate the growth rate for cases from Saturday to Friday.

Compiling all firms with sufficient data coverage on the Refinitiv Eikon database, we obtain a sample of 240 firms for which every explanatory variable is available for the full crisis period. Following Lins et al., 2017, microcap firms with a market capitalization below $250 million are excluded from our sample. These firms most often bear characteristics of low liquidity and high bid-ask spreads and are subject to more price pressure effects of trading, all of which would likely be more pronounced during the Covid-19 crisis.

3.2 Descriptive statistics

Descriptive statistics for our main variables are provided in Table 1. The summary statistics are shown in Panel A. Our primary variable of interest, *ESG Score*, could possibly range from zero to one. In our sample, firms are rated with a mean *ESG Score* of 0.5173. The standard deviation is 0.1889. In the rows below, summary statistics for the sub-components *Environmental Score*, *Social Score*, and *Governance Score*, are shown. For our sample, these have mean ratings of 0.4531, 0.5533, and 0.5221, respectively, and slightly higher standard deviations than the overall *ESG Score* with 0.2630, 0.2118, and 0.2212, respectively. The following row shows that *Crisis-Period Raw Return* varies between firms, entailing a sample mean of -23.44% and a standard deviation of 18.43%,

indicating large cross-firm, cross-time variations in returns over the crisis period. The median of -22.47%, in combination with the mean and standard deviation, is indicative of a market situation where investors and other stakeholders experienced a high degree of economic uncertainty and hence lowered their expectations about future firm performance and the outlook of investments (Dottling et al., 2022; Fahlenbrach et al., 2021). The standard deviation of the *Crisis-Period Abnormal Return* is 15.19%, which further indicates a considerable variation in firm performance during the crisis period. Table 1 Panel A also provides definitions and summary statistics for all firm characteristics used as control variables in our models. In the last row, the variable Covid Growth Rate is shown. This variable depicts the weekly growth rate of confirmed Covid-19 cases and is calculated over the crisis period from February to April 2020. It entails a mean of 1.1422 and a standard deviation of 0.9796, indicative of the rapid spread of the virus. Further, a correlation matrix is shown in Table 1 Panel B, showing the correlation of all the variables used in our main analyses.

Table 1
Descriptive Statistics

The sample consists of 240 firms, all with available ESG ratings from the Refinitiv Eikon database as of year-end 2019, the fiscal year prior the onset of the Covid-19 crisis. These scores constitute our main variable of interest, *ESG Score*. Moreover, returns are available during the period February 2020 to April 2020. *Crisis-Period Raw Return* is the raw return computed over the period February 2020 to April 2020. *Crisis-Period Abn. Return* is the market model-adjusted return over the period February 2020 to April 2020, with market model parameters computed over a five-year period ending in February 2020, using the respective Scandinavian indices as separate market proxies. Accounting data are based on the fiscal year ending in January 2020. *Market Capitalization* is in millions of dollars. *Long-Term Debt* is calculated as a firm's long-term debt deflated by the firm's total assets. *Short-Term Debt* is calculated as debt in current liabilities deflated by total assets. *Cash Holdings* is calculated as cash and marketable securities deflated by total assets. *Profitability* is calculated as operating income deflated by total assets. *Book-to-Market* is calculated as book value of equity deflated by market value of equity. *Negative B/M* is a dummy variable, set to one when the book-to-market ratio is negative, and zero otherwise. *Momentum* is the raw return over the period August 2019 to February 2020. *Idiosyncratic Risk* is computed as the residual variance from the market model estimated over a five-year period with monthly data. *Covid Growth Rate* is computed as the weekly growth rate of confirmed Covid-19 cases. Micro-cap firms, defined as firms with a market capitalization below $250 million as of year-end 2019, are removed from the sample. All control variables and returns, except for *Covid Growth Rate*, are winsorized at the 1st and 99th percentiles.

Panel A: Summary Statistics

Statistic	Mean	St. Dev.	25th perc.	Median	75th perc.
ESG Score	0.5173	0.1889	0.4046	0.5186	0.6651
Environmental Score	0.4531	0.2630	0.2525	0.4445	0.6385
Social Score	0.5533	0.2118	0.4175	0.5674	0.7304
Governance Score	0.5221	0.2212	0.3542	0.5122	0.6939
Crisis-Period Raw Return	−0.2344	0.1843	−0.3407	−0.2247	−0.1189
Crisis-Period Abn. Return	0.0006	0.1519	−0.0970	−0.0047	−0.0996
Market Capitalization	4801	6734	758	1654	5143
Long-Term Debt	0.2362	0.1628	0.1135	0.2274	0.3381
Short-Term Debt	0.0507	0.0641	0.0023	0.0282	0.0688
Cash Holdings	9.7256	12.7491	2.1445	4.9977	11.2985
Profitability	0.0761	0.1153	0.0312	0.0679	0.1213
Book-to-Market	0.4054	0.3761	0.1296	0.2841	0.5904
Negative B/M	0.0000	0.0645	0.0000	0.0000	0.0000
Momentum	0.2223	0.2980	0.0623	0.1903	0.3439
Idiosyncratic Risk	1.9445	15.6908	−6.4683	0.7563	10.4818
Covid Growth Rate	1.1422	0.9706	0.4493	0.5917	2.2118

Panel B: Correlation Matrix

	ESG	Raw	Abn.	Ln(M. Cap)	L/T D.	S/T D.	Cash H.	Profit.	B/M	Neg. B/M	Mom.	Id. Risk
ESG	1	-0.038	-0.135	0.478	0.025	-0.069	-0.243	0.104	0.066	0.049	-0.127	-0.262
Raw Ret.	-0.038	1	0.822	0.193	-0.399	-0.185	0.282	0.137	-0.286	-0.022	0.169	0.342
Abn. Ret.	-0.135	0.822	1	0.065	-0.390	-0.227	0.305	0.153	-0.349	0.008	0.142	0.266
Ln(Mkt Cap)	0.478	0.193	0.065	1	-0.050	-0.060	-0.149	0.176	-0.089	0.047	-0.027	-0.019
L/T Debt	0.025	-0.399	-0.390	-0.050	1	0.433	-0.390	-0.029	0.198	0.128	-0.002	-0.234
S/T Debt	-0.069	-0.185	-0.227	-0.060	0.433	1	-0.214	-0.058	0.142	-0.051	-0.053	-0.189
Cash H.	-0.243	0.282	0.305	-0.149	-0.390	-0.214	1	-0.089	-0.320	-0.044	0.113	0.345
Profit.	0.104	0.137	0.153	0.176	-0.029	-0.058	-0.089	1	-0.223	0.094	-0.032	0.089
B/M	0.066	-0.286	-0.349	-0.089	0.198	0.142	-0.320	-0.223	1	-0.069	-0.086	-0.269
Neg. B/M	0.049	-0.022	0.008	0.047	0.128	-0.051	-0.044	0.094	-0.069	1	-0.030	0.036
Mom.	-0.127	0.169	0.142	-0.027	-0.002	-0.053	0.113	-0.032	-0.086	-0.030	1	0.423
Id. Risk	-0.262	0.342	0.266	-0.019	-0.234	-0.189	0.345	0.089	-0.269	0.036	0.423	1
Covid	0.008	0.035	0.020	-0.002	-0.025	0.001	-0.050	-0.037	0.130	-0.037	-0.150	0.056

4 The Effects of a High ESG Profile during the Crisis

4.1 Baseline Results

We estimate several regression models to analyze the development of returns during the crisis period. The models are based on the firms' ESG ratings prior to the crisis, along with numerous control variables. All accounting data retained for the main regressions is dated to the end of the fiscal year 2019, the fiscal year prior to the onset of the crisis. Table 2 presents our baseline regression models. In columns (1) and (3), the dependent variable is the *Raw Crisis-Period Return*, and in columns (2) and (4) the same models are estimated but with the *Abnormal Crisis-Period Return* as the dependent variable. The main variable of interest is *ESG Score*, employed as a linear measure in the models of columns (1) and (2). In columns (3) and (4), we instead construct quartile dummies for the *ESG Score* measure to assess whether its effect on returns is more pronounced at very high or very low levels. Quartiles two, three, and four are employed in the regressions and the first quartile is captured by the intercept. The regression models in Table 2 can be specified as follows for columns (1) and (2) as well as (3) and (4), respectively:

$$Return_i = \beta_0 + \beta_1 ESG\ Score_i + \beta_3' Controls_i + e_i \tag{4.1.1}$$

$$Return_i = \beta_0 + \beta_1 ESG2_i + \beta_2 ESG3_i + \beta_3 ESG4_i + \beta_4' Controls_i + e_i \tag{4.1.2}$$

where $Return_i$ denotes the *Raw* or *Abnormal Crisis-Period Return*, $ESG\ Score_i$ is a firm's ESG rating measured at year-end 2019, and $Controls_i$ is a vector of control variables which are shown with their corresponding summary statistics in Table 1. The momentum factor is computed over a 6-month period prior to the onset of the crisis. The firm factor loadings and idiosyncratic risk are based on the Capital Asset Pricing Model and collected from Refinitiv. We further control for industry, defined by the Industry Classification

Benchmark (ICB) system, because some industries are more likely to have higher ESG ratings than others and may also be differently affected by the Covid-19 crisis (Ding et al., 2021).

One solicitude is that the performance of firms scoring high on ESG during the crisis period may be due to omitted variables that appear to be correlated with the *ESG Score*, rather than due to this variable itself. To address this, we further control for firm traits prior to the crisis that could affect stock returns and the firm's ability to withstand the economic downturn. The various proxies to measure the financial health and other characteristics of the firms in our sample are measured at the end of the fiscal year 2019 and are shown in Table 1.

First, *Cash Holdings*, *Short-term Debt*, *Long-term Debt*, and *Profitability* are included since it is more likely that firms with ample cash reserves, low levels of debt, and high profitability are better equipped to invest during a crisis. Meanwhile, firms with short-term debt that matures during the crisis and lower cash reserves are likely to be forced to reduce investments (Duchin, Ozbas, and Sensoy, 2010; Harford, Klasa, and Maxwell, 2014). Moreover, given that the pandemic had detrimental effects on cash flows and liquidity, it is reasonable to expect that these pre-existing corporate financial conditions had an impact on stock returns during the Covid-19 crisis (Ding et al., 2021).

Firm size is an additional trait that is likely to influence stock returns (Titman and Daniel, 1996), hence we measure and control for this as well. Specifically, firm size is controlled by the variable *Market Capitalization*, which is the logarithm of a firm's equity market capitalization, and *Book-to-Market*, which is the book value of equity deflated by the market value of equity. In addition, we incorporate a dummy variable for firms with a negative book-to-market ratio. This is because such firms are likely to be in a state of financial distress and may experience returns similar to those of high book-to-market firms, rather than low book-to-market firms (Fama and French, 1992).

We also control for return prior to the crisis since firms that have performed well

relative to peers are likely to continue to outperform during the crisis, while those that have performed poorly may continue to perform worse. This is captured by *Momentum*, which is a firm's raw buy-and-hold return over the six-month period that leads up to the beginning of the crisis period in February 2020.

Lastly, we control for the firm's respective idiosyncratic risks, since stock price volatility can affect returns (Goyal and Santa-Clara, 2003). The idiosyncratic risk is computed as the residual variance from the Capital Asset Pricing Model with monthly data estimated over the five-year period ending the month prior to the crisis.

Table 2
Crisis-Period Returns and ESG Score

This table presents regression estimates of crisis-period returns on *ESG Score* and control variables. Columns (1) and (2) present regression estimates of crisis-period returns on *ESG Score* as a linear measure whereas we use dummies for the ESG quartiles in columns (3) and (4). Crisis-period returns are measured both as raw buy-and-hold returns, as well as excess returns over the period February 2020 to April 2020. The quartile dummies are constructed such that $ESG2$ takes the value one if the firm is in the second quartile of ESG ratings in the sample, and zero otherwise. $ESG3$ takes the value one if the firm is in the third quartile and zero otherwise, and $ESG4$ takes the value one if the firm is in the top quartile and zero otherwise. All control variables employed in the regressions are as defined in Table 1. The industry dummies are defined through the ICB Industry Name classification system. Firms with a market capitalization below $250 million are removed from the sample. The return measures and all control variables are winsorized at the 1st and 99th percentiles. Standard errors are presented in the parentheses and heteroskedasticity-robust standard errors are applied based on the Breusch-Pagan test (see Appendix A for full tests).

	Dependent variable:			
	Raw Return	Abnormal Return	Raw Return	Abnormal Return
	(1)	(2)	(3)	(4)
ESG Score	−0.0237**	−0.0254		
	(0.0117)	(0.0133)		
ESG2			−0.0442*	−0.0496
			(0.0256)	(0.0292)
ESG3			−0.0552**	−0.0602**
			(0.0277)	(0.0325)
ESG4			−0.0923***	−0.0970***
			(0.0320)	(0.0329)
Factor loadings	Yes	Yes	Yes	Yes
Firm traits	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Observations	240	240	240	240
Adjusted R^2	0.5162	0.2999	0.5212	0.3087

*p<0.1; **p<0.05; ***p<0.01

The results of Table 2 column (1) show that firms scoring higher on ESG perform significantly worse in terms of both raw buy-and-hold and abnormal return during the crisis period. The economic importance of the results corresponds to a 44.77 basis point, on average, lower raw crisis-period return for every one-standard-deviation (0.1889) increase in *ESG Score*. Column (2) further show that for a one-standard deviation (0.1889) increase in *ESG Score*, the firm's abnormal crisis-period return decreases with, on average, 47.98 basis points. These findings demonstrate how investors' sensitivity increases and how they turn away from investments that score high on ESG factors during a period of high economic uncertainty and instead shift their attention toward other firm characteristics which they believe can generate higher returns (Dottling et al., 2022). Furthermore, the pro-social motives, which typically drive investments in ESG (Riedl et al., 2017), may be overseen due to the crisis, in turn making an excessive focus on ESG be perceived as costly. The economic uncertainty increased rapidly with the crisis and reached historically high levels which in turn affected the market. At first, the consequences on public health caused by the pandemic led to lockdowns and quarantines which in turn resulted in a decrease in labor demand. The result was a negative income shock, which reiteratively decreased consumption and business revenues (Dottling et al., 2022; Fahlenbrach et al., 2021). This shock fostered an increase in investor aversion toward socially responsible investments, compared to normal-times investor behavior (Bansal et al., 2022).

Table 2 columns (3) and (4) further show that firms in the higher ESG quartiles performed significantly worse compared to firms in the lower ESG quartiles during the crisis period. Moreover, when the baseline models of columns (1) and (2) with a linear measure of *ESG Score* as the main explanatory variable is re-estimated with quartile dummies of *ESG Score* as seen in columns (3) and (4), the effect of a firm's ESG rating on returns is shown to be more pronounced. Specifically, we divide the *ESG Score* into quartiles and include the corresponding dummy variables for the second, third, and fourth quartiles, allowing the intercept to capture the effect of the first quartile. Dividing the

main explanatory variable in this manner allows us to investigate whether the effect of a firm's ESG rating on returns is more evident at very high or very low scores for their ESG performance. The effect of *ESG Score* on returns is economically large and meaningful. The difference in raw returns between firms in the best and worst ESG quartiles, as captured by the coefficient on $ESG4$, is 9.23 percentage points. For abnormal returns, the difference is even greater, at 9.70 percentage points.

The findings presented in Table 2 show that the significance and magnitude of the impact of ESG on returns are much stronger when comparing the strongest ESG quartile to the weakest than when looking at ESG ratings as a linear measure. Firms with best-in-class ESG ratings perform significantly worse in terms of both crisis period buy-and-hold returns and excess returns, particularly when compared to the firms with the lowest ESG ratings. This is indicative of the fact that the negative relationship between ESG ratings and returns shown in columns (1) and (2) is primarily driven by the firms with the highest ESG ratings. Additionally, the fact that the magnitude increases when the lowest quartile is compared to the highest, indicates that the extreme ends of the ESG rating system have the strongest effect on investor beliefs and behavior. These characteristics have also been found in earlier research. Hartzmark and Sussman, 2019 show that the strongest effects of ESG on firm performance stem from investments that belong to the two extreme ends of a sustainability rating system, relative to investments with average ratings. In a similar manner, Dottling et al., 2022 find that investments with the highest sustainability ratings receive lower net inflows during the Covid-19 crisis, relative to average-rated investments. This relationship is also reasonable to expect since it is a fundamental cognitive process to evaluate information based on extreme rankings or scores, which not seldom underlies investor decision-making, in turn influencing and affecting markets (Hartzmark et al., 2019).

However, the negative relationship between ESG and returns that our findings indicate does not seem to exist during all crises, nor globally during the Covid-19 crisis. First,

Lins et al., 2017 find a positive relationship between socially responsible investments and returns during the 2008-2009 financial crisis. They assert that a firm's ESG efforts serve as a proxy for social capital and trust, which in turn enables superior performance due to stronger resilience to the effects of a crisis. The financial crisis of 2008 was however driven by a large negative shock to the trust in the financial system, which in turn led to severe consequences on the market. In contrast, the Covid-19 crisis did not pose a similar shock to trust in the financial system but was instead driven by the immediate economic effects created by the repercussions on public health. The Covid-19 crisis originated outside of the financial sector and immediately affected the real economy by its impact on consumption and business revenues through quarantine and lockdown measures (Fahlenbrach et al., 2021). It is therefore likely that investors anticipate that highly ESG-rated firms will face a decrease in demand for their products and services as consumers are not willing to pay the same price premium as during normal times. Hence, investors expect that the performance would be worse for this group of firms, in turn, have a lower valuation for these firms. This was not as evident during the 2008-2009 financial crisis, since it did not originate from a downturn in the real economy but rather commenced from stresses in the financial system. Hence, it is not necessarily expected that investor behavior in the context of the Covid-19 crisis would mirror that of the 2008-2009 financial crisis, which explains the negative relationship between a higher degree of social capital and performance that the results of Table 2 indicate. Second, Ding et al., 2021 find a positive relationship between ESG and returns on a global scale during the Covid-19 crisis. Nonetheless, our sample is focused on a specific subset of the global market with unique characteristics that differ from the world average, mostly as Scandinavia is world-leading with regard to CSR adoption and performance Liang et al., 2017. Furthermore, research has shown that it is the strong community belief in the importance of E&S issues in Scandinavia that encourages investors to drive local firms' ESG investments, which in turn results in substantially higher ESG scores in the region compared to the rest of the

world (Dyck et al., 2019). Moreover, a firm's ESG investments can act as a proxy for its commitment to internal and external stakeholder relationships and hence be tied to trust (Alchian et al., 2009). Nonetheless, a high level of ESG investment and trust is deemed crucial during normal times in this region, hence, too extensive investments into ESG will rather be perceived as costly during the crisis period. Consequently, the pro-social motives which typically drive investments in ESG (Riedl et al., 2017), is likely to be less important to investors when experiencing a negative income shock and economic distress (Dottling et al., 2022). In turn, this results in a situation where investors are likely to turn away from the highest ESG-rated investments.

4.2 ESG Components

In this section, we aim to determine which underlying activities or investments of a company's overall ESG rating that has the greatest impact on crisis-period returns. Intuitively, a firm can enhance its overall rating by investing in a variety of activities, but not all of these activities are likely to be valued equally by investors, as has been shown in previous literature (see e.g. Ding et al., 2021; Lins et al., 2017). To identify the main drivers behind our results we break down our main explanatory variable ESG Score into its three main components: *Environmental Score*, *Social Score*, and *Governance Score*. These three separate ratings are then our three separate main explanatory variables used in the analysis. The environmental component includes a firm's emissions, resource use, and green innovation. The social component comprises employee well-being, human rights, and ethical treatment of customers, suppliers, and communities where the company operates. The governance component constitutes of management practices, equal treatment of shareholders, anti-takeover device usage, as well as CSR strategy implementation and communication. We repeat our baseline regression for each of these three variables separately, using the control variables shown in Table 1 as well as industry dummies. These results are shown in Table 3 Panel A. We thereafter re-estimate the

previous models in a similar manner as done in Section 4.1 where instead of including the main explanatory variable as a linear measure, we divide the firms into quartiles and include the corresponding dummy variables for quartiles two to four. These findings are presented in Table 3.

Table 3
Crisis-Period Returns and ESG Components

This table presents regression estimates of crisis-period returns on *ESG Score* split into three components: *Environmental Score*, *Social Score*, and *Governance Score*. In Panel A, these components are employed as linear measures, whereas we in Panel B divide each component into four quartile dummies. The dummy variables are constructed such that *Environmental*2 takes the value one if the firm is in the second *Environmental Score* quartile, and zero otherwise. *Environmental*3 takes the value one if the firm is in the third *Environmental Score* quartile and zero otherwise, and *Environmental*4 takes the value one if the firm is in the fourth *Environmental Score* quartile and zero otherwise. These dummies are constructed in the same manner for all component scores, respectively. Columns (1), (3), and (5) present regression estimates of crisis-period returns in terms of raw buy-and-hold return whereas columns (2), (4), and (6) presents it in terms of crisis-period abnormal return. Both return measures are calculated over the period February 2020 to April 2020. The factor loadings and firm traits controlled for are shown in Table 1. The industry dummies are defined through the ICB Industry Name classification system. Firms with a market capitalization below $250 million are removed from the sample. The return measures and all control variables are winsorized at the 1st and 99th percentiles. Standard errors are presented in the parentheses and heteroskedasticity-robust standard errors are applied based on the Breusch-Pagan test (see Appendix A for full tests).

Panel A: Linear Measure of Component Scores

	Dependent variable:					
	Raw	Abnormal	Raw	Abnormal	Raw	Abnormal
	(1)	(2)	(3)	(4)	(5)	(6)
Environmental Score	−0.00088**	−0.00090**				
	(0.00043)	(0.00041)				
Social Score			−0.00110**	−0.00116*		
			(0.00053)	(0.0006293)		
Governance Score					−0.00028	−0.00034
					(0.00044)	(0.00048)
Factor loadings	Yes	Yes	Yes	Yes	Yes	Yes
Firm traits	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	240	240	240	240	240	240
Adjusted R^2	0.5165	0.2992	0.5165	0.3001	0.5081	0.2865

*p<0.1; **p<0.05; ***p<0.01

(Continued)

Panel B: Quartile Dummies of Component Scores

	Dependent variable:					
	Raw	Abnormal	Raw	Abnormal	Raw	Abnormal
	(1)	(2)	(3)	(4)	(5)	(6)
Environmental2	−0.03250	−0.03784				
	(0.02564)	(0.03031)				
Environmental3	−0.07178**	−0.07632***				
	(0.02815)	(0.02616)				
Environmental4	−0.03219	−0.03591				
	(0.02977)	(0.02772)				
Social2			−0.05177*	−0.05678**		
			(0.02645)	(0.03074)		
Social3			−0.06711***	−0.07058**		
			(0.02569)	(0.02840)		
Social4			−0.07397**	−0.07834**		
			(0.03060)	(0.03394)		
Governance2					−0.00318	−0.00304
					(0.02548)	(0.02552)
Governance3					0.01631	0.01342
					(0.02524)	(0.02674)
Governance4					−0.02304	−0.02572
					(0.02685)	(0.02752)
Factor loadings	Yes	Yes	Yes	Yes	Yes	Yes
Firm traits	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	240	240	240	240	240	240
Adjusted R^2	0.5177	0.3029	0.5203	0.3074	0.5084	0.2865

*p<0.1; **p<0.05; ***p<0.01

Our findings are presented in Table 3. The results of Panel A indicate that both the environmental and social components of a firm's overall ESG rating are significant in explaining crisis-period raw and abnormal returns, while the governance factor lacks a significant relationship to both return measures. Both the environmental and social elements are of similar economic importance. A one-standard-deviation (0.2630) increase in *Environmental Score* is associated with a 2.31 basis point lower excess return, while a one-standard-deviation (0.2118) increase in *Social Score* is associated with a 2.33 basis point lower excess return over the crisis period. These results suggest that investors employ a negative view towards firms with strong profiles in the environmental and social elements of ESG during the crisis period, while they view the governance profile as unimportant or that they employ an overall noisy judgment and valuation towards it. These findings are similar to what Lins et al., 2017 and Ding et al., 2021 found in their studies on crises in the U.S. and world markets. They show that investors mainly seem to acknowledge a firm's investments in the social and environmental components of ESG. Further, akin to us, Lins et al. do not find any significant effect of firm governance on returns, while Ding et al. find that different elements within the governance index have discordant effects. However, these discordant effects are, similarly to our findings, indicative of a noisy investor assessment of this factor.

However, when quartile dummies are included for the *Environmental*, *Social*, and *Governance ratings* as shown in Panel B of Table 3, some results that merit further consideration emerge. Specifically, the results of the environmental component as illustrated in Panel B columns (1) and (2) show no significant difference between the best and the worst quartiles in the environmental rating. Instead of the fourth quartile being the main driver behind the negative effects that we find when we apply the *Environmental Score* as a linear measure, the third quartile appears to be the primary driver. The difference in returns between firms in the lowest and the third quartile, as captured by the coefficient on *Environmental*3, is on average 7.18 percentage points lower crisis-period raw

return and 7.63 percentage points lower abnormal return. Nonetheless, the results from the analysis of the social component align with the findings of Panel A and our baseline results presented in Table 2, as they repeatedly indicate that the greatest difference in raw and excess returns is present in the relationship between firms in the highest and lowest quartiles. The difference in raw returns between firms in the best and worst *Social Score* quartiles, as captured by the coefficient on *Social*4, is 7.40 percentage points lower for the highest quartile. For abnormal returns, the difference is slightly greater, at 7.83 percentage points. Lastly, the estimates of the governance component on both return measures, which are shown in Panel B columns (5) and (6), ultimately provide the expected results in line with the findings of Panel A. None of the quartile dummy estimates have a significant impact on either of the return measures, precisely as when we regress the Governance Score as a linear measure. Again, this suggests that the variable is either seen as unimportant or that investors have a noisy assessment of it.

One possible explanation for the findings of the *Environmental Score* quartiles is that investors retain some attraction to firms with the strongest environmental ratings, but perceive that firms investing in the environmental component, yet not being in the top tier, are as costly as firms that have high ratings in the social component. Hence, the strongest impact is evident comparing the lowest to the third quartile. Furthermore, a reason why the social component provides the strongest and most consistent results overall could be that investors perceive it to provide a stronger connection to firm performance than the environmental or governance factors can. For instance, a firm's investments in employee health can have long-term effects on performance since employees are likely to improve their productivity as a result of higher motivation (Alchian et al., 2009). Hence, a firm's investments in ESG are likely to affect performance, which in turn influences investor valuation and returns. However, if a firm provides better job security and benefits this may decrease its short-term performance during times of uncertainty since it reduces its ability to adapt operations. In turn, the reduced short-term performance,

or at least the investor's anticipations of it, can lower the firm's valuation and returns. Compared to the rather clear connection between investments in the social component and firm performance, the link is not as pronounced between the environmental factor, firm performance, and investor valuations. For instance, Bolton et al., 2021 find a carbon premium in returns but also show that this premium disappears when they control for industry compositions in richer specifications.

4.3 Variations in Crisis and Non-Crisis Periods

Our results so far indicate that high levels of ESG ratings negatively affect stock returns in Scandinavia during the Covid-19 crisis period. In this section, we test the robustness of our findings and explore whether this negative relationship is unique to the crisis period or if there exist similar effects in adjacent periods of economic growth, perhaps due to some unobservable and hence omitted risk factor that is correlated with ESG.

This is investigated by a differences-in-differences model with continuous treatment and includes firm as well as weekly time-fixed effects. In a similar fashion as Lins et al., 2017 we include a 20-month pre-period prior to the onset of the crisis period, and a 20-month post-period which ends prior to the escalation of the Russo-Ukrainian war. For this panel of data, we estimate the following model which is shown in Table 4 Panel B:

$$\begin{aligned} Return_{i,t} = \beta_0 + \beta_1 ESG_{i,2019} * Crisis_t + \beta_2 ESG_{i,2019} * Post_t \\ + \beta_3' Controls_{i,t-1} + Time\ Fixed\ Effects + Firm\ Fixed\ Effects + e_{i,t} \end{aligned} \tag{4.3.1}$$

However, it is further important to consider that the crisis was a consequence of a global pandemic which had an escalation that was highly measurable in terms of the number of confirmed virus cases. Furthermore, the development of confirmed cases could easily be followed and likely had a psychological effect on investors since it was an indicator

of the outlook of the economy. Therefore, we want to evaluate whether our findings are robust also when this psychological effect is controlled for. To do this, we include the weekly growth rate of confirmed Covid-19 cases as a control variable. Fundamentally, the rationale for using a growth-based measure stems from a typical corporate valuation framework, where changes in stock valuations are indicative of changes in the anticipated growth rate of future cash flows (Ding et al., 2021). If changes in the expected growth rate of Covid-19 cases impact the expected growth of future cash flows, then a higher anticipated growth rate of Covid-19 infections would correspond to a slower growth rate of future cash flows, a lower price-to-earnings multiple, and in turn lower stock returns. The growth rate of the number of cases for a given week hence works as a proxy for the psychological effect as a consequence of the investor anticipation of the pandemic's spread.

The growth rate which we apply in our model is based on the number of cumulative cases for Scandinavia and is calculated for week t as follows:

$$Covid_t = \ln\left(1 + Cumulative\ Cases_t\right) - \ln\left(1 + Cumulative\ Cases_{t-1}\right) \tag{4.3.2}$$

We construct a panel of data to show the effect of this variable on both our return measures during the crisis period, which is defined to start in February and end in April 2020. Furthermore, we match the weekly returns for the firms of our sample with the corresponding week's growth rate of Covid-19 cases and include all previous control variables as described in Table 1. The results are shown in Panel A of Table 4, and the model can be specified as follows:

$$\begin{aligned} Return_{i,t} = \beta_0 + \beta_1 Covid_t + \beta_3' Controls_{i,t-1} + Time\ Fixed\ Effects \\ + Firm\ Fixed\ Effects + e_{i,t} \end{aligned} \tag{4.3.3}$$

Second, we control for the Covid-19 cases growth rate following the methodology of Ding

et al., 2021 by interacting it with all explanatory variables in the difference-in-differences model shown in Equation (4.3.1). The result is shown in columns (3) and (4) and can be specified as follows:

$$Return_{i,t} = \beta_0 + \beta_1 ESG_{i,2019} * Crisis_t * Covid_t + \beta_2 ESG_{i,2019} * Post_t * Covid_t + \beta_3' Controls_{i,t-1} * Covid_t + Time\ Fixed\ Effects + Firm\ Fixed\ Effects + e_{i,t} \tag{4.3.4}$$

In these models, the dependent variable is the weekly raw or abnormal return, $ESG_{i,2019}$ is our main variable of interest, measured at year-end 2019. $Crisis_t$ is a dummy variable equal to one for the period that starts in February when the market collapses and ends in April when the Scandinavian economies start to recover. $Post_t$ is a dummy variable equal to one for the period subsequent to the crisis, which ends in January 2022. $Controls_{i,t-1}$ is a vector of control variables that consist of all firm characteristics and factor loadings employed in previous regressions and shown in Table 1. The variable that depicts the weekly Covid-19 cases growth rate is specified as $Covid_t$ and is used as a control variable by an interaction with all explanatory variables. As in previous regressions, firms with a market capitalization below $250 millions as of year-end 2019 are excluded from the sample. We employ firm fixed effects to control for time-invariant omitted risk factors and any time-series pattern is removed via the weekly time-fixed effects. Furthermore, to condition on firm and time-fixed effects in this manner allow us to better isolate the differential impact of Covid-19 on buy-and-hold and abnormal returns as functions of firms' *ESG Score* and firm traits. The results are shown in Table 4.

Table 4
Returns Inside and Outside the Crisis Period

This table presents regression estimates of weekly returns on the growth rate of confirmed Covid-19 cases in Scandinavia in Panel A and on *ESG Score* with control variables in Panel B. In Panel A column (1), the dependent variable is weekly raw buy-and-hold returns, whereas it in column (2) is the weekly abnormal returns. Both return measures for Panel A are calculated over the February to April 2020 crisis period. For Panel B, columns (1) and (3) show weekly raw buy-and-hold returns and columns (2) and (4) show weekly abnormal returns. The return measures for Panel B are calculated over the period June 2018 to January 2022. *ESG Score* is measured at year-end 2019. The weekly growth rate of Covid-19 cases is included as a control variable in the form of an interaction with all explanatory variables. The factor loadings and firm traits controlled for are shown in Table 1. The traits based on accounting data are updated on a quarterly basis, whereas the traits based on market data are updated on a weekly basis. When the data of a firm trait is missing, the most recent available data is used instead. Factor loadings are re-estimated each year based on the last 60 months' data. The industry dummies are defined through the ICB Industry Name classification system. Firm fixed effects and weekly time fixed effects are employed. Firms with a market capitalization below $250 million are removed from the sample. The return measures and all control variables except for *Covid Growth Rate* are winsorized at the 1st and 99th percentiles. Heteroskedasticity-robust standard errors clustered at firm level are presented in the parentheses.

Panel A: Returns and Covid Cases Growth Rate

	Dependent variable:	
	Raw Return	Abnormal Return
	(1)	(2)
Covid Growth Rate	-0.000698^{***}	-0.000689^{***}
	(0.000031)	(0.000031)
Factor loadings	Yes	Yes
Firm traits	Yes	Yes
Industry dummies	Yes	Yes
Firm fixed effects	Yes	Yes
Time (weekly) fixed effects	Yes	Yes
Standard errors clustered by	Firm	Firm
Observations	1,948	1,948
Adjusted R^2	0.2085	0.3744

(Continued)

Panel B: Returns and ESG Score

	Dependent variable:			
	Raw Return	Abnormal Return	Raw Return	Abnormal Return
	(1)	(2)	(3)	(4)
Crisis * ESG Score	0.000299	0.000205	−0.007884*	−0.007296
	(0.0012311)	(0.001233)	(0.004634)	(0.004641)
Post * ESG Score	−0.000546	−0.000421	0.000333	0.000259
	(0.000519)	(0.000520)	(0.001163)	(0.001165)
Covid Growth Rate			−0.040231***	−0.041550***
			(0.005871)	(0.005880)
Covid interaction	No	No	Yes	Yes
Factor loadings	Yes	Yes	Yes	Yes
Firm traits	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Time (weekly) fixed effects	Yes	Yes	Yes	Yes
Standard errors clustered by	Firm	Firm	Firm	Firm
Observations	44,441	44,441	44,441	44,441
Adjusted R^2	−0.0020	0.0016	0.0496	0.0532

*p<0.1; **p<0.05; ***p<0.01

Table 4 Panel B presents the results of the impact of a firm's ESG rating on returns inside and outside the crisis period, both excluding and including the control for the Covid-19 cases growth rate. First, however, Panel A shows the regression specification of Equation (4.3.3), which represents the effect of the weekly Covid-19 cases growth rate on both our return measures. The results suggest that the weekly growth rate of confirmed Covid-19 cases significantly affects returns, which is expected as the stock market crash was primarily triggered by the virus spread. Second, Panel B shows the difference-in-differences models of Equation (4.3.1) and Equation (4.3.4), excluding and including the control for the Covid-19 cases growth rate in columns (1), (2) and columns (3), (4), respectively. The coefficient on the interaction between the 2019 ESG rating and the dummy for the crisis period captures the differential effect of a firm's *ESG Score* on weekly stock returns during the crisis period. When the interaction with the variable for the growth rate of Covid-19 cases is included, this effect is also based on the impact of the spread of the virus which works as a proxy for the psychological effects of the pandemic's escalation among investors.

In columns (1) and (2) of Table 4 Panel B, where we do not include the case growth rate, we are not able to identify any impact of a firm's ESG rating on returns during the crisis period, nor in the periods of economic recovery and growth. Nonetheless, in columns (3) and (4), where we include the Covid-19 cases growth rate as an interaction term to our explanatory variables, we find tendencies of a change in investor behavior during the crisis compared to adjacent periods. In terms of economic significance, if the Covid-19 cases grow at the average weekly rate (1.1422), the coefficient of -0.0079 on the $Crisis_t$ * $ESG\ Score_{i,2019}$ interaction term shown in column (3) indicates that a one-standard-deviation increase in 2019 *ESG Score* (0.1889) is associated with a 17.00 basis points lower weekly return during the crisis. Furthermore, the results not only indicate that high-ESG firms exhibit lower performance during the crisis period, but also that after this period, the negative relationship cannot be shown to endure, indicated by the

insignificant $Post_t$ * $ESG\ Score_{i,2019}$ interaction term. High-ESG firms' underperformance is hence limited to the period when the outlook for individuals and hence investors was perceived as uncertain. This is consistent with what Lins et al., 2017 found during the 2008-2009 financial crisis, where the shift in investor behavior only was present during the crisis period and then could not be said to be statistically different from zero, in an equivalently conducted difference-in-differences model as ours. Moreover, given that the effect only last during the crisis period, our results are indicative of a temporary shift in investor demand for sustainability that is merely driven by the momentary sell-off during the market crash, similar to the findings of Dottling et al., 2022 for the U.S. fund market. The tendency where investors ward off high-ESG investments hence seems to be driven by the immediate effects of uncertainty together with economic constraints. This implies that the temporary decline in demand that we find is both unique to the crisis period and likely to be driven by the economic distress imposed by the pandemic.

5 Conclusion

In this paper, we show the importance to recognize the unique effects of regions that deviate from a global trend. Our results provide evidence of how investor preferences shape stock returns of highly sustainable firms traded on the Scandinavian markets and, in particular, how they change during times of economic distress. Firms with higher ESG ratings perform significantly worse on the stock market compared to firms with lower ratings. We emphasize the importance to recognize the unique effects present in regions that deviate from the global norm as our results indicate an opposing effect in Scandinavia compared to what has been shown for the global mean. We further show that the negative impact on crisis-period returns was primarily driven by the environmental and social components of a firm's overall ESG rating, while investors seem to view the governance component as less important. The negative relationship between ESG and

returns was also exclusive to the crisis period, suggesting that the investors had a change in behavior during the time of economic distress and that these effects are not common to adjacent periods of economic growth. Lastly, since the effects are large and economically meaningful, we want to highlight the importance of extending the focus beyond financial capital when attempting to understand the determinants of firm-level performance during an economic crisis.

We do record three limitations to our study. First, as in most empirical research, we cannot disregard the possibility that some unobserved time-varying firm heterogeneity could have an impact on our findings. However, our results should mitigate this concern by the inclusion of a large variety of control variables as well as firm and time-fixed effects. Second, we acknowledge that we have a rather small sample in a limited region. This small sample is partly due to the small region, but also due to us not having access to all publicly traded firms' financial and non-financial data, which can lead to a selection bias. Finally, we only study one period of economic distress in our paper, which limits the general findings we can draw from our results. Therefore, examining additional periods of uncertainty in the Scandinavian region, as well as other regions that deviate from the global norm, would be a fruitful future research area.

References

Alchian, Armen and Harold Demsetz (2009). "Production, information costs, and economic organization". In: vol. 62. The Economic Nature of the Firm. Cambridge University Press. Chap. 5, pp. 173–196. ISBN: 9780521141772. DOI: 10.1017/CBO9780511817410.015. URL: http://dx.doi.org/10.1017/CBO9780511817410.015.

Baldauf, Markus, Lorenzo Garlappi, and Constantine Yannelis (2020). "Does Climate Change Affect Real Estate Prices? Only If You Believe In It". In: *The Review of financial studies* 33.3, pp. 1256–1295. DOI: 10.1093/rfs/hhz073. URL: http://www.econis.eu/PPNSET?PPN=169442068X.

Bansal, Ravi, Di (Andrew) Wu, and Amir Yaron (2022). "Socially Responsible Investing in Good and Bad Times". In: *The Review of financial studies* 35.4, pp. 2067–2099. DOI: 10.1093/rfs/hhab072. URL: http://www.econis.eu/PPNSET?PPN=180105939X.

Barber, Brad M., Adair Morse, and Ayako Yasuda (2021). "Impact investing". In: *Journal of financial economics* 139.1, pp. 162–185. DOI: 10.1016/j.jfineco.2020.07.008. URL: https://dx.doi.org/10.1016/j.jfineco.2020.07.008.

Bauer, Rob, Tobias Ruof, and Paul Smeets (2021). "Get Real! Individuals Prefer More Sustainable Investments". In: *The Review of financial studies* 34.8, pp. 3976–4043. DOI: 10.1093/rfs/hhab037. URL: https://www.narcis.nl/publication/RecordID/oai:cris.maastrichtuniversity.nl:publications%2F010b532d-389f-407f-a52b-cdd7c330d3d0.

Bernstein, Asaf, Matthew T. Gustafson, and Ryan Lewis (2019). "Disaster on the horizon: The price effect of sea level rise". In: *Journal of financial economics* 134.2, pp. 253–272. DOI: 10.1016/j.jfineco.2019.03.013. URL: https://dx.doi.org/10.1016/j.jfineco.2019.03.013.

Bolton, Patrick and Marcin Kacperczyk (2021). "Do investors care about carbon risk?" In: *Journal of financial economics* 142.2, pp. 517–549. DOI: 10.1016/j.jfineco.2021.05.008. URL: https://dx.doi.org/10.1016/j.jfineco.2021.05.008.

Ding, Wenzhi, Ross Levine, Chen Lin, and Wensi Xie (2021). "Corporate immunity to the COVID-19 pandemic". In: *Journal of financial economics* 141.2, pp. 802–830. DOI: 10.1016/j.jfineco.2021.03.005. URL: https://dx.doi.org/10.1016/j.jfineco.2021.03.005.

Dottling, Robin and Sehoon Kim (2022). "Sustainability Preferences Under Stress: Evidence from COVID-19". In: *Journal of financial and quantitative analysis*, pp. 1–39. DOI: 10.1017/S0022109022001296. URL: https://www.narcis.nl/publication/RecordID/oai:pure.eur.nl:publications%2F1579c327-e016-47fe-96e1-da46b171e87a.

Duchin, Ran, Oguzhan Ozbas, and Berk A. Sensoy (2010). "Costly external finance, corporate investment, and the subprime mortgage credit crisis". In: *Journal of financial economics* 97.3, pp. 418–435. DOI: 10.1016/j.jfineco.2009.12.008. URL: https://dx.doi.org/10.1016/j.jfineco.2009.12.008.

Dyck, Alexander, Karl V. Lins, Lukas Roth, and Hannes F. Wagner (2019). "Do institutional investors drive corporate social responsibility? International evidence". In: *Journal of financial economics* 131.3, pp. 693–714. DOI: 10.1016/j.jfineco.2018.08.013. URL: https://dx.doi.org/10.1016/j.jfineco.2018.08.013.

Engle, Robert F., Stefano Giglio, Bryan Kelly, Heebum Lee, and Johannes Stroebel (2020). "Hedging Climate Change News". In: *The Review of financial studies* 33.3, pp. 1184–1216. DOI: 10.1093/rfs/hhz072. URL: http://www.econis.eu/PPNSET?PPN=1694420213.

Fahlenbrach, Rüdiger, Kevin Rageth, and René M. Stulz (2021). "How Valuable Is Financial Flexibility when Revenue Stops? Evidence from the COVID-19 Crisis". In:

The Review of financial studies 34.11, pp. 5474–5521. DOI: 10.1093/rfs/hhaa134. URL: http://www.econis.eu/PPNSET?PPN=1776186974.

Fama, Eugene F. and Kenneth R. French (1992). "The Cross-Section of Expected Stock Returns". In: *The Journal of finance (New York)* 47.2, pp. 427–465. DOI: 10.1111/j.1540-6261.1992.tb04398.x. URL: https://api.istex.fr/ark:/67375/WNG-GR7XJ1H4-6/fulltext.pdf.

Goyal, Amit and Pedro Santa-Clara (2003). "Idiosyncratic Risk Matters". In: *The Journal of finance (New York)* 58.3, pp. 975–1007. DOI: 10.1111/1540-6261.00555. URL: https://api.istex.fr/ark:/67375/WNG-74CRVLMV-7/fulltext.pdf.

Harford, Jarrad, Sandy Klasa, and William F. Maxwell (2014). "Refinancing Risk and Cash Holdings". In: *The Journal of finance (New York)* 69.3, pp. 975–1012. DOI: 10.1111/jofi.12133. URL: https://api.istex.fr/ark:/67375/WNG-L37ZLFR1-0/fulltext.pdf.

Hartzmark, Samuel M. and Abigail B. Sussman (2019). "Do Investors Value Sustainability? A Natural Experiment Examining Ranking and Fund Flows". In: *The Journal of finance (New York)* 74.6, pp. 2789–2837. DOI: 10.1111/jofi.12841. URL: https://www.jstor.org/stable/45222766.

Hong, Harrison and Marcin Kacperczyk (2009). "The price of sin: The effects of social norms on markets". In: *Journal of financial economics* 93.1, pp. 15–36. DOI: 10.1016/j.jfineco.2008.09.001. URL: https://dx.doi.org/10.1016/j.jfineco.2008.09.001.

Ilhan, Emirhan, Philipp Krueger, Zacharias Sautner, and Laura T. Starks (2023). "Climate Risk Disclosure and Institutional Investors". In: *The Review of financial studies*. DOI: 10.1093/rfs/hhad002.

Krueger, Philipp, Zacharias Sautner, and Laura T. Starks (2020). "The Importance of Climate Risks for Institutional Investors". In: *The Review of financial studies* 33.3,

pp. 1067–1111. DOI: 10.1093/rfs/hhz137. URL: http://www.econis.eu/PPNSET?PPN=1694418839.

Liang, Hao and Luc Renneboog (2017). "On the Foundations of Corporate Social Responsibility". In: *The Journal of finance (New York)* 72.2, pp. 853–910. DOI: 10.1111/jofi.12487. URL: https://www.jstor.org/stable/26652702.

Lins, Karl V., Henri Servaes, and Ane Tamayo (2017). "Social Capital, Trust, and Firm Performance: The Value of Corporate Social Responsibility during the Financial Crisis". In: *The Journal of finance (New York)* 72.4, pp. 1785–1823. DOI: 10.1111/jofi.12505. URL: https://www.jstor.org/stable/26652553.

Riedl, Arno and Paul Smeets (2017). "Why Do Investors Hold Socially Responsible Mutual Funds?" In: *The Journal of finance (New York)* 72.6, pp. 2505–2550. DOI: 10.1111/jofi.12547. URL: https://www.jstor.org/stable/26653291.

Titman, Sheridan and Kent D. Daniel (1996). *Evidence on the Characteristics of Cross Sectional Variation in Stock Returns*. Tech. rep. National Bureau of Economic Research, p. 5604. DOI: 10.3386/w5604. URL: http://www.nber.org/papers/w5604.

Appendices

A Breusch-Pagan Tests for Heteroskedastic Error Terms

	Dependent variable:			
	Raw Return		Abnormal Return	
	Score	p-value	Score	p-value
Return ∼ ESG Score	0.9874	0.3204	7.3699	0.0066
Return ∼ ESG Score quartiles	2.9011	0.4071	10.347	0.0158
Return ∼ Environm. Score	0.5924	0.4415	7.1247	0.0076
Return ∼ Environm. Score quartiles	1.4726	0.6886	9.4965	0.0234
Return ∼ Social Score	3.5238	0.0605	6.7036	0.0096
Return ∼ Social Score quartiles	3.5238	0.0605	7.9102	0.0479
Return ∼ Governm. Score	0.0023	0.9617	3.8148	0.0508
Return ∼ Governm. Score quartiles	0.0023	0.9617	8.6606	0.0342

Note: A p-value < 0.05 indicates heteroscedasticity and if so, we apply robust standard errors. All models based on panel data consistently have robust standard errors clustered on firm-level, hence, these are not tested.