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ON THE RESILIENCE OF HIGH-ESG FIRMS

AN EVENT STUDY OF THE RUSSO-UKRAINIAN WAR

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ABSTRACT:

This study aims to deepen our understanding of the relationship between social capital and firm performance during times of crisis. To achieve this, we use ESG scores as proxy for social capital and investigate whether European high-ESG firms outperformed low-ESG firms during the Russo-Ukrainian War, which we argue constitutes an exogenous market shock. Using cross-sectional and difference-in-difference regression models, we find no evidence supporting our hypothesis of a positive relationship between ESG score and firm performance during the crisis. Moreover, we find that firms with high ESG scores had higher volatility and lower returns than firms with low ESG scores, contradicting our hypothesis and previous research. We suggest two possible explanations for the diverging results: 1) either our hypothesis is incorrect for this crisis due to its unique nature in relation to social capital or ESG, or 2) there is an empirical issue with the methodology of using ESG as a proxy for social capital. Our findings suggest that future research should investigate what constitutes a "threshold" crisis in which social capital contributes to firm resilience. Additionally, this study highlights the need for further research to identify the most appropriate metrics for measuring social capital during crises. Such research can provide a valuable understanding for firms seeking to develop and implement strategies that capitalize on social capital to enhance their resilience and maintain their competitive edge during times of crisis.

KEYWORDS: CSR, ESG, Russo-Ukrainian War, Social Capital

TABLE OF CONTENTS

1. INTRODUCTION

1.1 BACKGROUND

In mid-October 2021, the Russian army started accumulating significant military equipment and troops along its border with Ukraine, including the occupied Crimea region. Over the following months, Russia continued dispatching forces to the region in what would be the "largest military build-up in Europe since the cold war", according to The Economist (2022). On February 21st, 2022, Putin declared the independence of the two Ukrainian regions, Donetsk and Luhansk. Three days later, on February 24th, Putin announced the beginning of a "special military operation", followed by the first missile strike on Ukrainian military assets (The Economist, 2022). The outbreak of the war set off a refugee crisis in Europe as Ukrainians fled the conflict in their homeland. Additionally, the war remapped the global geopolitical landscape, for example, it prompted both Sweden and Finland to seek membership in NATO, further expanding the Western alliance's presence near Russia. The European continent has been particularly exposed to the development in Ukraine because of its proximity to the ongoing humanitarian crisis and its economic dependence on Russia before the invasion. In a report by the European Central Bank (2023**)** it is explained that the EU imported 27% of its crude oil, 47% of its solid fuel and 41% of its natural gas from Russia prior to the war. Furthermore, Russia and Ukraine accounted for more than one-third of global grain exports, which disrupted the food supply following the onset of the war. Overall, the rapid increase in commodity prices following the invasion and the unpredictability of the war caused major concern in global markets and heightened investor uncertainty (World Economic Forum, 2022).

Previous literature examining the relationship between geopolitical uncertainty and stock returns shows that political instability can have a considerable adverse effect on firm performance and increase the associated risk level of financial assets (Balcilar et al., 2018; Choudry, 2010; Rigobon and Sack, 2005). In an analysis of daily stock market returns from the first quarter of 2022 across 94 countries, Boungou and Yatié (2022) find evidence that the Russo-Ukrainian War significantly negatively impacted the global economy. The authors also find that the effect was strongest in markets closer to the war and in countries where the government condemned Russia's invasion. Continuing this research, the article by Ahmed et al. (2022) focuses specifically on stock returns in European markets after the outbreak of the

war in Ukraine. Similar to Boungou and Yatié (2022), the authors find support that the invasion constituted a significant negative shock to European stock prices. Considering the proximity and the previous economic ties between Europe and Russia, the conflict directly impacted the countries along with the companies operating within the region, feeding through both a social and economical channel (Ahmed et al., 2022).

Complementing the literature on political instability and firm performance, another strand of research investigates the resilience effect of high-ESG firms during times of crisis. The paper by Albuquerque et al. (2020) shows that stock returns for US firms with high ES ratings are higher compared to firms with low ES ratings during the outbreak of the Covid-19 pandemic. Lins et al. (2017) find similar evidence examining the Great Financial Crisis, showing that high-ESG firms exhibit better returns, higher profitability, and higher growth. The underlying theory in both papers posits that firms that can build greater social capital – proxied by their ESG rating - are rewarded by the market during times with heightened economic uncertainty in what can be described as an insurance-like property of these firms. Building on the previous literature's findings on the relationship between social capital and firm performance during times of crisis, this study set out to investigate if the same holds for European stocks during the outbreak of a new crisis - the Russo-Ukrainian War.

1.2 Delimitations and Scope

Even though the outbreak of the Russo-Ukrainian War had economic implications for the global economy, our study is delimited to focus solely on firms incorporated in the European Economic Area (EEA), Switzerland and the UK. The underlying reason is that previous studies show that the effect was strongest in markets closer to the war, as measured by the overall decline in European markets following the invasion. Given the European continent's unified response to the Russian invasion, along with the continent's energy reliance on Russia, we argue it is fair to assume the invasion impacted more firms than just the ones with direct economic ties to Russia. As a result, we focus on all European firms rather than just those with operations or assets in Russia prior to the war (Ahmed et al., 2022; Boungou & Yatié, 2022). In addition, the sample is further restricted to only include public companies due to limited ESG disclosure for private companies. Previous literature on the Russo-Ukrainian War also find that the impact on stock markets was largest in the two weeks following the invasion on

February 24th, 2022 (Boungou & Yatié, 2022). Therefore, our sample period is limited to the first quarter of 2022 in pursuit of capturing the immediate effect of the outbreak of the war.

2. Literature and Theory

In this chapter, we review the existing literature's mixed view on the relationship between ESG and financial performance, as well as the impact of social capital on firms' resilience during times of crisis. We identify a research gap regarding the resilience of European high-ESG firms during the Russo-Ukrainian War in 2022. Lastly, drawing on the theoretical framework of social capital, we formulate our hypothesis that there is a positive relationship between ESG and firm performance during times of crisis.

2.1 Literature Review

2.1.1 Relationship Between ESG and Firm Performance

A substantial body of literature exists across academic disciplines – accounting, finance, management, and marketing - devoted to investigating the impact of ESG on shareholder value. Although ESG and financial performance have been found to be positively correlated in several larger meta-studies (Busch & Friede, 2018; Orlitzky et al., 2003), it is still a disputed topic among researchers (Awaysheh et al., 2020). One potential explanation for the mixed results in the literature is the difficulty in ruling out variations in the endogenous explanatory variable (Awaysheh et al., 2020). For example, companies with strong financial performance may be better able to invest in ESG initiatives, while companies with poorer financial performance have less room for pursuing such investments. This would suggest that there may be a bidirectional relationship between ESG and financial performance which in turn could lead to an erroneous correlation between the two.

On a general level, the discussion on ESG and firm performance consist of two primary theoretical perspectives: the shareholder theory and the stakeholder theory. According to the shareholder theory, often attributed to Friedman (1970), ESG initiatives may be harmful to shareholders as they are viewed as potentially value-destructive. According to this point of view, the primary responsibility of a business is to maximize profits, and any investments in social capital may result in an agency problem. A manager, for example, who chooses such investments may prioritize projects that increase their personal benefits or serve stakeholders other than shareholders. On the other hand, an alternative perspective is that ESG activities can

generate value for *all* stakeholders, including shareholders (Albuquerque et al., 2020; McWilliams and Siegel, 2001). In their article, Porter and Kramer (2006) define the concept of "shared value", arguing that firms can gain long-term competitive advantage by incorporating socially responsible practices alongside their for-profit strategy. By viewing society and corporations as co-dependent, the authors claim that managers can unlock new opportunities that increase both the firm's social capital and competitiveness.

2.1.2 Resiliency Effect of ESG on Firms During Times of Crisis

However, a third theoretical view on the relationship between ESG and firm performance can be derived from previous research, proposing that the benefits from ESG activities manifest themselves only during times of crisis. Godfrey (2009) tests the theory that ESG activities can act as an "insurance-like" property for firms facing negative events. The study's result suggests that engagement in ESG activities can yield economic benefits for firms during crises. Studying firms during crises also helps mitigate the previously mentioned difficulty in ruling out endogeneity in the social capital variable. By examining firms following an exogenous shock, the effect of the ESG rating on firms' financial performance can be better isolated, as the rating remains fixed in the short term while the financial markets response is direct (Albuquerque et al., 2020; Lins et al., 2017), i.e., investors will base their assessment on their previous judgement of a firm's social capital and trustworthiness. Subsequent investigations by Lins et al. (2017) and Albuquerque et al. (2020) provide further support for this finding by examining the connection between social capital and performance during times of crisis. They utilize the Covid-19 Pandemic (Albuquerque et al., 2020) and the 2008 Great Financial Crisis (Lins et al., 2017) as exogenous shocks and find that high-ESG firms are more resilient during times of crisis and economic distress than low-ESG firms. Furthermore, Lins et al. (2017) argue that companies with higher social capital exhibit greater resilience during times of crisis. Their study shows that firms with high ESG ratings, used as a proxy for social capital, saw stock returns that were four to seven percentage points higher than those with low ESG ratings during the Great Financial Crisis. High-ESG firms also demonstrated higher profitability, growth, and sales per employee compared to low-ESG firms. Their results suggest that when the level of trust in businesses and markets falls, the social capital a company has developed with its stakeholders and investors pay dividends. Albuquerque et al. (2020) achieve similar results when investigating how firms' resilience against exogenous shocks can be explained by their ES score during the Covid-19 pandemic. Like Lins et al. (2017), they also use ESG score as a

proxy for social capital but excluding the Governance (G) pillar. They find that firms with higher ES scores tend to have higher returns, lower return volatility, and better operating margin than low-ES firms.

2.1.3 ESG AND THE RUSSO-UKRAINIAN WAR AS AN EXOGENOUS SHOCK

Research investigating how ESG relates to performance during the Russo-Ukrainian War is still scarce and in the early stage. Although some research has used the Russo-Ukrainian War as an exogenous shock, it has mainly been general research on whether the war negatively affected markets. Boungou and Yatié (2022) provide the first empirical evidence of the effect of the Russo-Ukrainian War on the world stock market returns. They use daily data of stock market returns from 94 countries from January 22nd, 2022, to March 24th, 2022. Their results reveal a negative relationship between the Russo-Ukrainian War and world stock market returns. In particular, the war had a more significant negative impact on the stock indices of the countries bordering Ukraine and Russia and the UN countries that condemned the war. Boubaker et al. (2022) examine the impact of the 2022 Russian invasion of Ukraine on global stock market indices, finding that it generated a negative cumulative abnormal return for these indices but with varying effects across different markets. For example, the Asian market was not affected, while the European was. Ahmed et al. (2022) examine the impact of the Russo-Ukrainian War on the European stock market and provide further support that it can be considered a crisis and an exogenous shock. The study finds that the crisis had a negative impact on European stock markets, with significant negative abnormal returns on February 21st, 2022, when Russia recognized two Ukrainian states as autonomous regions. The study also notes that the negative impact of the crisis varied considerably across industries, countries, and company sizes.

Prior research on ESG and the Russo-Ukrainian War mainly focuses on firms with assets in Russia. In their article, Basnet et al. (2022) investigate the role of ESG in the decision of firms to stay or leave the market of an invading country using the case of Russia. While their study is not directly related to the insurance effect of ESG, it provides valuable insights into how ESG factors can affect firms' decisions during a crisis. The study find that high-ESG firms that left Russia after the country's invasion of Ukraine were more likely to perform better after exiting than low-ESG firms. This suggests that ESG factors can play a crucial role in a firm's decision to exit a market during times of crisis.

In summary, while prior research has mainly focused on the impact of the war on markets and firms with assets in Russia, it is evident that more research is needed to understand how ESG relates to the performance and the resilience of all European firms during the Russo-Ukrainian War specifically.

2.1.4 Research Gap

Previous research by Albuquerque et al. (2020) and Lins et al. (2017) suggest there exists a positive relationship between high-ESG firms and performance during the Covid-19 pandemic and the Great Financial Crisis, respectively. However, research on the resilience of European ESG firms during the outbreak of the Russo-Ukrainian War is still relatively unexplored. In addition, while all three crises caused a spike in investor uncertainty, it is unclear whether the same result holds in this crisis, given the unique nature of war compared to previous crises. As a result, we've identified a research gap that we want to address with this thesis.

2.2 Theoretical Perspective

2.2.1 Social Capital and Trust - Why is ESG Value Creating?

Social capital and trust have been proved, from a macroeconomic perspective, to be an important part of economic development in societies and in capital markets (La Porta et al., 1997; Knack and Keefer, 1997; Guiso, Sapienza, and Zingales, 2004, 2008; Lins et al., 2017). In addition, social capital and trust are also important factors on an individual firm level and can affect performance. From a stakeholder perspective, the concept of reciprocity suggests that firms with high social capital are more likely to receive assistance from stakeholders (e.g., employees, customers, and suppliers) during a crisis (Lins et al., 2017; Knack and Keefer, 1997). For instance, Lins et al. (2017) argue that because high-social-capital firms have historically shown better attention to and collaboration with stakeholders, stakeholders are more likely to "do whatever it takes" to help these firms weather a crisis. Additionally, building on the concept of viewing firms as a nexus of contracts, social capital can reduce the need for formal contracts and facilitate implicit or incomplete contracts between firms and stakeholders, which reduces costs (Lins et al., 2017; Knack and Keefer, 1997). Furthermore, stakeholders tend to cooperate more with firms they perceive to be trustworthy, which is particularly relevant during times of crisis when trust in corporations, institutions, and capital markets may be low. (Lins et al, 2017; Guiso, Sapienza, and Zingales, 2015; Servaes and Tamayo, 2013). Finally,

firm-level social capital becomes increasingly important during times of crisis, as it can serve as a mechanism for fostering trust and encouraging stakeholder cooperation (Lins et al., 2017; Knack and Keefer, 1997).

In addition to the importance of trust and social capital during times of crisis, there is growing evidence that companies can use ESG practices to differentiate their products and foster customer loyalty. According to Albuquerque et al. (2019), product differentiation can lead to a more loyal consumer base and less price elasticity, which enables companies to charge higher prices and earn higher profit margins. Moreover, their theory suggests that this can reduce operating leverage and systemic risk while increasing firm value. Building on this theory, Albuquerque et al. (2020) show that high ESG scores can lead to firm resilience during the Covid-19 pandemic. Moreover, they argue that high customer loyalty will benefit a high-ESG firm's performance and resilience if the shock affects consumer demand.

In summary, social capital and trust are crucial factors for building stakeholder loyalty and cooperation, which companies can leverage through ESG practices to increase resilience during times of crisis.

2.3 Hypothesis

Overall, our research aims to better understand the relationship between social capital and a firm's performance during times of crisis. To achieve this, we test the theoretical mechanism discussed in the previous section, which implies that ESG activities can lead to greater resilience for firms in times of crisis due to higher social capital. In our empirical test, we leverage the outbreak of the Russo-Ukrainian War as an exogenous market shock to examine this relationship. More specifically, our research question is to investigate whether high-ESG firms outperformed low-ESG firms during the beginning of the Russo-Ukrainian War in 2022.

Drawing on the theoretical framework by Albuquerque et al. (2020) and Lins et al. (2019), which suggest that social capital plays a role in firm resilience, we hypothesize that high ESG scores will have a positive and significant impact on firm performance during times of crisis. We define firm performance as a positive abnormal return and lower volatility. Furthermore, we argue that the Russo-Ukrainian War constitutes an exogenous and systemic shock that

affected all European firms, making it a relevant crisis to investigate. Based on these considerations, we formulate the following hypothesis:

H_1: There is a positive relationship between ESG and firm performance during times of crisis.

While we anticipate that our findings will be consistent with previous research, we acknowledge that this is a unique type of crisis, and other factors may affect the outcome of the results. To begin with, according to Ahmed et al. (2022), the magnitude of stock price reactions to this crisis varies significantly across industries, countries, and company size, contrasting with the relatively homogeneous reactions observed in previous crises. Similarly, Boubaker et al. (2022) argue that the war had heterogeneous impacts on markets, mostly impacting Europe and NATO countries. Furthermore, the invasion of Ukraine is the first of its nature since World War II in any European country, and the geopolitical risk and threats in the Eurozone have escalated to peak levels. This significantly impacts the European economy and geopolitics in a broader and more long-term effect than previous modern crises (Ahmed et al., 2022).

In terms of social capital, this crisis has several unique features that could affect the relationship between social capital and firm performance. Firstly, western firms were forced to take a political stance not previously seen during the Covid-pandemic and the Great Financial Crisis. Companies with high ESG ratings are arguably facing increasing pressure to balance economic performance with social and environmental responsibilities. For example, firms may be forced to make decisions that prioritize long-term social capital over short-term economic benefits. Additionally, stakeholders expect high-ESG-rated firms to act responsibly, which can increase the pressure on them to meet higher standards of social and environmental responsibility. Firms with high social capital may also face increased scrutiny from stakeholders to ensure that they are not contributing to or benefiting from the conflict. For example, they may need to conduct due diligence on their supply chains to ensure that they are not using products or services that are linked to the conflict, which can negatively impact their performance. Furthermore, high-ESG-rated firms with more significant social capital may feel more pressure to make suboptimal economic decisions in the short term to preserve their social capital. This is because social capital is based on trust and goodwill earned from stakeholders over time, and it can be eroded if the firm is perceived to prioritize profits over social and environmental

responsibilities. If a company with high social capital engages in unethical or unsustainable practices, it may face backlash from stakeholders, leading to reputational damage, loss of revenue, and decreased economic performance. Therefore, firms with high ESG scores may have a greater incentive to prioritize social capital over short-term economic benefits during times of crisis, like the Russo-Ukrainian War. Finally, because high social capital firms may prioritize long-term social capital over short-term economic benefits in this crisis, we acknowledge that our sample's short timeframe may not fully reflect the long-term economic benefits of social capital.

3. METHOD

In this chapter, we present our study's research design and data collection process. We explain how we collect data, where it comes from, and how we manage and analyze it. We also describe the variables in our study and how they are operationalized for our regression models. Additionally, we provide information on the final sample size, the inclusion and exclusion criteria, and other relevant information regarding the sample.

3.1 RESEARCH DESIGN

3.1.1 ESG AS A PROXY FOR SOCIAL CAPITAL

Given the aim of our research, social capital constitutes the primary theoretical independent variable. However, the concept of social capital is challenging to quantify and operationalize accurately. To address this, previous researchers use ESG activities as a proxy for social capital based on the view that they generate social capital and trust (Albuquerque et al., 2020; Lins et al., 2017). However, while both papers use ESG scores as the independent variable in their empirical tests, they differ in the way they label the proxy. Albuquerque et al. (2020) label it ESG throughout their paper, whereas Lins et al. (2017) use the term CSR. Furthermore, while ESG ratings it does not fully capture the broad concept of social capital, it has the advantage of being quantifiable and relatively comparable across firms (Lins et al., 2017). For the sake of consistency and clarity, we use the term ESG throughout this thesis.

In our analysis, the independent variable we use is the total *ESG Score* from Refinitiv. One rationale for using the total ESG score is that it represents the primary score that investors and stakeholders are presented with. Although it is difficult to ascertain which pillar of the ESG score is most relevant in terms of social capital, it is evident that, in modern society, firms must

emphasize not only the social (S) component but also the environmental (E) aspect of their operations to establish trust with stakeholders. However, prior research provides arguments that support the exclusion of Governance (G) from the analysis, thereby recommending the use of the combined environmental and social scores, ES (Albuquerque et al., 2020). Considering this, we run additional robustness on the individual pillars of ESG.

3.1.2 Regression Models

To test our hypothesis, we establish two different regression models. Our first model is a cross-sectional regression analysis used to examine the relationship between firm stock performance and ESG on a quarterly basis. The usefulness of the cross-sectional model in our analysis is that it allowed us to incorporate accounting-based measures on operating performance, such as return on assets, operating profit margin and asset turnover. The disadvantage, however, is that the necessary data for these dependent variables can be obtained at most on a quarterly basis. Hence it hurts the granularity of the findings. The specification of the cross-sectional regression model is provided below.

$$Performance_i = ß_0 + ß_1 ESG_i + \sum ß_2 Firm\ Controls_i + ß_3 Industry\ FE_i + ß_4 Country\ FE_i + \varepsilon_i$$

The dependent variables in this regression model were *Abnormal Return Q1, Volatility Q1, Idiosyncratic Volatility Q1*, and *Operating Performance (*ΔROA *Q1,* ΔOPM *Q1,* ΔAT *Q1). Abnormal Return Q1* is calculated as the quarterly logarithmic stock return minus the stock's two-year CAPM beta multiplied by the quarterly logarithmic return on the STOXX 600 index. *Volatility Q1* is calculated as the standard deviation of the stock's daily logarithmic return. *Idiosyncratic Volatility Q1* is calculated as the standard deviation of the stock's daily abnormal logarithmic return. We choose to examine both volatility measures to allow the study of potential differences between the overall markets' risk and individual firms' risk during the study period. The natural logarithm is used to harmonize the scale of our variables. The *Operating Performance* variables *(*ΔROA *Q,* ΔOPM *Q1,* ΔAT *Q1)* are calculated as the difference between the Q12022 and Q42021 measures for each variable. The independent variable is the firms' *ESG Score* as reported on Refinitiv for the fiscal year 2021. In addition to our independent variable, we incorporate an array of control variables to proxy firms' varying financial strength prior to the Russo-Ukrainian war. More specifically, our control

variables in the regressions for *Abnormal Return Q1, Volatility Q1* and *Idiosyncratic Volatility Q1* are *Tobin's Q, Size, Cash, Leverage, ROE, Historical Volatility,* and *Dividend Yield*. For the regressions on *Operating Performance (*Δ*ROA Q1,* Δ*OPM Q1,* Δ*AT Q1),* we control for *Tobin's Q, Cash* and *Leverage* following the methodology used in Albuquerque et al. (2020). Logically firms characterized by traits such as high profitability, strong cash position, lower leverage and lower historical volatility can be assumed to weather an economic downturn better than firms with poorer scores on the same metrics. Controlling for firms' size (measured as the natural logarithm of annual sales plus one) was done to account for larger firms' tendency to be overrepresented in ESG disclosure statistics and have better ESG scores (Drempetic, 2020). All control variables are based on accounting and financial markets data on Refinitiv and CapitalIQ for FY2021; see *Table 11* in *Appendix C* for exact definitions and data sources. Lastly, we also include industry and country fixed effects.

For the second part of our analysis, we use a difference-in-difference regression model (DiD) to examine the effect of the war on the daily stock return level. Compared to the first regression model, this part of the method allows for a more specific analysis of the ESG effect on companies' performance by looking at the differential effect of an ESG treatment post invasion. The event date in our DiD model was February 24th, 2022, which marked the day when Russia's invasion of Ukraine began. The specification of the DiD-regression model is provided below.

$$Stock\ Performance_{it} = ß_0 + ß_1 ESG_{Treatment_i}\ x\ Post_{Invasion_t} + ß_3 Firm\ FE_i + ß_4 Day\ FE_t + \varepsilon_{it}$$

The dependent variables are *Daily Abnormal Returns* and *Daily Price Range* (i.e., daily volatility). *Daily Abnormal Return* is calculated as the daily logarithmic stock return minus the stock's two-year CAPM beta multiplied by the daily logarithmic return on the STOXX 600 index. The *Daily Price Range* is obtained by subtracting each stock's highest daily sale price from the stock's lowest daily sale price and scaling the difference by the midpoint of high and low daily stock prices. The independent variable is each firm's *ESG Score* as reported on Refinitiv for FY2021. *ESG Treatment* is a dummy variable indicating 1 if a firm's *ESG Score* belonged to the top quartile among all firms' *ESG Score* and 0 otherwise. *Post Invasion* is a dummy variable indicating 1 if return data was after February 24th, 2022, and 0 if reported before. In addition to our dummy variables, we also include firm- and day-fixed effects. The start date for our sample is January 3rd, 2022; hence we included stock price data 38 business

days before the invasion and 26 business days after the invasion. Expressed differently, we include 82,118 firm-day observations before the invasion and 56,186 firm-day observations post invasion. Please see *Figure 1* in *Appendix B* for visualization of event period in STOXX 600 index.

3.2 Data Collection

Our primary independent variable is *ESG Score* for firms the year prior to the Russian invasion of Ukraine, i.e., FY2021. ESG scores were retrieved from the Refinitiv Eikon ESG database for public firms in the European Economic Area (EEA), Switzerland and the UK. The information in the database is collected from publicly available resources such as annual reports, company statements and company websites and vetted by research analysts at Refinitiv. The database calculates over 630 ESG-metrics per company which are consolidated into 10 categories that connect to one of the three ESG pillars. The Environmental pillar comprises three categories: resource use, emissions, and innovation. The Social pillar covers four categories: workforce, human rights, community, and product responsibility. The third pillar, Governance, encompasses three categories: management, shareholders, and CSR policy. The 10 categories, in turn, constitute several sub-categories; for instance, the product responsibility category covers the topics of responsible marketing, product quality and data privacy. Refinitiv calculates a weighted average based on the rating in each category for determining the E-, S-, and G-pillar scores. The weights assigned to each category differs between industry for the E- and S-pillar. However, for the G-pillar, the weights are constant across all industries. Lastly, a company's rating is measured relative to its peers in its industry for the environmental and social score and against companies with the same country of registration for governance score (Refinitiv, 2022). The Refinitiv Eikon ESG database has been widely used in previous research on the relationship between ESG and firm financial performance (Albuquerque et al., 2020; Arouri et al., 2019; Ferrell et al., 2016).

Table 1 presents an overview of the screening process to arrive at the final sample set. The first delimitation was to exclude all European public companies that did not have an *ESG Score* reported in the Refinitiv Eikon ESG database for the fiscal year before the outbreak of the war, i.e., FY21. Second, after obtaining the ESG data from the Refinitiv Eikon ESG database, we manually removed another 58 firms that still had missing ESG data. Thirdly, we removed 100 firms that were not European incorporated in the sample. Fourthly, when merging the dataset

from Refinitiv with stock price data from CapitalIQ, we removed another 100 firms that lacked sufficient price data observations during the period. Fifthly, we manually removed another seven firms that lacked the financial data needed for control variables. Additionally, we removed three more firms incorporated in countries with less than six observations. Lastly, we removed 11 firms that belonged to industries with less than six observations in total. After the screening, we arrived at a final sample set including 2,161 European public firms across 23 countries and ten industries.

Table 1
Sample Screening

Sample	Sample Attrition	Unique Firms
European Public Companies w/ ESG Score > 0 on Refinitiv Eikon	n/a	2,440
Less Firms w/ Missing ESG Scores	58	2,382
Less Non-European Incorporated Firms	100	2,282
Less Firms w/ Insufficient Price Data When Merging w/ CapitalIQ Data	100	2,182
Less Firms Missing Financial Data	7	2,175
Less Firms in countries w/ < 6 observations	3	2,172
Less Firms in Industry Classification w/ < 6 observations	11	2,161
Final Sample		**2,161**

Notes
a. European countries include those in the European Economic Area, Switzerland, and the UK

Daily stock return data was collected for the first quarter of 2022 using CapitalIQ for all EEA, Swiss and UK-incorporated firms with ESG data available on Refinitiv Eikon. The *Daily Abnormal Return* is calculated as the difference between a firm's logarithmic return and the firm's 2-year CAPM beta multiplied by the STOXX-600 logarithmic return for that day. The firm-specific 2-year CAPM beta and the STOXX-600 daily return were retrieved from CapitalIQ's database. In addition, data for control variables were collected using a combination of CapitalIQ and Refinitiv databases. Exact definitions for variables can be found in *Table 11* in *Appendix C*, along with their respective data source.

Lastly, we use The Refinitiv Business Classification (TRBC) system to group companies into industry sectors. For our research, we group companies based on the Economic sector, which is the broadest definition out of the five levels available and is supposed to resemble industry sectors the most. The 13 different economic sectors available in TRBC are Energy, Basic Materials, Industrials, Consumer Cyclicals, Consumer-Non-Cyclicals, Financials, Healthcare, Technology, Utilities, Real Estate, Institutions, Associations & Organizations, Government Activity and Academic & Educational Services.

4. FINDINGS AND ANALYSIS

In this chapter, we present a description of our data and the results of two different regression analyses on abnormal returns and volatility. The first analysis is a cross-sectional regression model, while the second analysis is a difference-in-difference regression model. In addition, we include the results of several robustness tests conducted to ensure the validity of the findings.

4.1 DESCRIPTION OF DATA

Table 2 shows the distribution of firms in our sample data based on country of incorporation. The most frequent country in our sample is the United Kingdom representing a total share of 23.9% of the data, followed by Sweden, with a total share of 14.4%. One possible explanation for why Swedish firms outnumber larger economies like France, Germany, and Italy in the data is that we limit ourselves to only include firms with ESG disclosure, and Nordic firms have been shown to lead in terms of ESG disclosure (McCalla-Leacy et al., 2022).

Table 2
Summary Statistics - Country Composition

Country	Obs.	%
United Kingdom	516	23.9
Sweden	310	14.4
Germany	250	11.6
Switzerland	181	8.4
France	179	8.3
Italy	121	5.6
Finland	79	3.7
Norway	78	3.6
Spain	73	3.4
Netherlands	67	3.1
Denmark	62	2.9
Belgium	51	2.4
Poland	40	1.9
Austria	34	1.6
Greece	24	1.1
Ireland	23	1.1
Luxembourg	23	1.1
Portugal	15	0.7
Iceland	9	0.4
Cyprus	7	0.3
Romania	7	0.3
Hungary	6	0.3
Malta	6	0.3
Total	**2,161**	**100**

Notes
a. Countries include those in the European Economic Area, Switzerland,
b. Excluded due to less than six observations.: Czech Republic, Slovenia, Liechtenstein, Slovakia, Bulgaria.

Table 3 records the distribution of firms in our sample based on Economic sectors using TRBC industry classification. *Industrials* represent the largest share of firms, with approximately 20.8% of the observations, followed by *Consumer Cyclicals* at 15.5%.

Table 3

Summary Statistics - Industry Composition

Industry	Obs.	%
Industrials	450	20.8
Consumer Cyclicals	335	15.5
Technology	325	15.0
Financials	270	12.5
Healthcare	187	8.7
Basic Materials	165	7.6
Consumer Non-Cyclicals	138	6.4
Real Estate	135	6.3
Energy	93	4.3
Utilities	63	2.9
Total	**2,161**	**100.0**

Notes

a. Based on Refinitiv TRBC industry classification.

b. Academic and Educational Services was excluded due to less than six observations.

Summary statistics for our sample data are provided in *Table 4*. All variables derived from accounting data, i.e., *Tobin's Q, Size, Cash, Leverage, ROE, Dividend Yield,* Δ*ROA Q1,* Δ*OPM Q1* and Δ*AT Q1*, are winsorized at the 1% in each tail to mitigate non-representative values. The final sample consists of 2,161 firms across 23 countries and ten industries. The mean *Abnormal Return Q1* was -5.10; in other words, the stock price for the firms included in our sample, on average, declined by 5.10% during our study period. The standard deviation is relatively high at 23.08, suggesting significant volatility in the abnormal returns between firms in our sample data. The mean *ESG Score* is 0.53, indicating that, on average, our sample firms have a moderate ESG score. Worth noting is that the standard deviation of 0.21 shows a significant degree of variation in the ESG score in our sample data. *Tobin's Q* measures the firm's market value relative to its assets' replacement cost. In our sample data, the variable has a mean of 1.76, indicating that the average market value of firms in the sample is higher than their asset replacement. Comparing the mean *Historical Volatility* of 2.21 with the mean *Volatility Q1* of 2.89, we notice that the average firm reported higher volatility during our event period than their two-year historical average.

Table 4
Summary Statistics - Variables

Variable	Obs.	Mean	St.Dev.	5%	25%	Median	75%	95%
Abnormal Return Q1	2,161	-5.10	23.08	-39.42	-15.20	-4.07	6.96	26.27
ESG Score	2,161	0.53	0.21	0.17	0.38	0.55	0.70	0.86
Tobin's Q	2,151	1.76	1.48	0.72	0.98	1.24	1.91	4.64
Size	2,133	21.40	2.07	18.03	20.09	21.36	22.78	24.82
Cash	2,151	0.13	0.13	0.01	0.05	0.10	0.18	0.40
Leverage	2,151	0.24	0.19	0.00	0.07	0.22	0.36	0.60
ROE	2,121	8.79	25.08	-31.94	3.50	11.13	19.38	39.17
Historical Volatility	2,161	2.21	1.16	1.11	1.55	1.98	2.55	3.88
Dividend Yield	2,161	1.73	2.28	0.00	0.00	1.13	2.64	5.54
Volatility Q1	2,161	2.89	1.45	1.39	2.11	2.66	3.34	4.94
Idio. volatility Q1	2,161	2.53	1.62	1.20	1.70	2.20	2.88	4.67
ΔROA Q1	2,161	-0.05	2.51	-2.70	0.00	0.00	0.08	2.75
ΔOPM Q1	2,137	-0.46	30.24	-18.60	-1.01	0.00	0.08	13.46
ΔAT Q1	2,141	-1.42	6.04	-12.34	-1.47	0.00	0.00	4.55
Daily Abnormal Return	138,097	-0.08	3.03	-4.07	-1.28	-0.05	1.15	3.84
Daily Price Range	133,265	4.02	3.11	1.21	2.20	3.30	4.94	14.83

Notes
This table reports summary statistics (number of observations, mean, standard deviation, percentiles and median) for all variables. Accounting-based variables e.g., *Tobin's Q, Size, Cash, Leverage, ROE, Dividend Yield, ΔROA Q1, ΔOPM Q1* and *ΔAT Q1* have been winsorized at the 1% in each tail. Please see *Table 11* in *Appendix C* for definition of variables.

Table 5 shows the correlation coefficient between all 14 variables in our sample data. *Volatility Q1, Historical Volatility* and *Idio. Volatility Q1* show a significant positive correlation with each other which is to be expected as they are similar measures. *ESG Score* is negatively correlated with all volatility measures suggesting that higher ESG-rated firms tend to be associated with a lower risk, in line with our hypothesis. *Size* positively correlates with *ESG Score*, suggesting that larger firms tend to have higher ESG ratings, in line with previous findings by Drempetic (2020). Accounting for variables that are expected to have a higher correlation with each other, our correlation matrix shows no alarming correlations that would cause concern for multicollinearity. In addition to analyzing the correlation matrix, the variation inflation factor (VIF) was calculated for each independent variable. The tests showed no high correlations between the independent variable, as all VIF values were below 10, indicating no significant multicollinearity.

Table 5
Correlation Matrix

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1 ESG Score	1.00													
2 Historical Volatility	-0.29	1.00												
3 Volatility Q1	-0.14	0.55	1.00											
4 Idio. Volatility Q1	-0.21	0.65	0.87	1.00										
5 Abnormal Return Q1	0.10	-0.11	-0.39	-0.36	1.00									
6 Size	0.69	-0.35	-0.20	-0.24	0.13	1.00								
7 Tobin's Q	-0.07	0.05	0.05	0.02	-0.08	-0.14	1.00							
8 Cash	-0.21	0.28	0.23	0.21	-0.13	-0.34	0.29	1.00						
9 Leverage	0.10	-0.04	-0.05	-0.04	0.02	0.07	-0.13	-0.22	1.00					
10 ROE	0.13	-0.28	-0.20	-0.19	0.03	0.29	0.16	-0.22	-0.08	1.00				
11 Dividend Yield	0.22	-0.32	-0.29	-0.26	0.14	0.27	-0.17	-0.17	-0.03	0.24	1.00			
12 ΔROA_Q1	0.07	-0.10	-0.05	-0.04	0.10	0.12	0.00	-0.09	0.06	0.19	0.01	1.00		
13 ΔOPM_Q1	-0.04	0.06	0.07	0.06	-0.04	-0.11	-0.03	0.13	-0.06	-0.06	-0.03	-0.03	1.00	
14 ΔAT_Q1	0.06	-0.07	-0.07	-0.06	0.10	0.02	-0.07	-0.04	0.00	-0.08	0.02	0.03	0.06	1.00

Notes
This table reports the pair-wise correlation coefficients between all main variables. Please see Table 11 in Appendix for definition of variables.

4.2 Hypothesis Testing

4.2.1 Cross-sectional Regression

Table 6 presents the results of our cross-sectional regression model of quarterly abnormal returns for the first quarter of 2022. The dependent variable is *Abnormal Return Q1*, while the independent variable of interest is *ESG Score*. In addition, the regression model includes several firm-specific control variables, specifically *Tobin's Q, Size, Cash, Leverage, ROE, Historical Volatility*, and *Dividend Yield*. The analysis also includes industry and country-fixed effects to control for unobserved heterogeneity. The table shows three different model specifications, with each column representing a separate regression run.

Table 6

Cross-sectional Regression for Abnormal Returns Q1 2022

Dependent Variable	(1) Abnormal Return Q1	(2) Abnormal Return Q1	(3) Abnormal Return Q1
ESG Score	11.955***	5.576**	0.816
	(2.480)	(2.428)	(3.314)
Tobin's Q			0.446
			(0.335)
Size			0.008
			(0.471)
Cash			-15.020***
			(5.578)
Leverage			-2.166
			(2.740)
ROE			-0.020
			(0.031)
Historical Volatility			-1.005
			(1.395)
Dividend Yield			0.785**
			(0.371)
Industry FE	No	Yes	Yes
Country FE	No	Yes	Yes
Number of Firms	2,161	2,161	2,093
R^2	0.01	0.17	0.18

Notes

This table reports the output values from cross-sectional regressions of the first quarter abnormal returns in 2022 following the outbreak of Russo-Ukrainian war. The table reports the results from three different model specifications; (1) without firm controls and without industry and country fixed effects, (2) without firm controls but with industry and country fixed effects, (3) with firm controls and with industry and country fixed effects. The values in parenthesis are standard errors. The standard errors are robust to heteroskedasticity. Please see *Table 11* in *Appendix C* for definition of variables. *p < .1; **p < .05; ***p < .01.

The first model specification (1) included *ESG Score* as the sole independent variable. It shows a positive and statistically significant coefficient for ESG score on abnormal returns, with a coefficient of 11.955 and is significant at the 1% level. This suggests that firms with higher ESG scores tend to have higher abnormal returns in Q1 2022 without controlling for firm controls. In the second model specification (2), the industry and country fixed effects are included, and *ESG Score* remains significant with a positive coefficient. However, the magnitude of the coefficient decreases, suggesting that the effect of *ESG Score* on abnormal returns may be partially explained by differences between countries and industries. The third model specification (3) includes firm controls, *ESG Score*, and country and industry fixed effects. Although *ESG Score* remains positive, the magnitude of the coefficient decreases from 5.576 to 0.816. Furthermore, it is not statistically significant anymore, suggesting that the effect of *ESG Score* cannot explain abnormal returns when including firm controls. *Cash* and

Historical Volatility are significant predictors of abnormal returns, with negative coefficients, while *Dividend Yield* is statistically significant with a positive coefficient. *Tobin's Q, Size, Leverage* and *ROE* are not significant predictors of abnormal returns. The R-squared values for the first model are low at 1%, indicating that the model explains only a very small proportion of the variation in abnormal returns. This is expected since it only includes one variable. However, the R-squared values are 16 to 17 percentage points higher in the second (2) and third specification (3), suggesting that including fixed effects and firm control, variables improves the model fit. In conclusion, while *ESG Score* may have some explanatory value for quarterly abnormal returns in Q1 2022, its effect becomes insignificant when other firm controls are included.

In *Table 7,* we re-run the same cross-sectional regression as in *Table 6* but with two other dependent variables, *Volatility Q1*, specification one (1) to three (3), and *Idiosyncratic Volatility Q1*, specification four (4) to six (6). *Volatility Q1 is a firm's stock price fluctuation measured by the standard deviation of daily raw logarithmic returns over Q1 2022, while Idiosyncratic Volatility Q1 is the standard deviation of daily stock returns adjusted for its CAPM expected return.* The independent variable of interest is *ESG Score*. The regression includes the same firm-specific control variables, and industry and country fixed effects as the previous cross-sectional regression in *Table 6*.

Table 7
Cross-sectional Regression for Volatility Q1 2022

Dependent Variable	(1) Volatility Q1	(2) Volatility Q1	(3) Volatility Q1	(4) Idio. Volatility Q1	(5) Idio. Volatility Q1	(6) Idio. Volatility Q1
ESG Score	-1.124***	-0.886***	0.361**	-1.751***	-1.494***	-0.059
	(0.166)	(0.173)	(0.172)	(0.224)	(0.220)	(0.187)
Tobin's Q			-0.001			-0.032
			(0.017)			(0.017)
Size			0.004			-0.001
			(0.025)			(0.032)
Cash			0.832***			0.289
			(0.316)			(0.397)
Leverage			-0.031			-0.099
			(0.145)			(0.154)
ROE			-0.002			0.000
			(0.002)			(0.002)
Historical Volatility			0.598***			0.865***
			(0.102)			(0.181)
Dividend Yield			-0.099***			-0.060
			(0.021)			(0.025)
Industry FE	No	Yes	Yes	No	Yes	Yes
Country FE	No	Yes	Yes	No	Yes	Yes
Number of Firms	2,161	2,161	2,093	2,161	2,161	2,093
R^2	0.03	0.16	0.41	0.05	0.17	0.49

Notes
This table reports the output values from cross-sectional regressions of the first quarter volatility measures (volatility and idiosyncratic volatility) in 2022 following the outbreak of Russo-Ukrainian war. The table reports the results from six different model specifications: (1 & 4) without firm controls and without industry and country fixed effects, (2 & 5) without firm controls but with industry and country fixed effects, (3 & 6) with firm controls and with industry and country fixed effects. The values in parenthesis are standard errors. The standard errors are robust to heteroskedasticity. Please see *Table 11* in *Appendix C* for definition of variables.
*p < .1; **p < .05; ***p < .01.

In the first two specifications (1) (2), the regression results indicate that the *ESG Score* has a statistically significant negative relationship with *Volatility Q1*, with coefficients of -1.124 and -0.886 respectively. The negative sign suggests that firms with higher ESG scores have lower volatility. The coefficients are also statistically significant at the 1% level, indicating a high confidence level in the results. However, when including firm controls in the third specification (3), the coefficient for *ESG Score* is positive and statistically significant at the 5% level, indicating a positive relationship between *ESG Score* and *Volatility Q1*. In the fourth (4) and fifth (5) specifications, which include *Idiosyncratic Volatility* as the dependent variable, the coefficient for *ESG Score* is negative and statistically significant at the 5% level, indicating that higher ESG scores are associated with lower idiosyncratic volatility. However, the result is no longer significant when including firm controls in the sixth specification (6), although the coefficient is still negative. The R-squared values for the six specifications range from 0.14 to 0.48, indicating that the models explain between 3% and 49% of the variation in volatility. In

addition, the R-squared and adjusted R-squared values increase as we add firm controls, indicating that the model fit improves by including additional control variables. Overall, the results on the relationship between *ESG Score* and the two volatility measures remain largely inconclusive. *ESG Score* is only statistically significant at the 5% level for *Volatility Q1* in one of the specifications.

To further test firm performance, we run additional regressions on the change in operating performance metrics for the first quarter of 2022. The results in *Table 8* show that *ESG Score* has a statistically significant positive relationship with *ΔROA Q1* in the second model specification (2) with a coefficient of 0.576 at the 5% level. However, the R-squared value is only 4.9%, indicating a poor model fit. Other variables are insignificant, indicating no conclusive evidence to support our hypothesis.

Table 8

Cross-sectional Regression for Operating Performance Q1 2022

Dependent Variable	(1) ΔROA Q1	(2) ΔROA Q1	(3) ΔAT Q1	(4) ΔAT Q1	(5) ΔOPM Q1	(6) ΔOPM Q1
ESG Score	0.935***	0.576**	1.484**	0.542	-6.417	-4.029
	(0.279)	(0.264)	(0.656)	(0.668)	(4.065)	(3.522)
Tobin's Q		0.057		-0.097		-1.417
		(0.057)		(0.111)		(0.719)
Cash		-0.843		-0.304		28.214
		(0.699)		(1.257)		(11.265)
Leverage		0.910		0.967		-1.541
		(0.374)		(0.734)		(4.197)
Industry FE	No	Yes	No	Yes	No	Yes
Country FE	No	Yes	No	Yes	No	Yes
Number of Firms	2,161	2,151	2,141	2,137	2,137	2,133
R^2	0.006	0.049	0.003	0.084	0.002	0.085

Notes

This table reports the output values from cross-sectional regressions of the first quarter operating performance measures (change in return on assets, change in asset turnover, change in operating profit margin) in 2022 following the outbreak of Russo-Ukrainian war. The table reports the results from six different model specifications: (1, 3 & 5) without firm controls and without industry and country fixed effects, (2, 4 & 6) with firm controls and with industry and country fixed effects. The values in parenthesis are standard errors. The standard errors are robust to heteroskedasticity. Please see *Table 11* in *Appendix C* for definition of variables.
*p < .1; **p < .05; ***p < .01.

We conduct several robustness tests to ensure the validity of the results in our regressions. Firstly, as mentioned in section *4.1. Description of Data*, the variables are tested for multicollinearity by creating a correlation table and a VIF analysis. Both tests indicate no significant multicollinearity. Secondly, we perform a Breusch-Pagan and Cook-Weisberg test to test for heteroskedasticity. The analysis shows the presence of heteroskedasticity; therefore,

robust standard errors are used throughout all models to mitigate the issue of heteroskedasticity. Finally, to further examine the robustness of the results, we run regressions excluding the financial and energy sectors since they are typically highly regulated industries that set them apart from the other sectors. However, when the two industries are excluded, the results remain consistent with our original regressions. For *Abnormal Return Q1*, the coefficient for *ESG Score* is higher, 2.157 compared to 0.816; however, it remains insignificant with a P-value of 0.538. For *Volatility Q1*, the coefficient for *ESG Score* is slightly lower, 0.243 compared to 0.361; however, it is no longer statistically significant with a P-value of 0.143. To further ensure the robustness of our findings, we run regressions for each pillar of the ESG score, as well as on the combined ES score. Our original results are not affected by these additional analyses. For further details, please refer to *Table 12* in *Appendix D*.

In summary, based on the cross-sectional regression results for abnormal returns in Q1 2022, we find that the *ESG Score* is not significantly associated with *Abnormal Returns Q1* in the model when including firm controls and fixed effects for countries and industries. For volatility measures, we initially find no statistically significant value for *Idiosyncratic Volatility Q1* when including firm controls and a weak positive relationship between *Volatility Q1* and *ESG Score*. However, the last relationship does not hold when running robustness tests. Additionally, the regressions on operating performance metrics provide no further evidence to support our hypothesis.

4.2.2 Difference-in-Difference Regression

Table 9 presents the results of our difference-in-difference model (DiD) that examines the impact of *ESG Score* on *Daily Abnormal Returns* following the Russian invasion of Ukraine in early 2022. The output table presents two model specifications, one without firm- and day-fixed effects (1) and one with (2). The treatment effect is captured by the interaction between *ESG Treatment* (a dummy variable indicating 1 if the firm's ESG rating belongs to the top quartile) and *Post Invasion* (a dummy variable indicating 1 if the observation is in the post-invasion period, i.e. February 24th, 2022). The coefficient estimate for the interaction term is negative, -0.235, and statistically significant at the 1% level in the first model, suggesting that *ESG Treatment* has a negative impact on daily abnormal returns during the post-invasion period. In the second model specification (2), the same interaction term is included but with the addition of day- and firm-fixed effects. The individual coefficient estimates for *ESG*

Treatment and *Post Invasion* are omitted in the second model specification (2) as they are redundant when including firm- and day-fixed effects. The coefficient estimate for the interaction term remains negative at -0.237 and statistically significant, but at the 5% level compared to 1% in the first model specification (1). The results in the second specification (2) are concurrent with the first model specification (1), further suggesting that *ESG Treatment* negatively impacts daily abnormal return, including controlling for the firm- and day-fixed effects. In summary, the results from our difference-in-difference model in *Table 9* suggest that *ESG Treatment* negatively affects daily abnormal returns following the outbreak of the Russo-Ukrainian War.

Table 9

Difference-in-difference Regression for Daily Abnormal Returns Q1 2022

Dependent Variable	(1) Daily Abnormal Return	(2) Daily Abnormal Return
*ESG Treatment * Post Invasion*	-0.235***	-0.237**
	(0.038)	(0.109)
ESG Treatment	0.161***	
	(0.019)	
Post Invasion	0.189***	
	(0.024)	
Firm FE	No	Yes
Day FE	No	Yes
Number of Firm-day Observations	138,097	138,097
R^2	0.00	0.03

Notes

This table presents the results of our difference-in-difference model (DiD) that examines the impact of an ESG treatment on daily abnormal returns following the Russian invasion of Ukraine in 2022. The event date was set to the 24th of February 2022 and the regression includes a total of 138,097 firm-day observations. The table reports the results from two different model specifications: (1) without firm and day fixed effects, (2) with firm and day fixed controls. The standard errors are clustered around firm and day. Please see *Table 11* in *Appendix C* for definition of variables. *p < .1; **p < .05; ***p < .01.

In *Table 10,* we re-run the same difference-in-difference regression as in *Table 9* but with another dependent variable, *Daily Price Range*. Similar to the previous regression, the table presents two model specifications, one without firm- and day-fixed effects (1) and one with (2). In the first model specification (1), the coefficient estimate for the interaction term is positive at 0.189 and statistically significant at the 1% level in the first model, suggesting that *ESG Treatment* positively impacts the *Daily Price Range* during the post-invasion period. In the second model specification (2), the same interaction term is included but with the addition

of day- and firm-fixed effects. Individual coefficient estimates for *ESG Treatment* and *Post Invasion* are omitted in the second specification (2) and include firm- and day-fixed effects instead. The coefficient estimate for the interaction term remains positive at 0.201 and statistically significant, but at the 10% level compared to the 1% level in the first model (1). The results in the second specification (2) are concurrent with the first specification (1) but less statistically significant. In summary, the results from our difference-in-difference model in *Table 10* suggest that *ESG Treatment* positively affects *Daily Price Range* following the event date.

Table 10

Difference-in-difference Regression for Daily Price Range Q1 2022

Dependent Variable	(1) Daily Price Range	(2) Daily Price Range
*ESG Treatment * Post Invasion*	0.189*** (0.039)	0.201* (0.101)
ESG Treatment	-0.962*** (0.025)	
Post Invasion	1.066*** (0.019)	
Firm FE	No	Yes
Day FE	No	Yes
Number of Firm-day Observations	133,265	133,265
R^2	0.05	0.45

Notes

This table presents the results of our difference-in-difference model (DiD) that examines the impact of an ESG treatment on daily price range following the Russian invasion of Ukraine in 2022. The event date was set to the 24th of February 2022 and the regression includes a total of 133,265 firm-day observations. The table reports the results from two different model specifications: (1) without firm and day fixed effects, (2) with firm and day fixed controls. The standard errors are clustered around firm and day. Please see *Table 11* in *Appendix C* for definition of variables. *p < .1; **p < .05; ***p < .01.

In addition to the difference-in-difference regressions in *Table 9* and *Table 10,* we also include an array of robustness tests to validate our findings. We obtain similar results by re-running the difference-in-difference regressions for *Daily Abnormal Return* and *Daily Price Range* but excluding firms in the financial and energy sector. For *Daily Abnormal Return,* the coefficient estimate for the interaction term becomes slightly less negative at -0.179 compared to -0.237 and remains statistically significant at the 1% level. For *Daily Price Range,* the coefficient estimate for the interaction term becomes slightly less positive at 0.197 and statistically significant at the 1% level instead of the 10% level. Broadening the definition of the dummy

variable *ESG Treatment* to include firms in the top 50% of ESG ratings instead of the top quartile, we also obtain similar results. For *Daily Abnormal Return,* the coefficient estimate for the interaction term becomes slightly less negative at -0.177 and remains statistically significant at the 1% level. For *Daily Price Range,* the coefficient estimate for the interaction term becomes slightly more positive at 0.204 and becomes statistically significant at the 1% level instead of the 10% level. The results also hold when excluding firms in the financial and energy sector as well as using the broader definition of *ESG Treatment*, including firms in the top 50% of ESG ratings. For *Daily Abnormal Return,* the coefficient estimate for the interaction term becomes slightly less negative (-0.146) and remains statistically significant at the 1% level. For *Daily Price Range,* the coefficient estimate for the interaction term becomes slightly less positive at 0.194 and becomes statistically significant at the 1% level instead of the 10% level. Finally, similarly to the cross-sectional analysis, we test the robustness of our findings by running regressions on each pillar of the ESG score as well as on the combined ES score. These additional analyses do not affect our initial findings. Please see *Table 13* in *Appendix E* for more information. Overall, the difference-in-difference regression analysis in *Tables 9* and *10* suggests that *ESG Treatment* has a negative impact on *Daily Abnormal Returns* and a positive impact on *Daily Price Range* during the period. These results are consistent across different model specifications, including ones with the firm- and day-fixed effects, and hold when excluding firms in the financial and energy sector or using a broader definition of *ESG Treatment*.

4.3 Summary of Results

Regarding the relationship between *ESG Score* and *Abnormal Return* in Q1 2022, the cross-sectional regression results with firm controls and fixed effects for countries and industries do not show a significant association. Similarly, there is no statistically significant value for *Idiosyncratic Volatility Q1*, and we find only a weak positive relationship between *Volatility* and *ESG Score* that does not hold after running robustness tests. However, difference-in-difference regression analysis in *Tables 9* and *10* indicates that *ESG Treatment* has a negative impact on *Daily Abnormal Return* and a positive impact on *Daily Price Range*. More specifically, one standard deviation increase in *ESG Score* decreases the *Daily Abnormal Return* by -0.050 (0.210 * -0.237). For *Daily Price Range*, one standard deviation increase in ESG Score increases the change in volatility by 0.042 (0.210 * 0.201). The results suggest that firms with higher ESG scores have higher risk and lower returns than firms with lower ESG

scores during the test period. These results are consistent across various model specifications, including with firm- and day-fixed effects. They are also robust to exclusions of firms in the financial and energy sector or using a broader definition of ESG Treatment. In conclusion, we find no empirical evidence supporting our hypothesis that a high ESG score leads to better financial performance. Moreover, we find a negative relationship between ESG scores and firm performance, i.e., lower abnormal return and higher volatility. This result contradicts our hypothesis that a positive relationship exists between the two variables.

5. Discussion

In this chapter, we discuss our research findings in more depth. We begin by revisiting our research question and connecting it to the purpose of our study. Furthermore, we draw on the theoretical perspectives presented earlier in the paper and discuss our two main possible explanations for why the results do not support our hypothesis of a positive relationship between ESG and performance: either our hypothesis is incorrect for this crisis, or there is an empirical issue with the methodology of using ESG as a proxy for social capital.

5.1 Discussion of Results

The outbreak of the Russo-Ukrainian War impaired global trade and significantly increased geopolitical tensions (Ahmed et al., 2022). Leveraging this disruption in financial markets, our study set out to investigate the potential resilience effect of firms with high social capital. Evidence from previous studies suggests that firms that are better at building trust with their stakeholders are rewarded during times of heightened uncertainty in markets and therefore perform better than their peers with lower social capital (Albuquerque et al., 2020; Lins et al., 2017). Lins et al. (2017) argue that because high-social-capital firms have historically shown better attention to and collaboration with their different counterparties, stakeholders are more likely to "do whatever it takes" to help these firms weather a crisis. Furthermore, when there is general uncertainty in the market, investors may value previously trustworthy companies higher, which translates to a market premium for higher ESG-rated firms (Lins et al., 2017). Based on previous literature, our research set out to test whether the same relationship held during the Russo-Ukrainian War in 2022. More specifically, this led us to form the hypothesis that a positive relationship exists between ESG and firm performance, defined as a higher abnormal return and lower volatility, during the Russo-Ukrainian War.

However, in our empirical test, we find no evidence supporting the hypothesis of a positive relationship between ESG scores and firm performance during this crisis. Moreover, firms with higher ESG scores had higher volatility and lower returns than firms with lower ESG scores during the crisis, contradicting our hypothesis as well as previous research. Below, we suggest two possible explanations for why we find diverging results: 1) either our hypothesis is incorrect for this crisis due to its unique nature in relation to social capital or ESG, or 2) there is an empirical issue with the methodology using ESG as a proxy for social capital.

To begin with, there may be contextual factors surrounding the Russo-Ukrainian war that alter the relationship between social capital and firm performance compared to during the Great Financial Crisis and the Covid-19 Pandemic. In the past two crises, as shown by previous research, firms doing good, proxied by high ESG scores, were rewarded with greater financial performance than firms doing bad (Albuquerque et al., 2020; Lins et al., 2017). However, in this crisis, firms acting in accordance with expectations that come with high ESG scores, appear to instead be penalized during the Russo-Ukrainian War. For example, Swedish clothing company H&M incurred an estimated 2 billion SEK loss as they exited Russia (H&M, 2022). This penalty, however, is not only limited to firms that had operations in Russia prior to the invasion. For example, it affects firms that planned to start operations in Russia, firms that trade with countries that support Russia, firms with supply chains in countries that support Russia, and any other activity that could be interpreted as supporting the invasion or failing to actively condemn it. In general, it seems firms were forced to take more of an active political stance during the Russo-Ukrainian War compared to previous crises. As described by Lins et al (2017), social capital is based on trust and goodwill earned from stakeholders over time, and it could quickly be eroded if the firm is perceived to prioritize profits over social and environmental responsibilities. Adding to this, high-ESG-rated firms may experience more pressure in this regard as they have higher expectations from stakeholders to act responsibly. Consequently, firms with high social capital may have been less competitive in the short term as they prioritized their long-term reputation and social capital. This also suggests why the short timeframe of the study may not have adequately captured the full impact of social capital on firm performance.

In addition to social capital, there are several factors in relation to ESG contributing to why this crisis is unique compared to previous crises and contributing to explaining our unexpected

result. To start with, the invasion of Ukraine on February 24th caused global oil prices to surge due to uncertainty about sanctions on Russian oil (IEA, 2022). During the outbreak of the Covid-pandemic and the Great Financial Crisis, oil prices developed in the opposite direction, marking rapid and steep declines (FT, 2023). The increase in oil and commodity prices following the Russian invasion is an important difference as it particularly benefitted companies in the energy and mining sector during 2022. Notably, these industries are generally characterized by low ESG ratings because of their carbon footprint, corruption scandals and challenging working conditions (Refinitiv, 2022). Additionally, the onset of the new war in Europe led many states to increase their military spending, which in turn benefitted the defence industry significantly (Vediakova & Malik, 2022). For example, the stock price of Swedish aerospace and defence manufacturer SAAB AB increased 142.8% in one year after the 24th of February 2022. Similar to the energy and mining sector, the defence industry is also characterized by typically low ESG-rated companies. Comparing the development in financial markets following the Russo-Ukrainian war with the two previous crises, it appears to be a difference in how this event premiered typically low ESG-rated firms.

A second possible explanation for the divergent results observed in our study is that the current methodology may not fully capture the complex relationship between social capital and firm performance during this crisis. Although ESG score may have been a suitable proxy in past crises, the distinctive emphasis on geopolitical risk in the current crisis may not have been accurately represented in the ESG score (KPMG, 2022). Furthermore, while we use ESG scores from Refinitiv as a proxy for social capital, it is important to acknowledge that social capital is a broad concept, and capturing its dynamics through a single metric may be challenging. Additionally, it is possible that other activities or metrics may more accurately reflect a firm's social capital and provide a deeper understanding of this relationship. For example, a firm's social capital may be influenced by various factors such as its relationships with key stakeholders, its involvement in communities, or donations to non-profit organizations (Lins et al., 2017). This highlights the need for additional research to identify the most appropriate metrics for measuring social capital and to consider potential confounding factors that may affect the relationship. Finally, there could have been other firm control variables that we did not consider in the study, for example, advertising expenditures, employee turnover rates, executive compensation, and access to credit.

In conclusion, several plausible explanations exist for why our findings do not support our hypothesis, including the unique nature of the crisis and the use of ESG score as a proxy for social capital. Furthermore, our results highlight the need for additional research to identify the most appropriate metrics for measuring social capital. Such efforts could improve the robustness and reliability of social capital measures and our understanding of the role of social capital in shaping firm resilience during times of crisis. This might help firms better leverage social capital to build resilience and navigate future crises.

6. CONCLUSION

In this chapter, we summarize our findings and discuss how they contribute to the broader field of research. We also discuss the limitations of our study in terms of validity, reliability, and generalizability and propose potential ways to address these limitations. Finally, we suggest directions for future research, such as examining the relationship between social capital and firm performance in other crises and developing improved methodologies.

6.1 CONTRIBUTIONS

Following the established methodology to investigate the relationship between social capital and firm performance, our study set out to test if the relationship also held during the Russo-Ukrainian War. By examining a crisis that had not yet been researched extensively in previous literature, our study contributes by investigating if the same dynamics hold true in a different setting. On a more general level, our study also contributes to the broader discussion on the value-enhancing effect of ESG activities as we provide insight into whether differences in abnormal stock returns can be explained by firms' different ESG scores. Understanding how ESG performance is rewarded in financial markets is also relevant beyond academia for stakeholders such as investors, company management and policymakers alike.

However, contrary to previous research by Lins et al. (2017) and Albuquerque et al. (2020), we find no conclusive empirical evidence supporting a positive relationship between ESG rating and firm performance during the outbreak of the Russo-Ukrainian War. Instead, our findings suggest that potentially not all crises result in a visible insurance-like effect for high social capital firms. A possible explanation for this may be that high-ESG firms prioritize long-term social capital over short-term economic benefit in this type of crisis. Another possible conclusion is that the current methodology does not fully capture the dynamic between social

capital and firm performance during this crisis. Both these conclusions provide interesting areas for future research to examine.

6.2 Limitations

Validity refers to the degree to which a measure accurately captures the concept it is intended to measure. A critical limitation of our study is the validity of the ESG data used, as it may be that the ESG score does not accurately capture the concept of social capital. As mentioned earlier, we argue for the need for more research on using ESG as a proxy for social capital, as this is crucial to increasing validity. Furthermore, there is no standardized definition or framework for measuring ESG, so it can lead to inconsistencies across different providers and hinder comparability (OECD, 2021). While we rely on ESG scores from Refinitiv, there are numerous ESG score providers, and using more than one in our sample could have increased the validity. Another limitation of our study is the potential subjectivity in determining the most appropriate event date to use in the difference-in-difference regressions during this crisis. While we selected a specific event date, there are other possible event dates to consider, such as the date of the first intelligence reports of a possible Russian invasion, the date of the first EU sanctions on Russia, or the first significant rises in energy prices. The inclusion of these alternative event dates may yield different results.

In terms of reliability, we employ a transparent method and rely on public data, which can enhance the reliability of the results. However, one limitation is that ESG scores from providers such as Refinitiv may be revised retrospectively, which can affect the reliability of the findings by making it more challenging to replicate the study (Berg et al., 2021).

Although the sample size was relatively large compared to previous research in the field, our study only examined publicly traded firms in Europe, which may limit the generalizability of the findings to other geographies and other types of firms, such as privately held firms or non-profit organizations. Moreover, the use of only one quarter for the time period of the sample could have been expanded to increase generalizability by providing a broader context for studying the relationship between social capital and firm performance.

6.3 Suggestions for Future Research

In this study, we find no conclusive empirical data supporting a positive relationship between firms' ESG rating and firm performance during the outbreak of the Russo-Ukrainian War. Because previous research finds evidence supporting the positive relationship between ESG rating and firm performance (Albuquerque et al., 2020; Lins et al., 2017), we suggest that future research examine what constitutes a "threshold" type of crisis where one can find evidence for this relationship. Furthermore, the general criticism of research on ESG is the lack of standardization in reporting and regulation on disclosure requirements (OECD, 2021). As reporting of ESG data becomes more harmonized globally, possibilities to conduct studies involving larger datasets will arise, ultimately increasing the generalizability of the findings.

To complement our study, it would be beneficial for future researchers to investigate additional event dates in the difference-in-difference models beyond the one we utilized. By exploring other potential event dates, a more robust understanding of the relationship between social capital and firm performance can potentially be achieved for this crisis. Another approach is to adopt a multi-stage difference-in-difference regression, similar to Albuquerque et al. (2019), in which the authors examine two different event dates in the same model. Finally, this study highlights the need for additional research to identify the most appropriate metrics for measuring social capital during crises. Such research can provide a valuable understanding for firms seeking to develop and implement strategies that capitalize on social capital to enhance their resilience and maintain their competitive edge during times of crisis.

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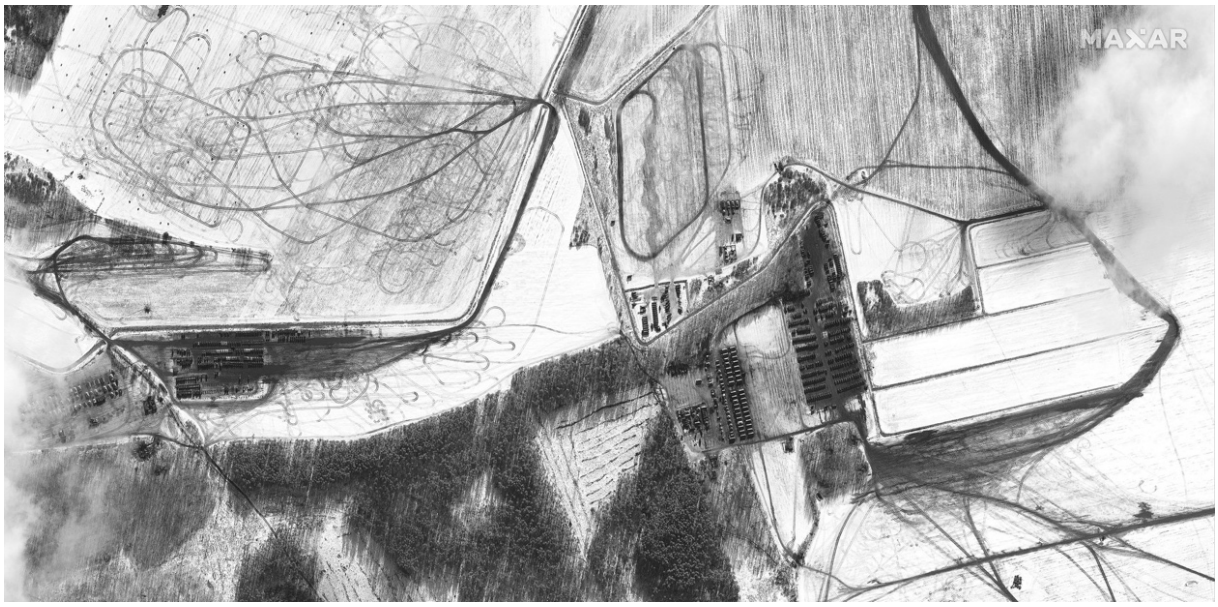
APPENDIX

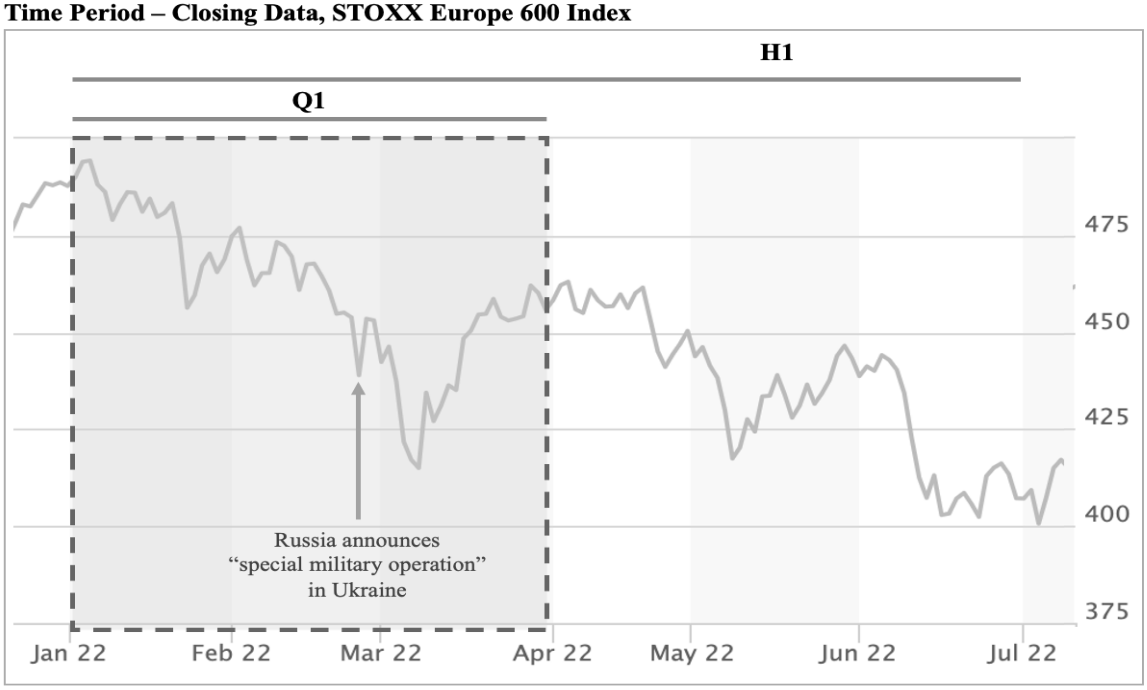
APPENDIX A: RUSSIAN TROOP MOBILIZATION



Satellite image of Russian troops near the Ukrainian border prior to the invasion. Source: The Economist

APPENDIX B: OVERVIEW OF EVENT PERIOD

Figure 1
Time Period – Closing Data, STOXX Europe 600 Index



(Source: MarketWatch)

APPENDIX C: TABLE WITH DEFINITIONS OF VARIABLES

Table 11
Definitions of Variables

Variable	Definition	Source
ESG Score	Refinitiv ESG Score, divided by 100 and measured in 2021.	Refinitiv Eikon
ESG Treatment	Dummy variable that equals one if firm's ESG score is in top quartile and equals zero otherwise.	
Post Invasion	Dummy variable that equals one from February 24 to March 31, 2022, and zero from January 1 to February 23, 2022.	
*ESG Treatment * Post Invasion*	Interaction term	
Tobin's Q	Book value of total assets minus book value of equity plus the market value of equity, all divided by book value of assets, measured in €(2021).	Refinitiv Eikon
Size	Natural log of firms' total revenue plus one, measured in €(2021).	Refinitiv Eikon
Cash	Cash and cash equivalents over book value of total assets, measured in €(2021).	Refinitiv Eikon
Leverage	Book value of debt over book value of total assets, measured in €(2021)	Refinitiv Eikon
ROE	Net income over book value of equity, measured in €(2021).	CapitalIQ
Historical Volatility	Volatility of daily logarithm return (i.e., the logarithm of gross return) of a stock during 2019.	CapitalIQ
Dividend Yield	Dividend per share (DVPSX) over stock price (PRCC), multiplied by 100, measured in $US(2019).	CapitalIQ
Daily Abnormal Return	The daily *Abnormal return* is the difference between daily logarithm return (i.e., the logarithm of gross return) of a stock and the CAPM beta times the daily logarithm return of the market, expressed as a percentage. The CAPM beta is the 2-year beta from CapitalIQ for each firm at the end of 2021, and the market return is from STOXX 600.	CapitalIQ
Abnormal Return Q1	The quarterly abnormal return is measured over the whole period of the first quarter of 2022, i.e. the difference between the logarithm of the stock's gross quarterly return and the CAPM beta times the logarithm of the market's gross quarterly return.	CapitalIQ
Volatility Q1	Volatility of daily logarithm returns of a stock during the first quarter of 2022. Expressed as percentage.	CapitalIQ
Idio. Volatility Q1	Volatility of daily *Abnormal return* of a stock during the first quarter of 2020. Expressed as percentage.	CapitalIQ
Daily Price Range	Daily high-low price range of a stock during Q1 (or H1) of 2022, scaled by the midpoint of high and low daily prices. The high price is the highest trade price for the date. Likewise, the low price is the lowest trade price for the date. The variable is calculated by taking the high price minus the low price divided by the volume weighted average trading price.	CapitalIQ
ΔROA Q1	Quarterly change (the first quarter 2022 value minus the fourth quarter 2021 value) in return on assets. Return on assets is operating income before depreciation over book value of totalt assets, multiplied by 100 (Same procedure for H1).	Refinitiv Eikon
ΔOPM Q1	Quarterly change (the first quarter 2022 value minus the fourth quarter 2021 value) in the operating profit margin. Operating profit margin is operating income before depreciation (OIBDPQ) over sales (SALEQ), multiplied by 100 (Same procedure for H1).	Refinitiv Eikon
ΔAT Q1	Quarterly change (the first quarter 2020 value minus the fourth quarter 2019 value) in asset turnover. Asset turnover is sales (SALEQ) over book assets (ATQ), multiplied by 100 (Same procedure for H1).	Refinitiv Eikon

APPENDIX D: CROSS-SECTIONAL ROBUSTNESS TESTS ON PILLARS OF ESG

Table 12

Cross-Sectional Regression Robustness Tests on Different Pillars of ESG

Dependent Variable	(1) Abnormal Return Q1	(2) Abnormal Return Q1	(3) Abnormal Return Q1	(4) Abnormal Return Q1	(5) Volatility Q1	(6) Volatility Q1	(7) Volatility Q1	(8) Volatility Q1	(9) Idio. Volatility Q1	(10) Idio. Volatility Q1	(11) Idio. Volatility Q1	(12) Idio. Volatility Q1
E Score	2.459				0.148				-0.054			
	(2.395)				(0.111)				(0.112)			
S Score		0.107				0.387				0.114		
		(2.778)				(0.155)				(0.163)		
G Score			0.130				0.121				-0.216	
			(2.593)				(0.132)				(0.146)	
ES Score				1.852				0.323				0.024
				(2.949)				(0.149)				(0.155)
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Firms	2,093	2,093	2,093	2,093	2,093	2,093	2,093	2,093	2,093	2,093	2,093	2,093
R^2	0.18	0.18	0.18	0.18	0.41	0.41	0.41	0.41	0.49	0.49	0.49	0.49

Notes

The values in parenthesis are standard errors. The standard errors are robust to heteroskedasticity. Firm Controls are same as in the previous regressions in *Table* 6 and *7*. Please see *Table 11* in *Appendix C* for definition of variables. *p < .1; **p < .05; ***p < .01.

APPENDIX E: DID ROBUSTNESS TESTS ON PILLARS OF ESG

Table 13

Difference-in-Difference Regression Robustness Tests on Different Pillars of ESG

Dependent Variable	(1) Daily Abnormal Return	(2) Daily Abnormal Return	(3) Daily Abnormal Return	(4) Daily Abnormal Return	(5) Daily Price Range	(6) Daily Price Range	(7) Daily Price Range	(8) Daily Price Range
E Score	-0.254***				0.174***			
	(0.035)				(0.061)			
S Score		-0.194***				0.285***		
		(0.038)				(0.066)		
G Score			-0.167***				0.060	
			(0.037)				(0.056)	
ES Score				-0.267***				0.283***
				(0.036)				(0.067)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Day FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Firm-day Observations	138,097	138,097	138,097	138,097	133,265	133,265	133,265	133,265

Notes

The values in parenthesis are standard errors. The standard errors are robust to heteroskedasticity. Regressions for ESG Score can be found in previous regressions in *Table 9* and *10*. Please see *Table 11* in *Appendix C* for definition of variables. *p < .1; **p < .05; ***p < .01.