

GREEN GOES GREEN: TO WHAT EXTENT DOES A COMPANY'S ESG RATING CORRELATE WITH ITS STOCK PERFORMANCE DURING THE COVID-19 PANDEMIC?

**A PANEL DATA REGRESSION STUDY ON THE EU STOCK
MARKET**

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Bachelor Thesis

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Keywords:

ESG, Sustainable Investing, Covid-19, Sector-analysis

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* For helpful comments and suggestions, we thank our tutor Riccardo Sabbatucci, Rickard Sandberg, and seminar participants at Stockholm School of Economics.

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Abstract

This thesis examines the relationship between ESG scores and financial performance during the early stages of the Covid-19 pandemic, using a sample of over 1,000 stocks from the EU and Schengen countries. For the overall market, the results revealed no significant relationship between the pre-2020 ESG score and financial performance. However, social and environmental scores had a positive relationship while governance had a negative relationship. Looking at specific sectors, the results varied between and within sectors. Some sectors, such as the IT and consumer discretionary sectors, had positive relationships with their respective pre-2020 ESG-scores. In contrast, other sectors, such as the financial sector, had a negative relationship. Furthermore, the results display a number of insignificant relationships suggesting that investing in ESG activities may not have had an impact on financial performance during spring 2020.

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1 Introduction

As of March 11th, 2020, the World Health Organization declared Covid-19 a pandemic. The first cluster of cases was reported by the Wuhan Municipal Health Commission, China, on the 31st of December, 2019, followed by a relatively long initial period of exponential increases in detected cases up until it was declared as a pandemic. The first reporting of Covid-19 cases on social media was made on the 4th of January 2020, followed by an increased number of published news as well as public announcements and statements. Thus, starting from the beginning of January, public awareness of Covid-19 increased quickly until it became a world-known pandemic. On the 8th of June 2020, the World Bank announced its forecast stating that Covid-19 will trigger the world's largest recession since World War II. Shutdown measures affecting internationalization, disrupted supply and demand as well as disruption of social services affecting human capital all created a global economic contraction (Felsenthal, 2020; Baldwin et al. 2001; Eichenbaum et al. 2021; Atkeson, 2020; Ma et al. 2020). The characteristics of this financial crisis, including it being caused by a pandemic and its consequent policy responses, have placed the global economy in a new, unfamiliar and unprecedented situation (Reinhart, 2020). Looking at the stock market, focusing on some of the world's major indices, there was a periodical decline in the Euro Stoxx 50-Index of -33.65% (between week 7 and 11 of 2020) (Statista Research Department, 2023a), a fall that could be compared with -27.39% (between week 7 and 12 of 2020) (Statista Research Department, 2023b) and -29.28% (between week 6 to 12 of 2020) (Statista Research Department, 2023c) for the SP 500 and the Dow Jones Industrial Average indexes respectively.

Moreover, during times of economic instability, where volatility is high and performance is low, the overall trust in the financial market decreases (Lins et al., 2017). Therefore, a question arises regarding what factors and corporate characteristics impact the financial performance of businesses in times of a financial crisis. As a result of the current global turmoil, it has been argued that the importance of ESG has reached all

time high levels (Pérez et al., 2022). The United Nations introduced the concept of ESG in 2006, which has since then brought increased attention and awareness to sustainability, even more so during the challenging times of the Covid-19 pandemic. The sustainability reporting ecosystem is undergoing a shift, with an increasing number of companies performing sustainability reporting and regulators implementing mandatory and regulated ESG reporting standards (KPMG, 2022). As a consequence of the increased sustainability reporting, opportunities for both new research and insights within the topic of ESG arise. Whether ESG ratings have a positive relationship with financial performance is a widely discussed and researched topic. A significant number of studies suggest a positive relationship, while others question if there is a relationship at all. Due to ESG being a relatively new concept, there is a need for further research of the relationship between ESG ratings and financial performance (Pérez et al., 2022). As a result, looking further into the relationship of ESG ratings and financial performance during a time of low trust is highly relevant. Consequently, “To what extent does a company’s ESG rating correlate with its stock performance during the Covid-19 pandemic?” is the question that will be addressed in this paper, focusing on both the overall market and specific sectors.

To investigate the relationship between sustainability and financial performance, numerous previous studies have investigated ESG rating’s impact on the stock market. The research has been done in different time periods, including various economic crises, with different ESG ratings and with different empirical methods. However, a gap in the research literature has been identified. The financial crisis induced by the Covid-19 pandemic is different in its nature compared to previous crises and hence of interest to analyze. Furthermore, previous research focuses on the whole stock market’s performance and overlooks different sectors’ relationship between ESG ratings and financial performance. This paper will contribute to existing research by diving deeper into each sector and investigating their respective relationship between ESG ratings and financial performance during the outbreak of Covid-19. Sectors are different in their nature, they

are exposed to a variety of different risks as well as opportunities, thus looking at the impact at sector-specific level is of interest. Using the Global Industry Classification Standards, GICS, a method used to classify economic sectors and industry groups, 11 different sectors are identified and further analyzed. In addition, the geographical scope of this paper will be limited to EU/EEA countries since a large part of existing research focuses on either the US, Asia or a worldwide scope. In short, this thesis will extend research on the relationship between financial performance and ESG scores by applying it to the Covid-19 crisis. It will also contribute to previous literature by applying research to a new geographical setting as well as providing a sectoral approach for the specific setting. Evidently, this is a new approach to the research topic and thus highly relevant given the limitation of previous literature.

In order to investigate ESG ratings' relationships with financial performance, data is collected on ESG ratings before the Covid-19 outbreak as well as stock performance during weeks 6 to 21 of the Covid-19 outbreak. The total weekly stock returns is used as the dependent variable, working as a suitable proxy for financial performance. In addition, the ESG score is used as an explanatory variable and is divided into total ESG score as well as the individual environmental, social and governance scores. Moreover, it is of importance to understand other variables that may impact the performance. Controlling for variables that are constant across all individual stocks, such as time and firm-specific characteristics, will enable an understanding of the actual relationship between the dependent and independent variables of interest. Additionally, including the growth rate of detected Covid-19 cases as an explanatory variable and multiplying it with pre-existing corporate characteristics, an enhanced understanding is made possible. However, some challenges have been identified with analyzing the relationship between ESG ratings and stock performance. These are further elaborated upon below.

An initial difficulty that is acknowledged is the disparity within the sustainability reporting system, leading to a problem of determining the most suitable ESG rating to

use. Six of the most common rating agencies in the market are KLD, Sustainalytics, Moody’s ESG, Refinitiv, MSCI and SP Global. Distinguishing how and why different ESG ratings differ is difficult, however the largest difference, 56% of the divergence, is due to the fact that the measurement procedures differ among ESG rating agencies. Moreover, the “halo effect” is identified among companies’ ESG rating scores. This indicates that if a rating agency gives a high score on one of the firm’s ESG sub-category, they are more likely to give a high score on the rest of the categories as well. As a result of the fragmented ESG rating market, the conclusions from research may differ depending on which ESG rating provider that provides data used (Berg et al., 2022). Consequently, ESG data availability is not only a result of the relatively short time period during which ESG scores have been calculated but also a result of the competitive ESG rating market. A second difficulty is recognised when using the growth rate in the number of detected Covid-19 cases as an explanatory variable. Since testing and reporting of Covid-19 cases differed between countries, especially during the initial period of the pandemic, results using the aforementioned variable may be biased. According to the European Commission, “..., testing strategies widely differed across countries in the early stages of COVID-19, and numerous countries did not prioritize building a solid testing strategy.” (European Commission, 2020). Neglecting the fact that some countries may have had a more limited testing capacity and solely looking at growth rate of detected cases to capture changes in infection risk is problematic. By incorporating the number of people being tested in the Covid-19 variable, this problem could potentially be minimized. In addition, looking at active cases could be another potential solution to the issue (Ding et al., 2021).

The results of this thesis show that firms with higher pre-2020 environmental and social scores were more resilient to the pandemic, while higher pre-2020 governance scores increased negative stock reactions to Covid-19. However, pre-2020 ESG scores have varying impacts on a sectoral level, with the information technology sector showing pos-

itive significant ESG and social scores respectively. The financial sector has significant negative relationships for governance and environmental scores, but positive for social. Furthermore, customer discretionary has significant results with altering signs, compared to consumer staples with no significance found. Furthermore, to increase reliability of our results, we carry out a number of precautionary measures. Firstly, all regressions include fixed effects, both for entity (firms) and time (weeks). Secondly, four control variables are added in order to find more precise estimates. Thirdly, all standard errors from the regressions are clustered to increase credibility. Lastly, an ACF test is conducted, and graphs of the variables used plotted to ensure that the data has no autocorrelation.

The outline of our study is divided into 7 sections. In [Section 2](#), a literature review related to this thesis is presented. Under [Section 3](#), our setting, data and summary statistics are explained and [Section 4](#) dissects our research design. In [Section 5](#), our main results are described followed by [Section 6](#) which is a discussion and conclusion of our results.

2 Literature Review

Ding et al. (2021) investigates the topic of corporate characteristics and its impact on financial performance in relation with Covid-19 cases. Using weekly stock returns and a defined Covid-19 explanatory variable, the paper evaluates how five different pre-pandemic firm characteristics contribute positively or negatively to stock returns during a financial crisis. With a large geographical scope, they have gathered data on 6,700 firms across 61 economies. Financial conditions, international supply chain and customer exposure to Covid-19, corporate social responsibility (CSR), corporate governance and ownership structure are the pre-pandemic characteristics examined which according to the authors may impact ‘corporate immunity’ in a pandemic. A key finding, related to the CSR characteristics, is that firms with a strong CSR performance prior to the pandemic

experienced superior stock returns during the beginning of 2020. In addition, they show that the relationship is even stronger among countries where environmental and social issues are of importance as a consequence of the country's social norms. According to the paper, these results are in line with the idea of CSR contributing to loyalty and stronger bonds among stakeholders. This thesis uses Ding et al.'s paper as a starting point, replicating its methodology to a relatively large extent. Furthermore, this thesis aims to extend their research by focusing on the CSR research and applying it on a sectoral level whilst creating a more homogenous set of firms by limiting the geographical scope to Europe.

Another highly renowned article dissects weather companies that have a higher level of trust, using CSR activities as a proxy, perform better during an economic crisis (Lins et al., 2017). More specifically, the article analyzes the topic in the context of the 2008-09 financial crisis, a crisis that differs in its nature compared to Covid-19. The paper finds that firms with high CSR ratings outperform the firms with a low rating by more than four percentage points. Extending the period of the research to post-crisis, the paper finds that the outperformance does not apply in the post-crisis period. This suggests that it is specifically in a period of low trust that CSR rating proposes an existing risk premia. Furthermore, the paper identifies a positive correlation between high CSR ratings and firm characteristics that suggests a strong financial health, such as high profitability, high sales growth and low debt. The correlation is argued to be due to a higher commitment from both stakeholders and investors of trustworthy firms. In short, this article is highly relevant considering our research question and will work as a suitable springboard for our thesis. The intention of this thesis is to extend the research by applying it to a more recent period of crisis, a period of low trust with a set of different characteristics.

As of today, the number of papers focusing on Covid-19 and its impact on stock performance with a sectoral approach is small. Despite the limited literature, a relevant paper investigates the stock market crash in the month of March 2020, focusing on the

US stock market and the impact it had on different industries. They found that the stock performance of different industries' varied a lot, both in terms of the coefficients' absolute size and direction. During the month of March, healthcare, food, natural gas and software sectors all generated positive stock returns, whereas crude petroleum, real estate, entertainment and hospitality sectors all experienced negative stock returns. In addition to those findings, the paper concludes that firms within the same sector reacted differently to Covid-19 in terms of managerial and financial decisions. The different responses are suggested to be due to differences in corporate governance (Mazur et al. 2021). Furthermore, another paper examines Covid-19's impact on specific industries in the stock market, focusing on the Chinese stock market. Using an event study approach, the paper, just as the previous paper discussed, identifies significant differences among industries' performance. Industries most heavily affected by the pandemic were transportation, mining, electric heating and environmental industries. In contrast, manufacturing, information technology, education and health industries went in the other direction performing relatively well. The paper emphasizes the need for, and lack of, literature on comparisons made on an industrial and sectoral level (He et al. 2020). Adding to this paper and extending it to another geographical scope is beneficial since specific regional characteristics, in this case of the Chinese market, limits conclusions that can be drawn. These papers' research and results recognises the importance of incorporating a sectoral approach in an analysis, visualizing key differences in the whole market. Thus, this thesis aims to contribute to existing research by looking at different sectors' relationship between ESG ratings and financial performance.

3 Setting, Data and Summary Statistics

In this segment, a comprehensive description is provided regarding the choice of setting, more specifically explaining the geographical region of the study and the specific time-

period, ESG background and the data provider’s rating methodology. In addition, a descriptive summary review is presented together with the used data sources.

3.1 Setting

3.1.1 COVID 19

The empirical analysis is based around the Covid-19 crisis. Covid-19 is a contagious disease which is caused by the virus SARS-CoV-2 (World Health Organization, 2023). As of March 11th, 2020, the World Health Organization declared Covid-19 a pandemic. Since then it has had a rapid growth and had severe effects on the world, including a considerable slowdown in economic activity (Brodeur et al., 2021; Baldwin et al., 2001; Eichenbaum et al. 2021; Atkeson, 2020; Ma et al. 2020). The growth rate seemingly stagnated in May 2020 and hence a clear period of the first wave of COVID19 can be defined between January and May which can serve as an economic shock with exogenous origins (Ding et al., 2021).

3.1.2 EU and Schengen

The European Union (EU) is another instrumental part of the conducted thesis. The aim of the union is to create an internal market within Europe as well as to promote and uphold its values in a global context. As a result, the EU is an important scheme of international economic integration and consequently of great interest to study as an area in financial research (El-Agraa, 2011). In addition, the identified gap in research literature makes the specific area interesting for further studies. Furthermore, including Schengen countries in this study is reasonable due to the significance of EU principles which they adhere to. The Schengen countries operate on identical free trade principles and an inclusion of these countries helps expand the pool of available data, consequently increasing the statistical trustworthiness of the study.

3.2 Data

In order to properly test the effect in focus of this thesis, a number of variables with data is needed to be sourced. More specifically: company's stock returns, ESG ratings, corporate characteristics data and Covid-19 cases.

3.2.1 Data Sources

The main data source used in this thesis is Refinitiv Eikon. Weekly stock returns, firm specific characteristics (e.g. ISIN, country of headquarters, sector classification and market capitalization) as well as ESG ratings are collected from Refinitiv. Capital IQ is used as a complement to Refinitiv Eikon, contributing with supplemental firm specific accounting data. Lastly, data on Covid-19 cases is collected separately from a database governed by John Hopkins University.

Regarding the ESG data, there is a clear divergence between different ESG rating agencies, where Bloomberg, KLD and Eikon have distinct differences (Dorfleitner et al. 2015). However, the general methodology to determine firms ESG activities and consequently their ratings, is based on annual reports, sustainability reports, news and other verifiable data in the public domain. According to Wong et al. (2019, 2020), investors prefer a great number of different ESG rating providers, with Refinitiv Eikon (previously Thomson Reuters) (Berg et al., 2021) being one of them. The Refinitiv ESG score uses a bottom-top approach to calculate an ESG score, ranging from 0 to 100. The scores are based on relative firm performance, hence evaluated based on country and industry comparable firms. With over 630 metrics which are manually collected from a variety of public sources and then carefully analyzed, the Refinitiv ESG database succeeds to capture approximately 85% of the global market cap. These 630 metrics are then calculated and divided up to 10 categories, distributed over each E, S and G pillar depending on their assigned weights (Refinitiv, 2022). Refinitiv Eikon is used as a data source for ESG ratings in this thesis, partly due to the fact that Refinitiv Eikon provides

both extensive and reliable data and partly due to a restricted and limited access to other ESG ratings.

Moreover, the Global Industry Classification Standard, GICS, is used to categorize the firms' respective sectors. Developed cooperatively by Morgan Stanley Capital International, MSCI, and Standard Poor's back in 1999, the classification is today applied to over 95% of the world's listed market capitalization. The most general classification level, which is used in this thesis, is the division of the 11 economic sectors: Consumer Discretionary, Consumer Staples, Energy, Materials, Industrials, Healthcare, Financials, Information Technology, Real Estate, Communication Services and Utilities (MSCI, 2018).

As aforementioned, Capital IQ is used as an additional source to Refinitiv Eikon in order to retrieve accounting data suitable to be control variables in order to provide a more robust analysis. Capital IQ is a reliable database that employs a comprehensive methodology to collect and analyze data from over 5000 individual data points. The database operates 24 hours a day, 7 days a week 24/7 to ensure that the data is always current and up-to-date (SP Global Market Intelligence, 2021).

In order to gather data for the number of Covid-19 cases, the interactive web-based dashboard provided by John Hopkins University is used. This source supplies researchers, public health authorities as well as the public with data in a freely accessible manner. Moreover, it is aligned with data reports provided by both WHO and Chinese CDC (Dong et al. 2020).

3.2.2 Sample Selection

A similar methodology to Ding et.al's (2021) sample selection has been applied to this thesis. A number of measures were taken with regards to creating an appropriate dataset for studying the effect using regressions. Firstly, the Refinitiv Eikon dataset only includes companies with reported ESG ratings in the Refinitiv database. Consequently, firms without an ESG rating were excluded in the final regressions. Secondly, the Covid-

19 dataset was filtered to only include the applicable geographical area (matching the stocks' countries of headquarters to EU and Schengen countries). Thereafter, three new values were calculated, including cumulative cases by week, growth rate of cases in a specific country and week and lastly its logarithmic form (needed for our research design). Thirdly, companies' stock returns during 2020, their corresponding ESG ratings for 2019 and corporate characteristics data from 2019 were merged. Subsequently, the new dataset was combined with the Covid-19 dataset, merged by both country and week from the respective datasets. Lastly, the complete dataset was purposely, as described above, limited to the specified time period to be studied, week 6, 2020 to week 21, 2020. During the process of completing the final dataset for the regressions, companies with missing data, in any of the columns, were removed. In addition, companies with a market capitalization below 250 million dollars were excluded from the sample. The rationale behind this is that smaller firms usually have lower liquidity, higher bid-ask spreads, and other characteristics that make them more vulnerable to the impact of crises (Lins et al., 2017). Evidently, by following these measures, a representative sample of European firms during the period specified was obtained with 14,008 observations, including more than 1,000 firms. Finally, the data sample was divided into sub-samples according to the GICS classification, enabling sector-specific analyses to be conducted.

3.3 Summary Statistics

The summary statistics (Table 1) includes an overview of all variables included in the research design. The Covid-19 variable is calculated as the cumulative weekly growth rate of detected Covid-19 cases in each respective country. By including this variable, each respective country's exposure to Covid-19 is captured. The rationale behind using growth rate in Covid-19 is, as Ding et al. (2021) explains, that previous growth rates can be used as a proxy for the market's expected growth rate. The formula for calculating the variable is as follows:

$$COVID19_{c,t} = \ln(1 + Cumulative\ cases_{c,t}) - \ln(1 + Cumulative\ cases_{c,t-1}) \quad (1)$$

In Equation 1, index c and t is country and week respectively, thus Cumulative cases $_{c,t}$ represents the number of cumulative weekly cases in each country. Moreover, log transformation is used to linearize the variable of weekly Covid-19 cases over time. Additionally, combining the methodology of Ding et al. (2021) and Lins et.al (2017) several control variables, i.e. factors that might impact the main analysis, are introduced. Firm traits such as firm size, leverage, cash and profitability are included as control variables. Firm size is the logarithmic value of each firm's market cap, leverage equals debt (short- and long-term) over total assets, cash equals the ratio between cash on hand over total assets and profitability is equal to gross profit margin.

Table 1

Summary Statistics: This table presents the summary statistics of key variables used in the study. N explains the number of non-missing observations for the specific variable. The average (mean) and standard deviation are determined across these observations for the specific variable. In addition, the value of the variable for minimum, 25th, 75th percentile and maximum of the distribution of the variable is provided.

Variable	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
<i>Weekly Stock Return</i>	14,008	-1.206	11.098	-74.125	-6.379	4.003	122.333
<i>COVID19</i>	14,008	0.903	0.677	0.144	0.395	1.315	4.723
Firm Characteristics							
<i>ESG Score</i>	14,008	55.472	20.010	1.599	41.751	70.943	94.155
<i>Social</i>	14,008	60.246	22.485	1.740	44.395	78.403	98.128
<i>Governance</i>	14,008	52.727	22.743	1.242	35.135	71.052	98.566
<i>Environmental</i>	14,008	50.712	25.780	0.000	31.469	72.114	98.886
<i>Firm Size (ln)</i>	14,008	22.052	1.671	19.347	20.709	23.092	29.906
<i>Cash</i>	14,008	0.111	0.108	0.000	0.044	0.139	0.940
<i>Leverage</i>	14,008	0.280	0.169	0.000	0.158	0.389	1.096
<i>Profitability</i>	14,008	0.434	0.310	-5.771	0.261	0.590	1.004

Table 1 presents the summary statistics of key variables incorporated in this research with a set of 14,008 number of observations. Weekly stock returns have a negative

mean, thus indicating that the average return for companies within EU and Schengen was negative during the initial period of the pandemic. In addition, the high standard deviation implies a highly volatile market. Furthermore, the cumulative weekly growth rate in logarithmic form for Covid-19 cases is 0.903 with a standard deviation of 0.677, indicating a sizable growth during the period with the minimum growth for a week being 0.144 and maximum of 4.723. Regarding the number of different measures of ESG, social has the greatest mean, although similar standard deviations to governance and environment. Interestingly, the environment has the smallest mean together with a minimum of 0 whilst also having the highest maximum score. Clearly differences among the parameters exist and could lead to different findings in the study. The summary statistics also include a number of firm characteristics which works as control variables in the thesis. Profitability has the highest standard deviation, including a negative minimum number indicating that some firms were not profitable prior to 2020. Profitability is the only ratio which can include a negative component whilst the other ratios include balance sheet items with a value of zero or above.

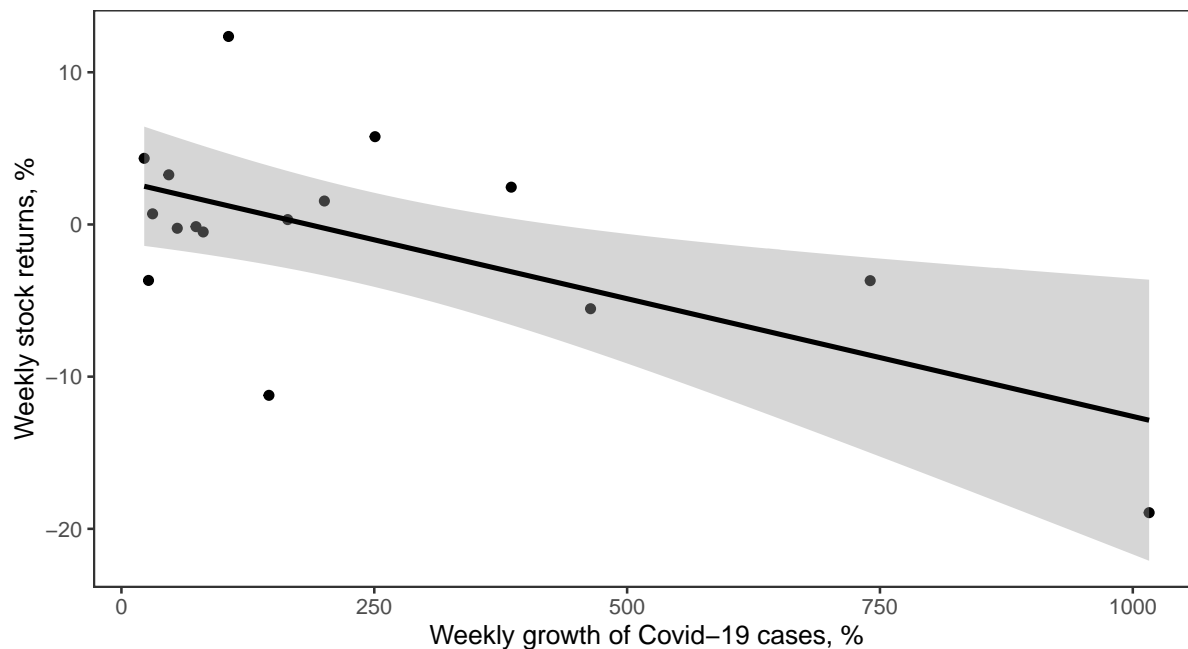


Figure 1. This figure presents the cross-sectional relation between average weekly stock returns across firms and the growth rate of COVID-19 cases. Each spot represents a week. The x-axis denotes the average weekly growth rate of COVID-19 cases for that week. The y- axis represents the weekly stock returns, averaged across the sample firms for that week. The period stretches from week 6 to week 21.

Plotting [Figure 1](#), the weekly stock returns and weekly growth of Covid-19 cases visualizes a clear negative trend. 16 weeks, thus 16 data points, are incorporated showing the trend from week 6 to week 21. It is clear that the week with highest growth of Covid-19 cases has the lowest weekly stock returns of almost -20%. Plotting these variables indicate that Covid-19 is of interest to use as an interaction term in further analyses of stock returns during this specific time frame.

Table 2

Correlation Matrix: The correlation matrix present how two different variables move together, either in the same or opposite direction (positive and negative coefficient respectively). The correlation coefficient indicates the strength of the two variables' relationship, with its value ranging from -1 to +1. This table includes all variables which present useful information for the regressions carried out.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Weekly Stock Return	1								
(2) COVID19	-0.270	1							
(3) ESG Score	-0.030	0	1						
(4) Social	-0.030	0	0.910	1					
(5) Governance	-0.020	-0.010	0.720	0.480	1				
(6) Environmental	-0.030	0	0.870	0.760	0.430	1			
(7) Firm Size	0.020	0.010	0.470	0.410	0.340	0.440	1		
(8) Cash	0.030	-0.010	-0.210	-0.190	-0.130	-0.240	-0.150	1	
(9) Leverage	-0.040	0.010	0.090	0.080	0.050	0.090	-0.010	-0.270	1
(10) Profitability	0.010	0	-0.010	0.010	0.010	-0.050	0.070	0.030	0.070

Looking at [Table 2](#), the weekly cumulative growth rate of Covid-19 cases, COVID19, has a negative correlation with weekly stock returns with a magnitude of -0.27. This further visualizes the negative relationship between the pandemic and the stock market. Moreover, as expected there is a strong and positive correlation between the independent environmental, social and governance scores and the ESG score. The largest correlation of those is between the social and ESG score, indicating that these two move the most in the same direction. Furthermore, we see that firm size has a positive correlation with the ESG score and its respective E, S, and G scores. Leverage has, just as firm size, a positive correlation with all the ESG scores, however with much smaller magnitudes of the correlation coefficients. On the contrary, cash has negative correlation with the ESG scores. Profitability has altering positive and negative correlations among the ESG, E, S and G scores and just as with leverage, with very small magnitudes.

4 Research Design

4.1 Hypothesis

Hypothesis 1: Higher ESG rating results in better stock performance during Covid-19

The hypothesis is in line with the findings of both Ding, et al. (2021) paper and Lins et al.'s (2017) paper. A conducted literature research has identified a significant number of papers indicating the same relationship. These papers have a general conclusion that high sustainability scores lower stock volatility and thus acts as a risk management tool during times of crisis. However, according to the literature research conducted, there is still a significant number of research resulting in no, and even some a negative, relationship between ESG ratings and stock returns. Thus, the relationship between stock returns and ESG is not yet clear and aims to be investigated in this thesis.

Hypothesis 2: Higher ESG rating results in better stock performance during COVID-19 for respective sectors

A second hypothesis is stated to further investigate the relationship between financial performance and ESG during Covid-19, with the aim of investigating whether individual sectors differ compared to the combined market. It is a reasonable extension to make considering that Mazur et al. (2021) and He et al. (2020) found clear differences between sectors' individual performance. According to them, the differences could possibly be explained by the G in ESG. Since sectors have different characteristics and thus are exposed to different idiosyncratic risks, we expect to see altering magnitudes of the expected positive relationship between financial performance and ESG scores.

4.2 Empirical model

Ding et.al (2021) contributes to the foundation of the empirical model used in this thesis, both for the overall market performance regressions and the sectorial ones. To investigate

the relationship between firm's ESG scores and stock performance, we use the following panel regression model:

$$Ret_{i,t} = \beta_1 * Covid19_{c,t} + \beta_2 * X_{i,pre2020} + \beta_3 X_{i,pre2020} * Covid19_{c,t} + \delta_i + \delta_t + \varepsilon_{i,t} \quad (2)$$

In the specified model, i and t represent indexes for firm and time respectively. The dependent variable, $Ret_{i,t}$ represents the weekly stock return of each firm. Equation 2 captures the pre-Covid 19 characteristics of each firm in the independent variable $X_{i,pre2020}$. By incorporating ESG ratings as well as other firm traits that each firm encompassed before the pandemic, i.e. before 2020, the model is able to represent the relationship between these variables and stock returns during the initial period of the pandemic. These pre-2020 control variables are multiplied with the Covid-19 variable, i.e. the weekly cumulative growth rate in detected Covid-19 cases for each country. This allows us to assess stock returns while accounting for economies' exposure to the Covid-19 pandemic. By incorporating firm (δ_i) and time (δ_t) fixed effects in the model it is possible to condition out any time-invariant differences across firms.. We want to condition out both firm fixed effects as well as time fixed effects to fully capture the relationship between stock returns and ESG ratings and increase robustness of the study. This is done by controlling for both observable and unobservable systematic differences among observed firm and time units.

Furthermore, to facilitate the interpretation of our panel regression model, a selection of the continuous variables in our model are standardized. These include weekly stock returns, ESG Scores (including environmental, social and governance scores), cash, profitability and leverage. Firm size and COVID19 variables are in their logarithmic form, thus constituting a more suitable alternative to the standardization.

5 Main Results

In the following section, we present the results from our regressions, both for the overall market and each sector.

5.1 Independent variables and stock performance for the overall market in Europe

5.1.1 Covid-19 displaying control variables

Table 3

Corporate financial conditions and stock returns in response to COVID-19 for the overall market: The table reports regression results analyzing how stock prices respond to the COVID-19 pandemic as functions of pre-pandemic corporate financial conditions. The dependent variable is the weekly stock return for each firm. COVID19 is the weekly growth rate of the number of confirmed COVID-19 cases in an economy in natural logratimic form. To measure a firm's financial conditions, we use Firm Size, Leverage, Cash and Profitability and they are in addition included as control variables in regression (2) and (3). Variables total returns, leverage, cash and profitability are standardized and COVID19 together with Firm Size are in natural logratimic form. The analyses cover the period from week 9, 2020 to week 15, 2020. The Appendix provides detailed variable definitions. We include firm and week fixed effects. Robust standard errors clustered at firm level are reported in parentheses. , , and denote significance levels at 1 %, 5 %, and 10 %, respectively.

Variable	Weekly Stock Returns	
	(1)	(2)
<i>COVID19</i>	-0.006 (0.017)	-0.538*** (0.109)
<i>Firm Size * COVID19</i>		0.024*** (0.005)
<i>Leverage * COVID19</i>		-0.018 (0.011)
<i>Cash * COVID19</i>		0.004 (0.013)
<i>Profitability * COVID19</i>		0.004 (0.009)
Control variables	No	Yes
Firm fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Number of Firms	1037	1037
Observations	14,008	14,008
R2	0.00001	0.001
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01	

As seen in [Table 3](#), COVID19, i.e. the variable for the cumulative growth of detected Covid-19 cases, has a negative relationship with weekly stock returns. When incorporating control variables, as well as fixed effects, the coefficient has a magnitude of -0.538 and is highly significant. This suggests that a country’s exposure to the Covid-19 pandemic is strongly and negatively correlated with the stock market performance of firms in that country. The estimates of the coefficient implies that the average weekly exposure to the Covid-19 pandemic (0.903, [Table 1](#)) is associated with the stock prices among firms in that country falling by 0.49 ($= 0.903 \times 0.538$) percentage points. Moreover, looking at the variable of firm size, considering its exposure to the pandemic, we see a positive significant relationship. This implies that larger firms are associated with positive weekly stock returns and would thus improve the stock price reaction to the pandemic. This estimate suggests that a one standard deviation increase in their logarithmic market cap would improve stock returns during the pandemic by 0.036 ($= 0.024 \times 1.671 \times 0.903$) percentage points. Moreover, [Table 3](#) reveals that Cash * COVID19 and Profitability * COVID19 enters with a positive coefficient, however not significant.

5.1.2 ESG scores and respective sub-scores

The results presented in [Table 4](#) suggest that firms with a greater pre-2020 environmental and social scores are more resilient to the pandemic. Entering positively and significantly, the result of these two sub-indices are in line with the first hypothesis of this thesis. Column 2 implies that if the Covid-19 cases grew at the average weekly rate in each country, a one standard deviation increase in the environmental Score (25.8) would increase the average weekly stock returns by 0.65 ($= 25.8 \times 0.028 \times 0.903$) percentage points. The same rational can be applied to the pre-2020 social score, where a one standard deviation increase (22.5), prior to 2020, would improve stock price reaction to Covid-19 with 0.59 ($= 22.5 \times 0.029 \times 0.903$) percentage points. In contrast, the Governance * COVID19 enters negatively and significantly, suggesting that firms with a higher pre-2020 governance

score would have lower stock prices as a reaction to Covid-19. An increase in the pre-2020 governance score's standard deviation (22.7) would result in an amplified negative stock return with 0.53 ($= 22.7 * 0.026 * 0.903$) percentage points. As noted in the table, all these estimated effects are economically meaningful. Moreover, the social score has the largest impact on average weekly stock returns, thus a one standard deviation increase in this score would impact the average weekly stock returns the most, in a positive direction.

Table 4

ESG and stock returns in response to COVID-19.: The table reports regression results analyzing how stock prices respond to the COVID-19 pandemic as functions of pre-pandemic corporate social responsibility activities. The dependent variable is the weekly stock return of each firm. We measure a firm's ESG performance using the overall ESG Score and the independent Environmental, Social, and Governance scores. Firm Traits COVID19 represents the interactions of COVID19 and a set of firm characteristics (i.e., Firm Size, Leverage, Cash, and ROA). Variables total returns, leverage, cash and profitability are standardized and COVID19 together with Firm Size are in natural logarithmic form. The Appendix provides detailed variable definitions. We include firm and week fixed effects. Robust standard errors are clustered at firm level are reported in parentheses. *, **, and *** denote significance levels at 1%, 5%, and 10%, respectively.

Variable	Weekly Stock Returns			
	(1)	(2)	(3)	(4)
<i>ESG Score * COVID19</i>	0.016 (0.010)			
<i>Environmental * COVID19</i>		0.028*** (0.010)		
<i>Social * COVID19</i>			0.029*** (0.011)	
<i>Governance * COVID19</i>				-0.026** (0.010)
Control Variables	Yes	Yes	Yes	Yes
Firm Traits * COVID19	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Number of Firms	1037	1037	1037	1037
Observations	14,008	14,008	14,008	14,008
R2	0.002	0.002	0.002	0.002

Note:

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

5.2 Independent variables and sectoral stock performance in Europe

5.2.1 Sector and Covid-19 displaying control variables

Looking further into the respective sector of the sample of firms, Covid-19 and stock performance seemingly have more altering relationships (Table A1 and Table A2). Consumer staples, consumer discretionaries and communication services all have a significant negative relationship between average weekly stock returns and Covid-19 cases. Moreover, all these three industries have a significant positive relationship between pre-covid firm size and weekly stock returns, indicating that larger firms within these sectors have performed better than smaller firms during Covid-19. A one standard deviation increase in their respective logarithmic firm sizes (1.756, 1.583 and 1.463), would improve their respective weekly stock returns with 0.09 ($= 1.756 * 0.055 * 0.903$), 0.05 ($= 1.583 * 0.035 * 0.903$) and 0.06 ($= 1.463 * 0.044 * 0.903$) percentage points respectively.

In addition, higher cash levels and profitability contributed significantly and positively to stock returns during Covid-19 within the financial sector. The economic interpretation is that a one standard deviation increase in these pre-2020 firm characteristics, 0.075 and 0.318 respectively, would increase stock prices with 0.02 ($= 0.075 * 0.242 * 0.903$) and 0.09 ($= 0.318 * 0.314 * 0.903$) percentage points respectively. Information technology also displayed a positive relationship between its Profitability * COVID19 variable and weekly stock returns, indicating that a one standard deviation higher profitability pre-2020 increased stock returns during the pandemic with 0.01 ($= 0.218 * 0.050 * 0.903$) percentage points for these firms.

Furthermore, looking at the number of observations and firms each sector has, it can be concluded that all sectors except real estate have a sufficiently high number of firms in their samples. More specifically, real estate has only 3 firms with a sum of 42 observations included in the sample. This causes concerns regarding its validity, for

example, its standard deviations are close to zero to (or completely non-existent), thus this variable is disregarded in further analyses.

5.2.2 Sectors and ESG scores

Table 5

ESG.Score and stock returns in response to COVID-19. for Industrials, Materials, Communication Services, Utilities, Energy, Information Technology, Consumer Staples, Health Care, Consumer Discretionary, Financials and Real Estate: The table reports regression results analyzing how stock prices respond to the COVID-19 pandemic as functions of pre-pandemic corporate social responsibility activities. The dependent variable is the weekly stock return of each firm. We measure a firm's ESG performance using the overall ESG Score. Firm Traits COVID19 represents the interactions of COVID19 and a set of firm characteristics (i.e., Firm Size, Leverage, Cash, and ROA). Variables total returns, leverage, cash and profitability are standardized and COVID19 together with Firm Size are in natural logratimic form. The Appendix provides detailed variable definitions. We include firm and week fixed effects. Robust standard errors are clustered at firm level are reported in parentheses. , , and denote significance levels at 1%, 5%, and 10%, respectively.

Variable	Weekly Stock Returns					
	Ind. (1)	Mat. (2)	Com.Ser. (3)	Uti. (4)	Enr. (5)	Inf.Tec. (6)
<i>ESG Score * COVID19</i>	0.005 (0.020)	-0.033 (0.027)	0.040 (0.031)	-0.007 (0.038)	-0.007 (0.052)	0.044* (0.027)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm Traits * COVID19	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Nr. of Firms	298	108	81	55	48	91
Observations	4,044	1,419	1,110	720	597	1,253
R2	0.002	0.002	0.004	0.003	0.017	0.007
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01					

Variable	Weekly Stock Returns				
	Con.Sta. (7)	Hea.Car. (8)	Con.Dis. (9)	Fin. (10)	Rea.Est. (11)
<i>ESG Score * COVID19</i>	0.065 (0.045)	0.038 (0.025)	0.026 (0.026)	-0.277*** (0.049)	4.371*** (0.00000)
Control Variables	Yes	Yes	Yes	Yes	Yes
Firm Traits * COVID19	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Nr. of Firms	77	101	169	6	3
Observations	1,013	1,365	2,363	82	42
R2	0.006	0.005	0.004	0.21	0.074
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01				

When incorporating the ESG Score, interacting with the COVID19 term, we see varying results of the different sectors (Table 5). We note that 6 out of the 10 sectors we analyse experienced a positive effect of a high ESG Score pre-2020 during the pandemic. However, only one of these shows a significant result, namely the information technology sector. The estimate of information technology suggests that a one standard deviation increase would increase stock prices with 0.76 ($= 19.211 * 0.044 * 0.903$) percentage points. In contrast, the financial sector result in a negative significant relationship between the ESG score, indicating that a one standard deviation increase in the ESG score would amplify the negative average weekly stock returns with ($= 19.083 * 0.277 * 0.903$) 4.77 percentage points. Thus, the impact of high ESG scores in the financial sector is large.

5.2.3 Sectors and Environmental Scores

Regressing our dependent variable, average weekly stock returns, on the environmental score we note that a higher share of our relationships are significant compared to the ESG score (Table 6). Out of the 10 relationships we analyse, 6 are positive and 3 are both positive and significant. The communication services, health care and consumer discretionary sectors all have a positive relationship, indicating that a high environmental score improved stock performance during the beginning of Covid-19. A one standard deviation increase in this pre-2020 score would improve these firms' performance by 1.35 ($= 22.676 * 0.066 * 0.903$), 1.96 ($= 26.119 * 0.082 * 0.903$) and 0.96 ($= 24.792 * 0.043 * 0.903$) percentage points respectively. Identically to the ESG score, the financial sector has a negative relationship between its pre-2020 environmental score * COVID19 and its average weekly stock returns. The results show that the sector would experience a 2.87 ($= 31.484 * 0.101 * 0.903$) percentage points lower stock return if the environmental score were to increase with one standard deviation.

Table 6

Environmental Score and stock returns in response to COVID-19 for Industrials, Materials, Communication Services, Utilities, Energy, Information Technology, Consumer Staples, Health Care, Consumer Discretionary, Financials and Real Estate: The table reports regression results analyzing how stock prices respond to the COVID-19 pandemic as functions of pre-pandemic corporate social responsibility activities. The dependent variable is the weekly stock return of each firm. We measure a firm's ESG performance using the Environmental score. Firm Traits COVID19 represents the interactions of COVID19 and a set of firm characteristics (i.e., Firm Size, Leverage, Cash, and ROA). Variables total returns, leverage, cash and profitability are standardized and COVID19 together with Firm Size are in natural logratimic form. The Appendix provides detailed variable definitions. We include firm and week fixed effects. Robust standard errors are clustered at firm level are reported in parentheses. , , and denote significance levels at 1%, 5%, and 10%, respectively.

Variable	Weekly Stock Returns					
	Ind. (1)	Mat. (2)	Com.Ser. (3)	Uti. (4)	Enr. (5)	Inf.Tec. (6)
<i>Environmental * COVID19</i>	0.005 (0.019)	-0.007 (0.026)	0.066*** (0.019)	-0.012 (0.038)	0.013 (0.056)	0.038 (0.025)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm Traits * COVID19	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Nr. of Firms	298	108	81	55	48	91
Observations	4,044	1,419	1,110	720	597	1,253
R2	0.002	0.002	0.006	0.003	0.017	0.007
<i>Note:</i> *p<0.1; **p<0.05; ***p<0.01						

Variable	Weekly Stock Returns				
	Con.Sta. (7)	Hea.Car. (8)	Con.Dis. (9)	Fin. (10)	Rea.Est. (11)
<i>Environmental * COVID19</i>	0.042 (0.038)	0.082*** (0.028)	0.043** (0.022)	-0.101*** (0.018)	-6.557*** (0.00000)
Control Variables	Yes	Yes	Yes	Yes	Yes
Firm Traits * COVID19	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Nr. of Firms	77	101	169	6	3
Observations	1,013	1,365	2,363	82	42
R2	0.006	0.008	0.005	0.21	0.074
<i>Note:</i> *p<0.1; **p<0.05; ***p<0.01					

5.2.4 Sectors and Social Scores

Table 7

Social Score and stock returns in response to COVID-19 for Industrials, Materials, Communication Services, Utilities, Energy, Information Technology, Consumer Staples, Health Care, Consumer Discretionary, Financials and Real Estate: The table reports regression results analyzing how stock prices respond to the COVID-19 pandemic as functions of pre-pandemic corporate social responsibility activities. The dependent variable is the weekly stock return of each firm. We measure a firm's ESG performance using the Social score. Firm Traits COVID19 represents the interactions of COVID19 and a set of firm characteristics (i.e., Firm Size, Leverage, Cash, and ROA). Variables total returns, leverage, cash and profitability are standardized and COVID19 together with Firm Size are in natural logarithmic form. The Appendix provides detailed variable definitions. We include firm and week fixed effects. Robust standard errors are clustered at firm level and are reported in parentheses. *, **, and *** denote significance levels at 1%, 5%, and 10%, respectively.

	Weekly Stock Returns					
Variable	Ind. (1)	Mat. (2)	Com.Ser. (3)	Uti. (4)	Enr. (5)	Inf.Tec. (6)
<i>Social * COVID19</i>	0.014 (0.020)	-0.001 (0.030)	0.058** (0.029)	-0.008 (0.037)	0.007 (0.056)	0.053** (0.022)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm Traits * COVID19	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Nr. of Firms	298	108	81	55	48	91
Observations	4,044	1,419	1,110	720	597	1,253
R2	0.002	0.002	0.005	0.003	0.016	0.008
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01					

	Weekly Stock Returns				
	Con.Sta.	Hea.Car.	Con.Dis.	Fin.	Rea.Est.
Variable	(7)	(8)	(9)	(10)	(11)
<i>Social * COVID19</i>	0.057 (0.041)	0.059** (0.023)	0.051* (0.028)	0.289*** (0.051)	-0.214*** (0.000)
Control Variables	Yes	Yes	Yes	Yes	Yes
Firm Traits * COVID19	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Nr. of Firms	77	101	169	6	3
Observations	1,013	1,365	2,363	82	42
R2	0.006	0.007	0.005	0.21	0.074
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01				

The results of [Table 7](#) suggests that the majority of firms' stock prices with a greater pre-2020 Social score in their ESG rating were more resilient to the pandemic. 8 out of 10 sectors experienced this positive effect from a high pre-2020 social score, with 5 of the relationships being significant. The communication services, information technology, health care, consumer discretionary and financial sector all had a significant and positive Social * COVID19 estimate. The economic interpretation indicate that if the Covid-19 cases grew at the average weekly rate in each country, a one standard deviation in each of the scores, 22.553, 22.133, 21.991, 21.576 and 22.014, would increase weekly stock returns with 1.18 ($= 22.553 * 0.058 * 0.903$), 1.06 ($= 22.133 * 0.053 * 0.903$), 1.17 ($= 21.991 * 0.059 * 0.903$), 0.99 ($= 21.576 * 0.051 * 0.903$) and 5.74 percentage points respectively. As seen, the results for communication services, health care and consumer discretionary sector are consistent with their environmental score in that they have a both positive and significant impact on average weekly stock returns during the pandemic.

5.2.5 Sectors and Governance Scores

Lastly, in contrast to the environmental and social pre-2020 score, the governance score had on average a negative impact on the weekly stock returns during the pandemic ([Table 8](#)). Only 3 out of the 10 sectors have a positive relationship, however none of them are significant. If the Covid-19 cases grew at an average weekly rate in each country, then the materials, consumer discretionary and financial sectors would, with a one standard deviation increase in their pre-2020 governance score, amplify their negative weekly stock returns with 1.60 ($= 24.971 * 0.071 * 0.903$), 1.00 ($= 20.549 * 0.054 * 0.903$) and 4.81 ($= 22.657 * 0.235 * 0.903$) percentage points respectively.

Table 8

Governance Score and stock returns in response to COVID-19 for Industrials, Materials, Communication Services, Utilities, Energy, Information Technology, Consumer Staples, Health Care, Consumer Discretionary, Financials and Real Estate: The table reports regression results analyzing how stock prices respond to the COVID-19 pandemic as functions of pre-pandemic corporate social responsibility activities. The dependent variable is the weekly stock return of each firm. We measure a firm's ESG performance using the Governance score. Firm Traits COVID19 represents the interactions of COVID19 and a set of firm characteristics (i.e., Firm Size, Leverage, Cash, and ROA). Variables total returns, leverage, cash and profitability are standardized and COVID19 together with Firm Size are in natural logratimic form. The Appendix provides detailed variable definitions. We include firm and week fixed effects. Robust standard errors are clustered at firm level are reported in parentheses. , , and denote significance levels at 1%, 5%, and 10%, respectively.

Variable	Weekly Stock Returns					
	Ind. (1)	Mat. (2)	Com.Ser. (3)	Uti. (4)	Enr. (5)	Inf.Tec. (6)
<i>Governance * COVID19</i>	-0.009 (0.016)	-0.071** (0.032)	-0.014 (0.031)	0.023 (0.037)	-0.037 (0.052)	0.013 (0.025)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm Traits * COVID19	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Nr. of Firms	298	108	81	55	48	91
Observations	4,044	1,419	1,110	720	597	1,253
R2	0.002	0.006	0.003	0.003	0.018	0.006

Note:

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

Variable	Weekly Stock Returns				
	Con.Sta. (7)	Hea.Car. (8)	Con.Dis. (9)	Fin. (10)	Rea.Est. (11)
<i>Governance * COVID19</i>	0.024 (0.040)	-0.023 (0.027)	-0.054* (0.029)	-0.235*** (0.041)	0.570
Control Variables	Yes	Yes	Yes	Yes	Yes
Firm Traits * COVID19	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Nr. of Firms	77	101	176	6	3
Observations	1,013	1,365	2,458	82	42
R2	0.005	0.004	0.006	0.21	0.074

Note:

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

5.3 Summary of Results

To summarize our findings, looking at the overall market, the social and environmental scores have a positive and significant impact on stock returns during the initial period of the economic crisis caused by the Covid-19 pandemic. This suggests that a higher score limits the downside of the crisis since firms with a high score are more resilient to the economic downturn. Moreover, we see signs of the same trend when looking at each individual sector's environmental and social scores. However, the results are diverse and do not result in significant results across all sectors. The governance score has an opposite impact on stock performance, further decreasing the negative stock returns caused by the financial crises.

5.4 Robustness tests

A number of measures have been taken to further increase the trustworthiness of the estimates presented in this thesis. First of all, control variables have been added in order to capture a more precise effect, as well as excluding micro-cap firms (below 250 million dollars). Furthermore, fixed effects for both time and firms have been added for the panel data regressions allowing us to only study the within effect. In accordance with applying the fixed effect methodology, standard errors have been clustered at the firm level. This approach aligns with best practices and enables the test to be carried out correctly. Lastly, an ACF test has been done to correctly recognise any potential serial correlation that could be present and hence confirms that the test is trustworthy.

6 Discussion and Conclusion

In this section, we summarize the empirical and sample-related limitations and discuss our findings.

6.1 Sample-related limitations

Before discussing the results, it is important to recall some empirical and sample-related limitations that could impact the findings. The use of one single ESG score as a classification of firm specific ESG rating poses a limitation to these results. There exist multiple ESG scores that differ in their nature, creating a question regarding what or which scores to use. However, using multiple rating agencies and conducting one analysis per provider would be impractical given the nature of this thesis. Combining different providers could result in issues related to internal validity, particularly due to the potential selection bias (Winship and Mare, 1992). Furthermore, Covid-19 testing across Europe, especially in the initial period of the pandemic, posed another limitation to the result creating uncertainties regarding how many actual active cases each country had. Thus, the robustness of our regressions can be questioned. Lastly, when dividing the initial sample into respective GICS sectors, relatively small sample sizes creates results with a lack of confidence due to lower reliability and accuracy of the respective regression analysis. Moreover, it is possible that there are unobserved endogenous effects that our control variables do not account for in the relationship between each regression. As a result, the overall performance of each sector during the Covid-19 pandemic could impact the sign, size, and significance of the estimates.

6.2 Overall Market Performance

6.2.1 Positive and significant Environmental and Social Score

To begin with, the overall market results (see [Table 4](#)) shows positive and significant results for both social and environmental scores. This indicates that firms during the crisis of Covid-19 performed better if they had a higher score in the social or environmental dimensions. These results are in line with previous research findings (Ding et.al, 2021; Lins et al., 2017). Furthermore, looking at a sectoral level on the respective E, S and G

pre-2020 scores, the social score resulted in the largest number of individual significant relationships (5 out of 10, excluding the real estate sector). Thus, the social part of ESG seems to have the most prominent impact among the different industries, all with positive signs. The environmental score had a slightly lower number of significant individual relationships among the sectors (4 out of 10). Moreover, the environmental score had more varying relationships among the different industries, however with the majority of the significant relationships being positive. As the prices in the stock market include market sentiments, beliefs about the future and other factors not directly linked to firms' performances and bottom line, it is not possible to state a single explanation to the positive link between social and environmental scores and financial performance during Covid-19. However, Albuquerque et al. (2019) claim that CSR activities, such as focusing on employee well-being, creating safe products, value relationships and agreements with suppliers, cherishing the environment, etc., could potentially strengthen relationships between stakeholders and firms. Strengthening the relationship, thus building trust between the respective parties, could in turn have positive effects during crises. Suggesting that social and environmental activities build more trust and thus that firm's investing in these activities perform better in a period of low trust is in line with Lins et al (2017) research. As aforementioned, they state that CSR activities pose a risk premia in times of low trust, such as during a crisis causing economic instability (Lins et al., 2017).

6.2.2 Negative and Significant Governance Score

In contrast to the social and environmental score, the governance score turns out negative and significant in our results (see [Table 4](#)). At a sectoral level, a number of individual regressions also display a negative relationship (3 out 10 being negative and significant). This implies that firms with a greater governance score experienced, on average, lower resilience during the crisis. Interestingly, Ding et al. (2021) do not include governance in their CSR regression analyses, instead they treat corporate governance as a separate pre-

2020 corporate characteristics. They found a negative relationship between the number of antitakeover provisions for each firm, something they interpret as entrenched executive. This is argued to be in line with the view of executive entrenchment and its negative relationship with ability to respond effectively to a crisis. Hence, a possible explanation behind our negative governance score could be a higher rate of executive entrenchment. Moreover, they examine the size and shape of the board as well as the compensation schemes and find no significant relationships. Adding to this, Lins et al. (2017) does not include ESG Stats corporate governance category in their main analyses, since they argue that this is generally not included in a firms' CSR rating. However, they still argue that it may be correlated with the trustworthiness of a firm, thus include it in their robustness tests and find no significant relationship between it and stock returns. These articles' treatment of the governance variable indicate that it might be relevant to treat the variable separately. Alternatively, looking further into this variable and analyzing the Refinitiv governance score's respective sub-components (management, shareholders and CSR strategy) could be relevant.

6.3 Sectoral Market Performance

6.3.1 Positive and significant scores for the Information Technology sector

Diving deeper into the analysis, the only sector which had a positive and significant relationship between the overall ESG score and average weekly stock returns during Covid-19, thus supporting our second hypothesis, was the information technology sector. Furthermore, the social score was the only individual E, S and G score with a significant relationship, indicating that this sub-score was the main driver of the IT sector's overall results. Consequently, entering the pandemic with a high social score in the IT sector proved to be economically meaningful and improved stock returns. Looking at the characteristics of the Covid-19 pandemic, we see that it has accelerated the digitalization of industries and societies, increasing demand for new and further integrated IT systems.

Moreover, the nature of the information technology sector is highly competitive, with developments happening at a rapid pace, causing the length of products' life-cycles to decrease. Research has shown that in such a fast-paced environment, where differentiation becomes difficult, it is important for long-term success to create and improve intangible assets such as social capital. In addition, customer loyalty and commitment, increased by social capital and trust, is of great importance in the information technology sector, building a further market advantage (Del-Castillo-Feito et al., 2022; Mazur et al., 2021). Implementing this body of research to our thesis, it becomes possible to explain, at least partially, what the driving forces could be behind the results.

6.3.2 Both Positive and Negative scores with significance for the Financials Sector

Furthermore, the financial sector showed large economically meaningful results for both the total ESG score and all the three sub scores of ESG. The sector had a negative coefficient for two of three sub-scores, environment and governance, contributing to a negative relationship between the sector and the total ESG score. However, results showed that the social score and the financial sector had a positive relationship between its score and weekly stock returns. Looking into each respective relationship, the social score had the largest economically meaningful impact, where a one standard deviation increase in the score would decrease the sector's negative average weekly stock returns by 5.74 percentage points. Looking at the environmental score, the financial sector has by far the lowest mean of all the sectors individual scores, at 25.542 compared to the average of 50.712. In contrast, the governance score had a high mean and an economic meaningful interpretation with a large coefficient. Unlike our results, previous studies have shown that there is indeed a positive relationship between ESG rating and financial performance within the financial sector, with evidence from the European banking sector. However, it is worth mentioning that there are altering results between the sub-scores,

indicating that there might not be any clear relationship for this sector (Bualay, 2019). Moreover, worth mentioning is the low sample of financial firms in the dataset, with only 6 firms being included in the analysis, which is a consequence of adding the control variables to the dataset. Just as we disregarded the real estate sector in the analysis, the robustness of the test and the accuracy of interpreting the results for the financial sector must be questioned.

6.3.3 Both Positive and Negative scores with significance for the Consumer Discretionary sector

As presented in the results, the consumer discretionary sector was significantly impacted during the pandemic by all three sub scores of ESG. The social and environmental scores impacted stock returns positively, whilst the governance score had a negative impact. The consumer discretionary sector is considered an indicator of economic growth or slowdown since it is highly affected by external events impacting the stock market. This is based on the goods and services of these businesses being non-necessities with demand depending on consumers' available income (Mazur et al., 2021). Based on this argumentation, different implications can be drawn from the results. Firstly, ESG scores is something that is prioritized for nonessential products and services. During a financial crisis, non-essential goods and services benefit from previous activities increasing its social and environmental sustainability scores. In contrast, the consumer staples sector, which includes necessary products and services, did not provide any significant results and thus do not seem to be affected by its pre-2020 ESG activities. This clear divergence is arguably of importance since it generates insights and evidence about non-essential goods compared to essential goods and services. Looking at the respective industries' summary statistics, we see evidence that the consumer staples sector has a higher volatility (higher standard deviation) than the consumer staples sector. This insight suggests that more volatile sectors benefit from higher E and S scores, possibly due to a greater amount

of trust needed. However, further research is required in order to fully understand the mechanisms behind it.

6.3.4 Insignificant results for majority of industries

Even though the results in this thesis found several significant and economically meaningful relationships between ESG scores and financial performance, the majority of the sectoral analyses showed insignificant relationships. Thus, for these, there is no clear impact of pre-2020 ESG scores on stock returns during the initial period of the pandemic. This is true for the overall ESG score as well as the environmental and governance score. However, worth emphasizing is that for the social score it is equally likely that firms either are positively affected as that they are not affected at all. A possible mechanism that could explain these findings is that there are simply no material benefits to having a high ESG score during a financial crisis. This view is in line with some previous research, suggesting that there is in fact no relationship between CSR and stock returns (Bae et al., 2021). Another mechanism could be that it is too broad looking at the sustainability scores clustered into one single score, or three single sub-scores. This would underline the importance of dividing the scores and looking at more basic levels in order to avoid overlooking key relationships.

6.4 Future research possibilities

There is potential to extend this research and generate new insights. The economical crisis caused by the Covid-19 pandemic has generated a new interesting area for research. Even though, as of today, there already exists a numerous number of papers focusing on this period, there are still a lot of unexplored topics. In addition, societies are still affected by the virus and its consequences, thus we are still in an interesting time period to further investigate. Consequently, extending the time period of the research could be of interest. One could either apply the research to a later time period or apply a longer time period,

including both an initial period and an extended period after the crisis. Moreover, the Covid-19 crisis has impacted both firms and societies a lot, shifting focus, priorities as well as generating new knowledge. Thus, looking at how the ESG scores have changed after the pandemic's outbreak would be of interest. Do firms value sustainability higher? Is it an increased demand and thus pressure from consumers to value sustainability higher? Will this in turn have a positive financial impact on stock returns? Diving deeper and looking into the components of each respective social, environment and governance score is also of interest. By further analysing these pre-2020 corporate characteristics a deeper understanding of what affected the financial performance of EU firms during Covid-19 may be generated. Adding to this, this thesis uses a single sustainability score, the Refinitiv ESG Stats, and since differences among score providers exist, replicating this study using a different provider could be useful. In general, the more standardized and commonly used a score is, the easier it is to correctly interpret and compare results between different types of research and studies.

6.5 Concluding remarks

To conclude, this thesis generates insights about stock performance during the Covid-19 pandemic in relation to pre-2020 ESG scores. Although there is disparity among the different ESG scores (overall ESG, social, environment and governance) and their relation to stock returns, there are still some concluding remarks that can be drawn from the results. Social scores impacted stock returns positively and significantly for a half of the sectors as well as for the overall market, indicating that there indeed are some benefits to investing in social activities prior to a crisis. The environmental score had slightly more diverse results, however still with the majority of significant results being positive. Lastly, the governance score had a negative impact on stock performance during the initial period of 2020, with a small amount of sector relationships being significant. Furthermore, information technology, financial and consumer discretionary are examples

of sectors which are significantly impacted by their ESG scores and thus should evaluate what activities to focus on. In short, after analyzing each sector's performance in relation to ESG scores, a conclusion can be made that there is a need for further investigation and there exists important differences among different sectors that should be taken into consideration.

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8 Appendices

Table A1

Corporate financial conditions and stock returns in response to COVID-19 for Industrials, Materials, Communication Services, Utilities, Energy and Information Technology: The table reports regression results analyzing how stock prices respond to the COVID-19 pandemic as functions of pre-pandemic corporate financial conditions. The dependent variable is the weekly stock return for each firm. COVID19 is the weekly growth rate of the number of confirmed COVID-19 cases in an economy in natural logratimic form. To measure a firm's financial conditions, we use Firm Size, Leverage, Cash and Profitability and they are in addition included as control variables in regression (2) and (3). Variables total returns, leverage, cash and profitability are standardized and COVID19 together with Firm Size are in natural logratimic form. The analyses cover the period from week 9, 2020 to week 15, 2020. The Appendix provides detailed variable definitions. We include firm and week fixed effects. Robust standard errors clustered at firm level are reported in parentheses. , , and denote significance levels at 1 %, 5 %, and 10 %, respectively.

Variable	Weekly Stock Returns					
	Ind. (1)	Mat. (2)	Com.Ser. (3)	Uti. (4)	Enr. (5)	Inf.Tec. (6)
<i>COVID19</i>	-0.250 (0.183)	-0.460 (0.393)	-0.974* (0.511)	0.090 (0.628)	0.510 (0.391)	-0.460 (0.340)
<i>Firm Size * COVID19</i>	0.008 (0.008)	0.020 (0.017)	0.044* (0.022)	-0.008 (0.027)	-0.013 (0.018)	0.024 (0.015)
<i>Leverage * COVID19</i>	-0.030 (0.021)	-0.015 (0.021)	-0.009 (0.028)	-0.021 (0.033)	0.020 (0.041)	0.003 (0.022)
<i>Cash * COVID19</i>	0.009 (0.019)	0.024 (0.023)	0.043 (0.050)	0.003 (0.028)	0.020 (0.038)	0.027 (0.017)
<i>Profitability * COVID19</i>	0.002 (0.019)	0.019 (0.022)	-0.034 (0.032)	0.020 (0.042)	-0.061 (0.044)	0.050** (0.024)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Nr. of Firms	298	108	81	56	48	91
Observations	4,044	1,410	1,110	734	597	1,253
R2	0.002	0.002	0.003	0.003	0.016	0.006
<i>Note:</i>				*p<0.1; **p<0.05; ***p<0.01		

Table A2

Corporate financial conditions and stock returns in response to COVID-19 for Consumer Staples, Health Care, Consumer Discretionary, Financials, and Real Estate: The table reports regression results analyzing how stock prices respond to the COVID-19 pandemic as functions of pre-pandemic corporate financial conditions. The dependent variable is the weekly stock return for each firm. COVID19 is the weekly growth rate of the number of confirmed COVID-19 cases in an economy in natural logratimic form. To measure a firm's financial conditions, we use Firm Size, Leverage, Cash and Profitability and they are in addition included as control variables in regression (2) and (3). Variables total returns, leverage, cash and profitability are standardized and COVID19 together with Firm Size are in natural logratimic form. The analyses cover the period from week 9, 2020 to week 15, 2020. The Appendix provides detailed variable definitions. We include firm and week fixed effects. Robust standard errors clustered at firm level are reported in parentheses. , , and denote significance levels at 1 %, 5 %, and 10 %, respectively.

Variable	Weekly Stock Returns				
	Con.Sta. (1)	Hea.Car. (2)	Con.Dis. (3)	Fin.. (4)	Rea.Est. (5)
<i>COVID19</i>	-1.282** (0.528)	-0.305 (0.348)	-0.747*** (0.265)	0.059 (0.462)	-1.403
<i>Firm Size * COVID19</i>	0.055** (0.023)	0.009 (0.014)	0.035*** (0.012)	-0.016 (0.021)	1.065
<i>Leverage * COVID19</i>	-0.021 (0.041)	0.020 (0.014)	-0.021 (0.024)	-0.033 (0.041)	
<i>Cash * COVID19</i>	0.036 (0.042)	-0.027 (0.059)	0.033 (0.024)	0.242*** (0.038)	
<i>Profitability * COVID19</i>	-0.061 (0.040))	0.009 (0.019)	0.007 (0.019)	0.314*** (0.049)	
Control Variables	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Nr. of Firms	77	101	169	6	3
Observations	1,013	1,365	2,363	82	42
R2	0.005	0.004	0.004	0.207	0.074
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01				

Table A3

Summary Statistics for Industrials: This table presents the summary statistics of key variables used in the study. N explains the number of non-missing observations for the specific variable. The average (mean) and standard deviation are determined across these observations for the specific variable. In addition, the value of the variable for minimum, 25th, 75th percentile and maximum of the distribution of the variable is provided.

Variable	Industrials		
	N	Mean	St. Dev.
<i>Weekly Stock Return</i>	4,044	-1.715	10.587
<i>COVID19</i>	4,044	0.898	0.672
Firm Characteristics			
<i>ESG Score</i>	4,044	52.672	20.991
<i>Social</i>	4,044	57.930	23.420
<i>Governance</i>	4,044	50.375	23.834
<i>Environmental</i>	4,044	48.126	26.456
<i>Firm Size</i>	4,044	21.946	1.757
<i>Cash</i>	4,044	0.109	0.084
<i>Leverage</i>	4,044	0.281	0.150
<i>Profitability</i>	4,044	0.351	0.412

Table A4

Summary Statistics for Materials: This table presents the summary statistics of key variables used in the study. N explains the number of non-missing observations for the specific variable. The average (mean) and standard deviation are determined across these observations for the specific variable. In addition, the value of the variable for minimum, 25th, 75th percentile and maximum of the distribution of the variable is provided.

Variable	Materials		
	N	Mean	St. Dev.
<i>Weekly Stock Return</i>	1,419	-1.126	9.775
<i>COVID19</i>	1,419	0.916	0.713
Firm Characteristics			
<i>ESG Score</i>	1,419	60.215	20.789
<i>Social</i>	1,419	64.004	22.122
<i>Governance</i>	1,419	57.163	24.971
<i>Environmental</i>	1,419	58.536	25.134
<i>Firm Size</i>	1,419	21.966	1.496
<i>Cash</i>	1,419	0.077	0.052
<i>Leverage</i>	1,419	0.248	0.117
<i>Profitability</i>	1,419	0.370	0.166

Table A5

Summary Statistics for Communication Services: This table presents the summary statistics of key variables used in the study. N explains the number of non-missing observations for the specific variable. The average (mean) and standard deviation are determined across these observations for the specific variable. In addition, the value of the variable for minimum, 25th, 75th percentile and maximum of the distribution of the variable is provided.

Variable	Communication Services		
	N	Mean	St. Dev.
<i>Weekly Stock Return</i>	1,110	-1.297	11.262
<i>COVID19</i>	1,110	0.897	0.662
Firm Characteristics			
<i>ESG Score</i>	1,110	55.511	18.947
<i>Social</i>	1,110	59.539	22.553
<i>Governance</i>	1,110	52.876	21.305
<i>Environmental</i>	1,110	47.427	22.676
<i>Firm Size</i>	1,110	22.280	1.463
<i>Cash</i>	1,110	0.089	0.103
<i>Leverage</i>	1,110	0.350	0.224
<i>Profitability</i>	1,110	0.530	0.222

Table A6

Summary Statistics for Utilities: This table presents the summary statistics of key variables used in the study. N explains the number of non-missing observations for the specific variable. The average (mean) and standard deviation are determined across these observations for the specific variable. In addition, the value of the variable for minimum, 25th, 75th percentile and maximum of the distribution of the variable is provided.

Variable	Utilites		
	N	Mean	St. Dev.
<i>Weekly Stock Return</i>	720	-0.759	9.051
<i>COVID19</i>	720	0.953	0.755
Firm Characteristics			
<i>ESG Score</i>	720	61.375	20.171
<i>Social</i>	720	63.921	23.064
<i>Governance</i>	720	55.604	20.906
<i>Environmental</i>	720	63.111	24.267
<i>Firm Size</i>	720	22.681	1.358
<i>Cash</i>	720	0.065	0.058
<i>Leverage</i>	720	0.378	0.166
<i>Profitability</i>	720	0.518	0.302

Table A7

Summary Statistics for Energy: This table presents the summary statistics of key variables used in the study. N explains the number of non-missing observations for the specific variable. The average (mean) and standard deviation are determined across these observations for the specific variable. In addition, the value of the variable for minimum, 25th, 75th percentile and maximum of the distribution of the variable is provided.

Variable	Energy		
	N	Mean	St. Dev.
<i>Weekly Stock Return</i>	597	-2.228	14.692
<i>COVID19</i>	597	0.913	0.718
Firm Characteristics			
<i>ESG Score</i>	597	59.113	20.170
<i>Social</i>	597	62.771	22.880
<i>Governance</i>	597	58.944	24.466
<i>Environmental</i>	597	55.518	22.434
<i>Firm Size</i>	597	22.109	2.015
<i>Cash</i>	597	0.117	0.080
<i>Leverage</i>	597	0.248	0.153
<i>Profitability</i>	597	0.446	0.277

Table A8

Summary Statistics Information Technology: This table presents the summary statistics of key variables used in the study. N explains the number of non-missing observations for the specific variable. The average (mean) and standard deviation are determined across these observations for the specific variable. In addition, the value of the variable for minimum, 25th, 75th percentile and maximum of the distribution of the variable is provided.

Variable	Information Technology		
	N	Mean	St. Dev.
<i>Weekly Stock Return</i>	1,253	-0.627	10.540
<i>COVID19</i>	1,253	0.888	0.651
Firm Characteristics			
<i>ESG Score</i>	1,253	51.307	19.211
<i>Social</i>	1,253	57.117	22.133
<i>Governance</i>	1,253	48.992	22.345
<i>Environmental</i>	1,253	45.032	24.790
<i>Firm Size</i>	1,253	21.677	1.598
<i>Cash</i>	1,253	0.166	0.115
<i>Leverage</i>	1,253	0.214	0.145
<i>Profitability</i>	1,253	0.450	0.218

Table A9

Summary Statistics Consumer Staples: This table presents the summary statistics of key variables used in the study. N explains the number of non-missing observations for the specific variable. The average (mean) and standard deviation are determined across these observations for the specific variable. In addition, the value of the variable for minimum, 25th, 75th percentile and maximum of the distribution of the variable is provided.

Variable	Consumer Staples		
	N	Mean	St. Dev.
<i>Weekly Stock Return</i>	1,013	-0.418	8.466
<i>COVID19</i>	1,013	0.904	0.684
Firm Characteristics			
<i>ESG Score</i>	1,013	59.160	16.963
<i>Social</i>	1,013	62.919	20.358
<i>Governance</i>	1,013	53.880	19.180
<i>Environmental</i>	1,013	58.209	23.103
<i>Firm Size</i>	1,013	22.528	1.756
<i>Cash</i>	1,013	0.079	0.080
<i>Leverage</i>	1,013	0.272	0.130
<i>Profitability</i>	1,013	0.411	0.181

Table A10

Summary Statistics Health Care: This table presents the summary statistics of key variables used in the study. N explains the number of non-missing observations for the specific variable. The average (mean) and standard deviation are determined across these observations for the specific variable. In addition, the value of the variable for minimum, 25th, 75th percentile and maximum of the distribution of the variable is provided.

Variable	Health Care		
	N	Mean	St. Dev.
<i>Weekly Stock Return</i>	1,365	0.226	9.246
<i>COVID19</i>	1,365	0.917	0.722
Firm Characteristics			
<i>ESG Score</i>	1,365	53.975	19.914
<i>Social</i>	1,365	61.387	21.991
<i>Governance</i>	1,365	51.155	23.256
<i>Environmental</i>	1,365	42.206	26.119
<i>Firm Size</i>	1,365	22.305	1.676
<i>Cash</i>	1,365	0.164	0.197
<i>Leverage</i>	1,365	0.243	0.194
<i>Profitability</i>	1,365	0.556	0.340

Table A11

Summary Statistics Consumer Discretionary: This table presents the summary statistics of key variables used in the study. N explains the number of non-missing observations for the specific variable. The average (mean) and standard deviation are determined across these observations for the specific variable. In addition, the value of the variable for minimum, 25th, 75th percentile and maximum of the distribution of the variable is provided.

Variable	Consumer Discretionary		
	N	Mean	St. Dev.
<i>Weekly Stock Return</i>	2,363	-1.698	13.923
<i>COVID19</i>	2,363	0.887	0.617
Firm Characteristics			
<i>ESG Score</i>	2,363	56.492	18.556
<i>Social</i>	2,363	60.610	21.576
<i>Governance</i>	2,363	53.770	20.549
<i>Environmental</i>	2,363	52.813	24.792
<i>Firm Size</i>	2,363	21.851	1.583
<i>Cash</i>	2,363	0.113	0.100
<i>Leverage</i>	2,363	0.303	0.175
<i>Profitability</i>	2,363	0.461	0.224

Table A12

Summary Statistics Financials: This table presents the summary statistics of key variables used in the study. N explains the number of non-missing observations for the specific variable. The average (mean) and standard deviation are determined across these observations for the specific variable. In addition, the value of the variable for minimum, 25th, 75th percentile and maximum of the distribution of the variable is provided.

Variable	Financials		
	N	Mean	St. Dev.
<i>Weekly Stock Return</i>	82	-0.128	10.937
<i>COVID19</i>	82	0.908	0.688
Firm Characteristics			
<i>ESG Score</i>	82	48.644	19.083
<i>Social</i>	82	55.231	22.014
<i>Governance</i>	82	56.831	22.657
<i>Environmental</i>	82	25.542	31.484
<i>Firm Size</i>	82	21.844	1.400
<i>Cash</i>	82	0.080	0.075
<i>Leverage</i>	82	0.229	0.216
<i>Profitability</i>	82	0.730	0.318

Table A13

Summary Statistics Real Estate: This table presents the summary statistics of key variables used in the study. N explains the number of non-missing observations for the specific variable. The average (mean) and standard deviation are determined across these observations for the specific variable. In addition, the value of the variable for minimum, 25th, 75th percentile and maximum of the distribution of the variable is provided.

Variable	N	Real Estate	
		Mean	St. Dev.
<i>Weekly Stock Return</i>	42	-2.805	12.206
<i>COVID19</i>	42	0.865	0.453
Firm Characteristics			
<i>ESG Score</i>	42	50.599	5.868
<i>Social</i>	42	57.281	4.201
<i>Governance</i>	42	55.882	15.218
<i>Environmental</i>	42	37.531	6.671
<i>Firm Size</i>	42	20.751	0.954
<i>Cash</i>	42	0.132	0.170
<i>Leverage</i>	42	0.343	0.306
<i>Profitability</i>	42	0.392	0.183

Table A14
Variable Definition

Variable	Definition	Source
Weekly stock return	The weekly stock return of each firm in a week is calculated by using dividend-adjusted closing prices on the last trading day of the week.	Refinitiv Eikon
COVID19	The weekly growth rate of the number of confirmed COVID-19 cases in an economy. For economy c in week t, $COVID19 = \log(1 + \text{confirmed cases in week } t) - \log(1 + \text{confirmed cases in week } t-1)$	Center for Systems Science and Engineering at Johns Hopkins University
Firm size	The natural logarithm of market capitalization	Refinitiv Eikon
Leverage	The ratio of total debt divided by total assets.	Capital IQ
Cash	The total amount of cash and short-term investments divided by total assets.	Capital IQ
Profitability	The total revenue minus cost of goods sold divided by total revenue.	Capital IQ
ESG Score	The average of the indexes of Environmental, Social, and Governance, measuring a firm's commitment to each respectively.	Refinitiv Eikon
Environmental	The Environmental Score consists of three elements. Resource utilization with focus on water, energy, supply chain and sustainable packaging. Emission reduction including emissions, waste, biodiversity and Environmental management systems. Lastly, innovation and it includes product innovation and green revenues.	Refinitiv Eikon
Social	The Social Score consolidates data regarding how much companies improve the well-being of their employees (Workforce), uphold human rights (Human Rights), contribute to community development (Community), and meet their obligations to consumers (Product Responsibility).	Refinitiv Eikon
Governance	The Governance Score consolidates data regarding how well made a company's csr strategy is, structure and compensation scheme of management and shareholder's rights and takeover defenses	Refinitiv Eikon