E or S or G: What matters in times of financial crisis?

Ajitha Duvvuri(41949) & Catherina Melissa Campedelli(41959)



Stockholm School of Economics

A thesis presented for the degree of

MSc in Finance

2020-2022

Tutor: Jan Starmans

Acknowledgements

We would like to express our heartfelt gratitude to our tutor Jan Starmans for his guidance and support throughout the process of writing this thesis.

Abstract

Our constant search for finding better ways to stay afloat during a crisis and the need to better understand the significance of ESG in investing led us to investigate the relationship between ESG scores and firm's performance during the Great Financial Crisis using a sample of 508 public firms in Europe. We performed a cross sectional regression on the data and find that high ESG scoring firms had higher stock returns compared to low ESG scoring firms in our baseline results but during robustness tests, the results were different. While there was no significant effect of ESG scores on raw returns, a significant effect was observed on out-performance of the firms which didn't allow us to draw conclusive results. When we test for the effect of individual pillar scores on returns, we find that governance factor has higher significance when compared to the other two factors for the out-performance of firms in times of global financial crisis. The significance of the scores continued to hold when ESG scores of 2005 and 2008 were used to check for robustness expanding the period till 2013 but attenuated when we used the scores for the end of 2007. Though the results couldn't support our hypotheses, there is a scope for further exploration of governance factor in times of other crises to establish its significance.

Keywords— ESG scores - Environmental Pillar - Social Pillar - Governance Pillar - Abnormal returns - Stock Returns - Market Model - Out-performance - Global Financial Crisis

Table of Contents

1 Introduction **1**

1.1 ESG Definition and Evolution 3

1.1.1 Definition 3

1.1.2 History of ESG 6

1.1.3 ESG Investing in numbers 7

1.1.4 ESG Rating and Greenwashing 8

2 Literature Review **11**

2.1 Performance of ESG 11

2.2 ESG Resilience/Lower Risk 12

2.3 E, S and G Performance in times of crisis 13

2.4 Hypothesis & Methodology 16

2.4.1 Hypothesis1 16

2.4.2 Hypothesis2 16

3 Data **18**

3.1 Sample Construction 18

3.2 Descriptive Statistics 19

4 Results **22**

4.1 Hypothesis 1 Results 22

4.2 Hypothesis 2 Results 28

5 Robustness Check **34**

6 CONCLUSION **43**

6.1 Findings 43

6.2 Limitations 43
6.3 Future research avenues 44

Bibliography **45**

Appendix A Figures & Tables **51**

List of Figures

1.1 ESG Factors and Trends 3
1.2 A spectrum of capital 4

A.1 Growth of ESG assets by region 51
A.2 Proportion of sustainable investing relative to total managed assets . . . 51
A.3 Asset classes in global ESG investing (2018) 52
A.4 ESG focused equities 52

List of Tables

3.1 Summary Statistics 20
3.2 Correlation Matrix 21

4.1 ESG Scores and Returns 25
4.2 ESG Quartiles and Returns 27
4.3 Environmental Pillar Scores and Returns 29
4.4 Social Pillar Scores and Returns 31
4.5 Governance Pillar Scores and Returns 33

5.1 ESG Scores and Returns 36
5.2 Environmental Pillar Scores and Returns 38
5.3 Social Pillar Scores and Returns 40
5.4 Governance Pillar Scores and Returns 42

A.1 Correlationmatrix for Robustness Tests Data 53

List of Abbreviations

ESG . . . . . Environmental Social Governance

CSR . . . . . Corporate Social Responsibility

SRI . . . . . Socially Responsible Investment

CAPM . . . . . Capital Asset Pricing Model

COVID-19 . . . . . Coronavirus disease of 2019

1 | Introduction

The recurrent financial crises warrant the need for firms to develop a resilience that can withstand such crises and for investors to find such firms for long-term investments. There is compelling evidence that Socially Responsible Investments are a win-win for both firms and investors in the long term (Fulton, Kahn, & Sharples, 2012). Socially Responsible Investment is concerned with the integration of financial and non-financial objectives, such as the implementation of ESG factors (Døskeland & Pedersen, 2016). There is evidence that high ESG-rated firms outperform markets (Clark, Feiner, & Viehs, 2015; Bennani et al., 2018; Derwall, Guenster, Bauer, & Koedijk, 2005; Cai & He, 2014). Further, there are studies showing that high ESG-rated firms outperform markets in times of crisis as well (Nofsinger & Varma, 2014; Albuquerque, Koskinen, Yang, & Zhang, 2020; Broadstock, Chan, Cheng, & Wang, 2021). While there is evidence of relationship between ESG performance and firms' outperformance in times of crisis, we don't have enough literature on which of the three ESG factors help with the outperformance most during crises. Indeed, looking at the environmental ESG factor, research has documented a direct relationship between the environmental performance of firms and stock price performance (Klassen & McLaughlin, 1996), while for the social factor Edmans checked for a relationship between employee wellbeing and stock returns and found that a portfolio of the '100 Best Companies to Work For' earned positive returns above industry benchmarks(Edmans, 2011) . Finally, with regards to the governance factor, the most prominent study is likely to be the one by Deng, Kang, and Low (2013) showing that CSR activities signal a firm's commitment to satisfying implicit contracts, which in turn boosts stakeholders' willingness to support a firm's operations, especially in difficult times(Deng, Kang, & Low, 2013). Furthermore, as shown by Albuquerque ey al., CSR activities strengthen customer loyalty and hence reduce a corporation's susceptibility to economic downturns (Albuquerque et al., 2020).

In other words, firms with stronger CSR policies and activities prior to the pandemic experienced superior stock price performance in response to COVID-19.

The objective of our research is to investigate two elements related to ESG: the first is the relation between high ESG scores and higher stock returns during the Great Financial Crisis in European public firms. The second is the prevalence of at least one amongst the three ESG factors in driving the outperformance of analyzed companies during the same period. We choose to investigate these elements, as finding a more resilient factor could provide useful tools in building hedging strategies for crisis times. To test which of the E, S & G scores plays an important role during a crisis, we first examine the total ESG score effects on return performance of 508 non-financial firms with ESG data available on the Refinitiv Eikon database over the August 2008 to March 2009 financial crisis period. In regressions that control for a wide variety of firm characteristics, we find that firms that entered the crisis period with high ESG scores have higher crisis-period stock returns than those that entered it with low ESG scores. Then we perform the regressions on the individual pillars and find that the governance factor outperforms the market in times of crisis. This result, though inconclusive, highlights the importance of reaching and maintaining a good level of corporate governance, not only to obtain good financial results, but to be better able to anticipate and overcome difficult market periods.

The remainder of the paper is structured as follows: **Section I** gives a detailed view of ESG, **Section II** discusses in more detail the theoretical motivation behind our proxies and tests. **Section III** discusses our data and summary statistics. In **Section IV**, we analyze whether ESG scores impact stock returns during the crisis. In **Section V**, we conduct robustness tests. **Section VI** concludes with the findings, limitations, and future implications.

1.1 ESG Definition and Evolution

1.1.1 Definition

According to the ESG Investing Official Training Manual (Simonek & Verhagen, 2021), ESG investing is defined as an approach to managing assets where investors explicitly incorporate environmental, social and governance (ESG) factors in their investment decisions with the long-term return of an investment portfolio in mind. In other words, ESG investing aims to identify, evaluate and price social, environmental, and economic risks and opportunities.

Figure 1.1: ESG Factors and Trends

	ENVIRONMENTAL FACTORS	SOCIAL FACTORS	GOVERNANCE FACTORS
Definition	Factors pertaining to the natural world. These include the use of, and interaction with, renewable and non-renewable resources (e.g. water, minerals, ecosystems and biodiversity).	Factors that affect the lives of humans. The category includes the management of human capital, non-human animals, local communities and clients.	Factors that involve issues tied to countries and/or jurisdictions, or are common practice in an industry; as well as the interest of broader stakeholder groups.

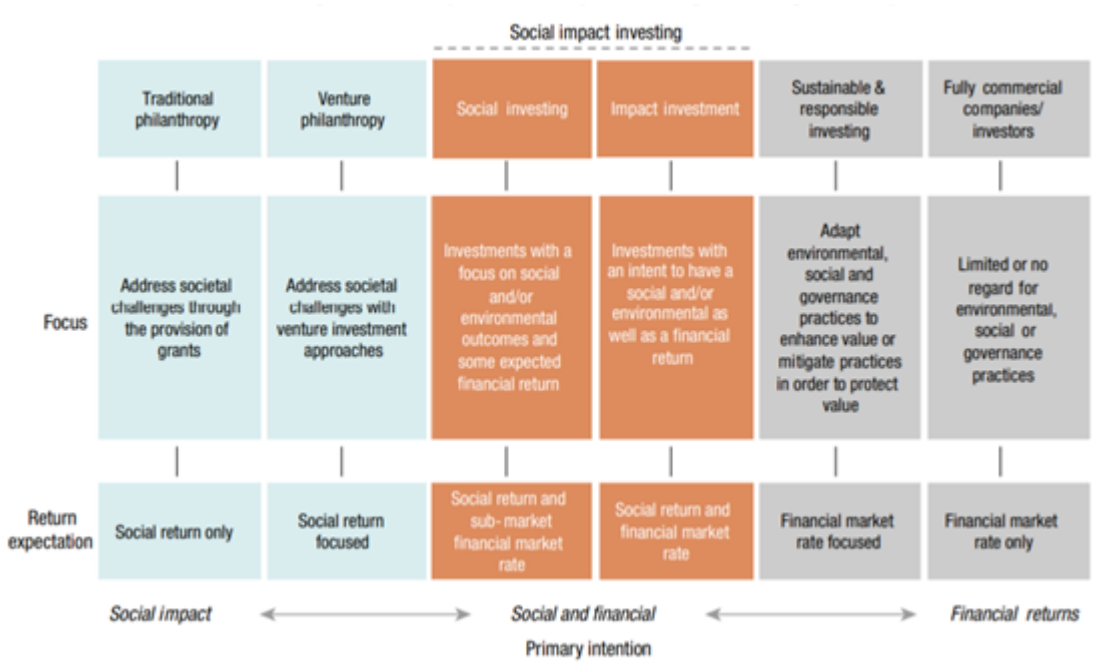
Source: CFA Institute

ESG investing is part of responsible investment. While there is no standard definition of responsible investment, we will present the main investment approaches in this chapter based on the definition by the CFA ESG Investing Official Training Manual (Simonek & Verhagen, 2021).

Responsible investment is a general term for the different ways in which investors can integrate ESG within security selection and portfolio construction. Most of the forms of responsible investment, except for engagement, are ultimately related to portfolio construction. Engagement, on the other side, concerns whether and how an investor tries to influence an issuer's behavior on ESG matters, both for equity and bond sec-

tors. As there is no standard classification in the industry, the types of responsible investment overlap and evolve over time.

Figure 1.2: A spectrum of capital



Source: OECD

Socially responsible investment (SRI) refers to approaches that apply social and environmental criteria in evaluating companies. In this case, investors usually score companies using a set of criteria and a hurdle is established for qualification within the investment universe, based either on the full universe or sector-by-sector.

Sustainable investment refers to the selection of assets that contribute in some way to a sustainable economy, i.e. an asset that minimizes natural and social resource depletion. It is also referred to companies with positive impact or companies that will benefit from sustainable macro-trends. The term 'sustainable investment' can also be employed to mean a strategy that screens out activities considered contrary to long-term environ-

mental and social sustainability, such as coal mining or exploring for oil in the Arctic regions.

Thematic investment refers to selecting companies that fall under a sustainability-related theme, such as clean-tech or sustainable agriculture. Thematic funds select companies within various sectors that are relevant to the theme. To be noted, though, that not all thematic funds are considered to be responsible investments or best-in-class. Becoming one not only depends on the theme of the fund, but also on the ESG characteristics of the selected companies.

Impact investing refers to investments made with the specific intent of generating positive, measurable social and/or environmental impact alongside financial returns (which differentiates it from philanthropy). This type of investment is usually associated with direct investments, such as in private debt, private equity and real estate. However, in recent years, impact investing has increasingly mainstreamed into the public markets. Measurement and tracking of the agreed-upon impact generally lie at the heart of the investment proposition.

Finally, ethical and faith-based investment refers to investing in line with certain principles, usually using negative screening to exclude companies whose products and services are deemed morally objectionable by the investor or certain religions, international declarations etc. Faith-based investors have been activist shareholders, in order to improve the conduct of investee companies. Another popular strategy is portfolio building with a focus on screening out the negative; in other words, avoiding ‘sin stocks’ or other assets at odds with their beliefs.

1.1.2 History of ESG

Responsible investing dates back as far as investing itself. In the 17th and 18th centuries, religious groups such as the Quakers and Methodists already laid out guidelines to their followers on the types of activities in which they should or should not invest. Negative screening was the most popular form of socially responsible investment (SRI) in the early days. One of the first ethical mutual funds that moved to screens based on religious traditions was the Pioneer Fund that was launched in 1928[1].

In more recent times, ethical exclusion has been adopted during the Vietnam War in 1971, with the establishment of the Pax World Fund (now IMPAX Asset Management)[2]. At the time, the fund offered an alternative investment option for those opposed to the production of nuclear and military arms.

The main differences between early and modern SRI are the level of shareholder activism, the widespread consideration of environmental factors and the introduction of positive screening investments, which aim at maximizing financial returns alongside having a socially aligned investment strategy. SRI includes ESG factors in the traditional investing framework, that was mainly focused on profits and risk-adjusted returns.

The modern form of ESG investing began with a letter and call to action: in January 2004, the UN Secretary General, Kofi Annan, asked the CEOs of significant financial institutions to take part in an initiative, under the authority of the UN Global Compact and with the support of the International Finance Corporation (IFC), to integrate ESG into capital markets. The initiative produced a report entitled Who Cares Wins, which

[1] Renneboog, L., Ter Horst, J. and Zhang, C. (2008). "Socially responsible investments: Institutional aspects, performance, and investor behavior." Journal of Banking & Finance, 32(9), pp.1723–1742.

[2] IMPAX Asset Management (2021). History. Available at:https://impaxam.com/about-us/history/

effectively coined the term 'ESG'. The report states that embedding ESG factors in capital markets makes good business sense and leads to more sustainable markets and better outcomes for societies. At the same time, the UN Environment Program Finance Initiative (UNEP FI) produced the Fresh fields Report, which showed that ESG issues are relevant for financial valuation. These two reports formed the backbone for the launch of the Principles for Responsible Investment (PRI) at the New York Stock Exchange in 2006 and the launch of the Sustainable Stock Exchange Initiative (SSEI) in 2007.

1.1.3 ESG Investing in numbers

As there is no common definition of responsible investments, there is a wide range of data regarding responsible investments' market. One of the most comprehensive market reviews was made by the Global Sustainable Investment Alliance (GSIA), its most recent report shows sustainable investing assets in the five major markets stood at US$ 30.7 trillion (£22.1tn) at the start of 2018, a 34% increase in two years[3]. Except from Europe, the market share of sustainable investing has grown in all regions. In terms of where sustainable and responsible investing assets are domiciled globally, Europe (46)% and the USA (39)% continue to manage the highest proportions (Appendix Figure A.1).

Responsible investment directs a considerable share of managed assets in each region (as can be seen in Appendix Figures A.2 and A.3). The proportion of sustainable investing relative to total managed assets grew in almost every region. Europe represents the only exception to this trend since sustainable investing assets have declined relative to total managed assets since 2014. At least part of the market share decline in Europe

[3]Global Sustainable Investment Alliance (2018). 2018 Global Sustainable Investment Review. Available at www.gsi-alliance.org/wp-content/uploads/2019/06/GSIR_Review2018F.pdf and Global Sustainable Investment Alliance (GSIA) (2012). 2012 Global Sustainable Investment Review.

stems from a shift to stricter standards and definitions for sustainable investing in that market.

1.1.4 ESG Rating and Greenwashing

Escrig-Olmeda et al.define the lack of transparency in methodologies, commensurability, and the lack of an overall score, as the main challenges for ESG-raters (Escrig-Olmedo, Fernández-Izquierdo, Ferrero-Ferrero, Rivera-Lirio, & Muñoz-Torres, 2019). There are probably two main reasons why ESG ratings differ so much among different agencies and credit ratings: first, the concept of ESG performance is not clearly defined and, consequently, quite freely interpretable, if compared with the concept of risk of default, which is, for example, unique. Secondly, the collection of traditional financial data has been in place for decades, while the collection of ESG ratings has only developed over the last thirty years. The lack of a homogeneous framework for ESG-ratings means that results from one provider cannot be directly comparable to another's. It is interesting to understand how much the scores provided by different agencies diverge, and the empirical analysis provided by the MIT Sloan School of Management[4] can help us in estimating it. In their paper, researchers show that the correlation between the ratings provided by different agencies reaches 54% . For comparison, credit ratings between Moody's and S& P are 99% correlated. The implications being that investors receive different information according to which agency they are referring to. Agencies do not meet the stakeholder's expectations in their rating methodology and this, in turns, lowers the usefulness and acceptance of the rating score. Further, since the scores of rating agencies are seldom comparable, and the same firm can receive different rankings from different agencies, the credibility of ESG-ratings in practice can be questioned. Currently, ESG-ratings are still provided by different actors globally and there is no

[4]Berg, F., Koelbel, J. F., & Rigobon, R. (2019). Aggregate confusion: The divergence of ESG ratings. MIT Sloan School of Management.

unifying methodology or process for rating, each actor compiles the ratings based on a methodology of their own. In addition, the implementation of ESG-frameworks within organizations is still lacking. Some critics also argue that companies only report what is measurable and not what is necessary in a CSR-context, and by extension also for ESG-purposes (Whitelock, 2019). Further, as the scores are highly dependent on companies' own disclosures, that means that there could be a bias towards good corporate social performance in data availability, as companies with good CSR are likely to disclose more information voluntarily (Dorfleitner, Halbritter, & Nguyen, 2015). That would imply that poor performers lack scores, or underlying scores, in the data. If the information provided by the agencies is misleading, the legitimacy of ESG-rating in society and the trust in both ESG-raters and companies would suffer. Its therefore in the interest of all participants that ESG-ratings can be trusted and viewed as legitimate.

Strictly related to the rating issue is the problem of greenwashing. One of the sources of greenwashing is indeed the variety of methodologies employed by ESG rating agencies (Nelson, 2018). The absence of a uniform definition and systematic framework for responsible investments classification raises concerns for greenwashing of investments. One could indeed argue that RI is simply a marketing tool deployed to attract capital. The lack of a uniform framework makes it challenging to draw the line between sustainable and conventional investments and buying such investment products could also give a false sense of security or satisfaction to investors (Nelson, 2018). As RI products proliferate with little oversight, the problem of investment greenwashing raises a need for stricter standards and a systematized taxonomy (Nelson, 2018). As a response, the European Union agreed in March 2019 on new rules on disclosure requirements for sustainable investments: there will be requirements for asset managers to disclose ESG risks in their investments and to inform investors about ESG considerations as a part of

fiduciary duty [5] . European Commission (2019) states that the end goal is to establish a unified EU taxonomy [6].

[5] https://ec.europa.eu/commission/presscorner/detail/en/IP_19_1571andhttps://www.unepfi.org/news/industries/investment/eu-policy-makers-achieve-political-agreement-on-investor-disclosures-and-esg

[6] https://ec.europa.eu/commission/presscorner/detail/en/ip_19_6793

2 | Literature Review

2.1 Performance of ESG

On a first glance, it is plausible to expect a negative impact of CSR companies on portfolio and stock performance. Indeed, on a company level, higher CSR might imply competitive disadvantage because it brings about additional costs. These costs reduce profits and therefore the wealth of shareholders. This concept is often referred to as "the agency view of corporate social responsibility", i.e. when pursuing CSR, the interests of managers and shareholders diverge. Under this perspective, CSR is detrimental for shareholders but is anyway pursued by managers, who fail to obtain compensation for good firm performance and seek private benefits (awards and other appreciations from promoters of social responsibility). This expectation therefore views CSR as a waste of corporate resources (Ferrell, Liang, & Renneboog, 2016). In addition, when considering a portfolio which invests in companies with good CSR (i.e. excludes certain companies that normative portfolio theory would include), it can be argued that underdiversification would lead to sub-par returns.

However, it is shown in a study(Clark et al., 2015) that in a large majority of the analyzed cases, companies with robust ESG practices obtain better operational and investment performances. Accordingly, it was found that, during the period 2014-2017, ESG outperformed both in Europe and North America (Bennani et al., 2018). In Europe in particular, positive returns were generated by all dimensions of ESG, with a higher relevance for the governance factor. Another paper (Derwall et al., 2005)that investigates whether SRI brings the inferior or superior portfolio performance presented evidence that the portfolio with high rank in eco-efficiency led to higher average return when compared to low rank in the period of 1995 – 2003. One study (Cai & He, 2014) found an equal-weighted environmentally responsible portfolio can gain al-

pha from the fourth year in the period of 20 years from 1992 to 2011. In its report, Blackrock (2018)[1] demonstrates that ESG-focused equity benchmarks outperform the traditional ones practically in every way: annualized returns are higher, while volatility and maximum monthly draw-downs are lower (Appendix A.4).

2.2 ESG Resilience/Lower Risk

There is evidence (Sokolovska & Kešeljević, 2019) that superior financial performances of sustainable companies have two main sources: the first being that sustainable companies show better financial ratios and financial variables, the other that those companies are less risky. Using a four-factor risk-adjusted model in the study (Carhart, 1997; Renneboog, Ter Horst, & Zhang, 2008) it was found that a slightly negative discrepancy in market loadings between sustainable and non-sustainable funds worldwide, the implication being that the sustainable funds' market return sensitivity is lower than that of conventional funds.

Not only does CSR affects the financial performance of companies, but it can also be examined from the viewpoint of risk mitigation. For example, a procedure was developed to dynamically hedge climate risk by constructing mimicking portfolios that hedge innovations in climate news series obtained by textual analysis of news sources(Engle, Giglio, Kelly, Lee, & Stroebel, 2020). In terms of hedging, studies have demonstrated that green stocks can be used as climate change hedges.

[1] Blackrock, 2018, "Sustainable investing: a "why not" moment", available at https://www.blackrock.com/corporate/literature/whitepaper/bii-sustainable-investing-may-2018-us.pdf

2.3 E, S and G Performance in times of crisis

Nofsinger & Varma (2014) find that ESG selection drive asymmetric return patterns in which SRI funds outperform relative to conventional funds in market crisis periods(Nofsinger & Varma, 2014). Their results are coherent with those of Lins et al. (2017) in that socially responsible investments add value by outperforming during periods of market crises (Lins, Servaes, & Tamayo, 2017). In crisis periods SRI funds outperform by 1.61 – 1.75% with no evidence of underperformance after the crisis period. This can let us think that responsible investments have insurance-like properties in that they perform better during market crises. A possible explanation for this behavior is that trust is essential in financial markets, and its benefits can be seen from the performance of ESG investing during market conditions when overall trust in the markets is low. Investors trust the data coming from socially responsible companies and thus they are not overreacting to bad news.

Growing interest in ESG issues has increased the amount of research on the relationship between CSR and financial performance. Using a sample of 12,915 US firm-year observations from 1992 to 2007, El Ghoul et al. examine whether CSR affects the cost of equity capital(El Ghoul, Guedhami, Kwok, & Mishra, 2011). They argue that if socially responsible firms are viewed as less risky, then these firms should have lower cost of equity. They find that, after controlling for firm-specific determinants, firms with higher CSR scores have lower cost of equity capital. Thus, managers should pursue CSR-related activities because of lower financing costs in addition to the benefit to society at large.

In recent times, during the COVID-19 crisis, the trends of environmental, social, and governance (ESG) stocks' integration in investors' portfolio choice decisions have been rising remarkably. For instance, ESG-driven assets have crossed $ 40 trillion of global

capitalization, and the big investors (e.g., World Business Council on Sustainable Development) now give more importance to ESG issues for earning higher future returns (Rubbaniy, Khalid, Ali, & Naveed, 2021). These portfolio choice reconsiderations stimulate a capital flow from high-risk assets to ESG portfolios (Singh, 2020), and improve the portfolio returns that can be seen in ESG indices and ETFs during COVID-19 (Albuquerque et al., 2020; Broadstock et al., 2021). For instance, since the start of the pandemic, some of the leading ESG stock indices like the S & P 500 ESG index have outperformed their parent indexes by 0.6% percent on a total return basis. In a recent survey by J.P. Morgan for tracking the ESG implications during the COVID-19, around 55% of respondents see a positive outlook of ESG stocks in the next three years. The HSBC (2020) sustainable finance investment survey[2] shows that global investments in sustainable funds (worth of $ 45.6 billion) peaked in the first quarter of 2020 COVID-19 pandemic, where about 41% investors consider sustainability issues in their investments. Although the inflows to ESG-based funds have risen since the recent outbreak of pandemic (Broadstock et al., 2021), the risk-return characteristics of ESG stocks have already got some attention in the current literature. For instance, recent studies on ESG stocks document that companies with higher ESG ranking are subject to lower risk and remain stable during turbulent times (Ferriani & Natoli, 2021; Omura, Roca, & Nakai, 2021; Singh, 2020). The ESG screening of stocks results in higher returns and, lower volatility and tail risk (Díaz, Ibrushi, & Zhao, 2021; Omura et al., 2021; Verheyden, Eccles, & Feiner, 2016).

The COVID-19 related literature already provides some studies on the performances of each ESG factor. For Example, a study (Engelhardt, Ekkenga, & Posch, 2021) states that during the Covid-19 crisis, the social component of ESG is highly statistically significant and shows the largest effect, thus the social score is the predominant driver of their results. This finding is in line with Albuquerque et al., who focus on the envi-

[2]Available at:https://www.sustainablefinance.hsbc.com/mobilising-finance/sustainable-financing-and-investment-survey-2020

ronmental and social (ES) aspects of ESG (Albuquerque et al., 2020). Consistent with the paper's main prediction, their first result is that first quarter abnormal returns are significantly correlated with E and S ratings in the cross-section. Also, they find that firms with high E and S ratings earn an extra daily return of 0.45% . In a recent study conducted by Engelhardt et al on high ESG rated European firms, it was not only found that there were higher abnormal returns and lower stock volatility associated with these firms during the COVID crisis, but also that social scores drove these results(Engelhardt et al., 2021). To sum up, there is no consensus in the literature on which of the ESG factors has been the key performance driver or the best performer during the COVID 19 crisis.

Considering the Great Financial Crisis, Cornett et Al report in their study on CSR and Bank performance during the crisis that, on average, banks seem to be rewarded for being socially responsible, since ROE is positively and significantly related to CSR scores(Cornett, Erhemjamts, & Tehranian, 2016). Lins et al. study the value of corporate social responsibility during the 2008 – 2009 financial crisis by examining the performance of 1,673 non financial firms with CSR data(Lins et al., 2017). The authors find that firms with high CSR ratings had significantly higher – between four and seven percentage points – stock returns during the crisis than those firms that had low CSR ratings. The authors argue that the effect of social capital in explaining stock returns is at least half as large as the effect of financial variables, such as cash holdings and leverage. In addition, they tested the performance of high-CSR firms during non crisis periods. Their models show that CSR affects returns only during the crisis period. Even during the recovery period after the crisis there was no difference in the stock returns between high- and low-CSR firms. It seems that investors value the social capital of high-CSR firms during a crisis of trust which translates into out performance during crisis periods. Investments in a high-CSR firm can be viewed as a sort of insurance policy that pays

off when the economy suffers from severe lack of confidence (Lins et al., 2017). Palmi, P., et al demonstrate the strong role of organizational resilience based on adoption of corporate governance, environmental and social practices (CESPs) in reacting to unexpected shocks, while preserving business sustainability pre- and post-Great Financial Crisis(Palmi, Morrone, Miglietta, & Fusco, 2018).

Finally, if we consider the Great Financial Crisis of 2007, we face the same literature discordance. Indeed, while some studies have shown the importance of CSR in economic out performance during Great Financial crisis(Lins et al., 2017) , there was no study to the best of our knowledge that compared the individual effect all the three E, S & G factors during crisis. Hence, we wanted to examine the contribution of all three factors to determine which factor drove the superior performance of firms during the 2007-2008 crisis. We decided to focus on Europe as it is the most significant player in the sustainable investing industry with $ 14.1 trillion total assets committed to sustainable and responsible investment strategies (The Global Sustainable Investment Alliance, 2018).

2.4 Hypothesis & Methodology

We have the following two hypotheses:

2.4.1 Hypothesis1

Higher ESG scores of firms help with higher stock returns during crisis in European public firms.

2.4.2 Hypothesis2

When exploring the individual pillar effect on the returns, we will find at least one pillar helps out-performance of the stocks.

We apply the methodology employed by Lins et al to study our hypotheses(Lins et al., 2017). In their study, using a linear regression mode, they have shown the effect of CSR performance on returns during the global financial crisis of 2008 in the American context, while we explore effect of ESG scores in the European context and extend it to further understand the individual pillar effects. In addition, the reference model does not include governance scores in CSR scores while ours does.

3 | Data

3.1 Sample Construction

Our sample consists of 614 publicly listed European firms from 19 different countries. We have chosen such firms whose ESG scores at the end of 2006 are available. We obtained Refinitiv's ESG ratings from Thomson Reuters Eikon which has also been used in the CSR literature (Albuquerque et al., 2020; Demers, Hendrikse, Joos, & Lev, 2021). We collected Refinitiv's ESG ratings along with all environmental, social and governance pillar scores for the year 2006. Refinitiv measures corporate environmental, social, and governance performance into several sub-dimensions. A firm's environmental performance is covered by the categories of resource use, emissions, and innovation. Social performance is measured by the sub-dimensions' workforce, human rights, community, and product responsibility, and governance performance is evaluated by the sub-dimensions management, stakeholders, and CSR strategy (Refinitiv, 2021).

We obtain stocks' return data, index returns and accounting data also from Refinitiv (Refinitiv, 2021). We remove financial firms from our sample considering the support such firms receive from governments in times of crisis as was done by Lins et al in their study (Lins et al., 2017).

We considered the crisis period to be from August 2008 to March 2009 as in the previous crisis literature (Lins et al., 2017; Lins, Volpin, & Wagner, 2013). The main stock return measures for each firm are Crisis-Period Raw Return, which is the firm's raw return of period from August 2008 through March 2009, and Abnormal Crisis-Period Return, which is the raw return minus the expected return, based on the market model,CAPM, estimated over the 60-month period ending in July 2008. To avoid the issues with outliers, we winsorize these returns at the 1st and 99th percentiles. We regress these return measures on ESG scores for the year 2006 to find the effects of ESG performance on

the returns. We chose the scores for 2006 to avoid the possibility that firms may have preemptively changed their ESG policies for 2007 in anticipation of the crisis ahead, as was done by Lins et.al (Lins et al., 2017). After combining nonfinancial firms with sufficient data coverage on all the databases, we obtain a sample of 508 nonfinancial firms for which all explanatory variables are available for the crisis period.

3.2 Descriptive Statistics

Table 3.1 provides descriptive statistics for our main variables. The first two rows of the table show our dependent variables of interest, Raw Returns and Abnormal returns, which are negative, with a mean of-4.32% for both, a median of -3.4% for the former and -3.08% for the later, and a 25th percentile value of-4.32% and -4.4%, indicating that while keeping in with times, the returns are negative but not strongly negative which might be because of the shorter sample chosen by us. Table 3.2 presents a correlation matrix of all the variables employed in our main analysis.

Table 3.1: Summary Statistics

The sample consists of 508 European public firms for which ESG scores are obtained at the end of 2006, raw returns are the returns during the crisis period August 2008 to March 2009; abnormal returns are the market model-adjusted return over the period August 2008 to March 2009, with market model parameters computed over five-year period ending in July 2008. Accounting data is obtained as of end of 2007. Market capitalization is in millions of Euros. Long-term debt is computed as the long-term debt divided by total assets; cash holdings are computed as cash and marketable securities divided by assets; short-term debt is computed as debt in current liabilities divided by assets and book-to-market is computed as book value of equity divided by market value of equity. Negative B/M is a dummy variable set to 1 if it's positive, to zero otherwise. Momentum is defined as the raw return over the period August 2007 to July 2008, while idiosyncratic risk is computed as the residual variance from market model estimated over the five-period ending in July 2008, using monthly data.

	Mean	SD	25^{th} Perc.	Median	75^{th} Perc.
Raw Return	-4.32	16.03	-4.32	-3.4	16
Abnormal Return	-4.32	17.49	-4.4	-3.08	17.7
Long-Term Debt	0.19	0.18	0.19	0.17	0.2
Cash Holdings	0.11	0.11	0.11	0.07	0.1
Short-Term Debt	0.31	0.15	0.31	0.29	0.2
Book-to-Market	0.49	0.54	0.49	0.35	0.5
Profitability	8.79	7.42	8.79	6.92	7.4
lnMKtCap	22.38	1.6	22.38	22.37	1.6
Momentum	-19.33	21.07	-19.33	-20.08	21.1
Idiosyncratic Risk	0.09	0.14	0.09	0.02	0.1
Environmental Pillar Score	28.97	26.22	28.97	24.05	26.2
Social Pillar Score	39.04	21.48	39.04	34.83	21.5
Governance Pillar Score	47.67	22.09	47.67	47.1	22.1
ESG Score	38.75	18.81	38.75	35.31	18.8
Market Capitalisation	18850.61	44204.97	1655.1	5195.93	15090.8
Negative B/M	1.99	0.11	2	2	2

Table 3.2: Correlation Matrix

	Raw Return	Abnormal Return	Long-Term Debt	Cash	Short-Term Debt	B/M	ROA	ln MKt Cap	Momentum	Idiosyncratic Risk	EP Score	SP Score	GP Score	ESG Score	MkT Cap	Sector	Country
Raw Return																	
Abnormal Return	0.82																
Long-Term Debt	0.00	0.01															
Cash	0.01	-0.06	-0.30														
Short-Term Debt	0.01	0.03	-0.19	0.13													
B/M	-0.01	0.02	0.02	-0.19	-0.16												
ROA	0.04	-0.04	-0.22	0.43	0.06	-0.32											
lnMKtCap	-0.01	0.02	-0.06	0.02	-0.07	-0.20	0.00										
Mom	-0.03	-0.07	-0.16	0.05	-0.03	-0.19	0.08	0.09									
Idiosyncratic Risk	-0.04	0.11	-0.09	0.00	0.08	0.01	-0.16	0.18	-0.09								
EP Score	0.01	0.05	0.00	-0.14	-0.05	0.01	-0.10	0.49	0.01	0.15							
SP Score	0.03	0.04	0.06	-0.06	-0.05	0.01	-0.13	0.46	0.02	0.06	0.67						
GP Score	0.01	0.05	0.00	-0.10	-0.11	-0.06	-0.03	0.33	0.03	0.07	0.34	0.38					
ESG Score	0.02	0.06	0.02	-0.11	-0.07	-0.01	-0.10	0.53	0.02	0.11	0.84	0.88	0.67				
MkT Cap	0.00	0.00	-0.09	0.05	-0.06	-0.08	0.06	0.65	0.08	0.00	0.30	0.31	0.21	0.34			
Sector	-0.02	-0.02	0.15	0.03	-0.02	-0.01	-0.08	0.01	0.10	-0.13	-0.09	0.09	0.02	0.01	0.04		
Country	0.05	-0.03	0.06	0.01	-0.10	0.07	0.12	-0.24	0.00	-0.59	-0.02	0.08	0.02	0.03	-0.03	0.03	
Negative B/M	-0.01	-0.01	-0.37	-0.02	-0.23	0.14	-0.12	0.10	0.09	0.05	0.03	-0.02	0.04	0.02	0.04	-0.02	-0.07

4 | Results

4.1 Hypothesis 1 Results

We estimate various linear regression models of stock returns during the crisis period as a function of firms' pre-crisis ESG Ratings, Individual ESG pillar scores and several control variables. We employed country and sector dummies in all models to account for possible regulatory policy differences on ESG policies in various countries and sectors, difference in onset of crisis in different countries.

$$RawReturn_i = \beta_0 + \beta_1 ESG_{i,2006} + Countrydummies + Sectordummies + e_i$$

$$AbnormalReturn_i = \beta_0 + \beta_1 ESG_{i,2006} + Countrydummies + Sectordummies + e_i$$

Table 4.1 contains our baseline regression models. The dependent variable in first and third columns is raw crisis-period return termed as "raw return", while in the second and fourth columns, the dependent variable is abnormal crisis-period return, termed as "abnormal return". Our variable of interest is the firm's ESG Score measured at year-end 2006. The first column shows that change in ESG scores can lead to a change of 0.1 percentage point in stock returns. The second column shows that change in ESG scores can lead to a change in 2.5 percentage points change in the abnormal returns. One concern with the specifications reported in first and second columns is that the that the strong performance of high-ESG firms during the crisis may be due to omitted variable bias. To address this possibility, we control for a firm's financial health in the year before the crisis and for other firm characteristics that have been found to affect stock returns. We employed the factors such as book-to-market, size and momentum. We also use several proxies to measure a firm's financial health and, thus, its ability to withstand a severe downturn in the economy, as employed by Lins et al , those are: cash holdings (cash and marketable securities divided by assets), short-term debt (debt in

current liabilities divided by assets), long-term debt (long-term debt divided by assets), and profitability (operating income divided by assets)(Lins et al., 2017). During a crisis, profitable, cash-rich firms with low debt can continue investing, while other firms may be forced to cut investment, especially if they have short-term debt maturing during the crisis, as seen in the literature (Duchin, Ozbas, & Sensoy, 2010; Almeida, Campello, Laranjeira, & Weisbenner, 2009; Harford, Klasa, & Maxwell, 2014). As additional firm characteristics may also be important for stock (Daniel & Titman, 2005) we also control for book-to-market (book value of equity divided by market value of equity), size (lnMktCap), and momentum (the firm's raw return over the period from August 2007 to July 2008). We also add a dummy for firms with a negative book-to-market ratio, as such firms are likely distressed and hence their returns may behave more like those of high book-to-market firms than low book-to-market firms (Fama & French, 1995) . Finally, we control for a firm's idiosyncratic risk (the residual variance from the market model estimated over the five-year period ending in July 2008, using monthly data) considering the possibility that stock price volatility also affect returns (Goyal & Santa-Clara, 2003). We also measure financial health and firm characteristics at the end of December of 2007, except for momentum and idiosyncratic volatility, which are computed over one and five years, respectively, before the start of the crisis period.

$$\text{Raw Return}_i = \beta_0 + \beta_1 ESG_{i,2006} + \beta_2 LnMktCap_{i,2007} + \beta_3 Momentum_{i,2007} + \beta_4 Book - to - Market_{i,2007} + \beta_5 Profitability_{i,2007} + \beta_6 Long - TermDebt_{i,2007} + \beta_7 Short - term_{i,2007} + \beta_8 CashHoldings_{i,2007} + \beta_9 Idiosyncraticrisk_{i,2007} + \beta_{10} NegativeB/M_{i,2007} + Countrydummies + Sectordummies + e_i$$

$$\text{Abnormal Return}_i = \beta_0 + \beta_1 ESG_{i,2006} + \beta_2 LnMktCap_{i,2007} + \beta_3 Momentum_{i,2007} + \beta_4 Book - to - Market_{i,2007} + \beta_5 Profitability_{i,2007} + \beta_6 Long - TermDebt_{i,2007} + \beta_7 Short - term_{i,2007} + \beta_8 CashHoldings_{i,2007} + \beta_9 Idiosyncraticrisk_{i,2007} + \beta_{10} NegativeB/M_{i,2007} + Countrydummies + Sectordummies + e_i$$

The results presented in third and fourth columns of Table 4.1 confirm that firms with high ESG scores had higher raw returns, but the significance levels drop for the case of abnormal returns. The effect on raw returns increased from 0.1 percentage points to 0.2 percentage points showing that there was some downward bias in the first column and an upward bias in the second column. Turning to the control variables, we notice that firms with lower cash holdings showed higher abnormal returns during crisis. This contradicts the earlier assumption that firms with better financial health tend to perform better during crises. The negative relationship with cash holdings results is in line with the findings of Tran, Q. T. which suggest that managers are more likely to expropriate shareholders through corporate liquidity policy over a financial crisis, which further implies that managers should be encouraged to disgorge cash during a financial crisis (Tran, 2020). The Book-to-market seems to have an inverse relationship as seen in the third column which is in line with the view that book-to-market may also proxy for some sort of distress risk (Fama & French, 1995), where low book-to-market is typical of firms with high average returns on capital (growth stocks), whereas high book-to-market is typical of firms that are relatively distressed. This is consistent with the view that book-to-market ratios may also proxy for a distressed firm effect which may have dominated the conventional 'market timing' effect during the Great Financial Crisis (Dissanaike, Faasse, & Jayasekera, 2014) .

In table 4.2, we re-estimate our previous models, but instead of including our linear measure of ESG score as an explanatory variable, we divide firms into ESG score quartiles and include dummies for quartiles top (ESG Score 4), second (ESG Score 3) and third (ESG Score 2) (the intercept captures the effect of bottom quartile (ESG Score1). This approach allows us to assess whether the effect of a firm's ESG scores on returns is more pronounced at very high levels of ESG scores. The results show that firms with better ESG scores had high returns with higher statistical significance as observed for values in ESG-top quartile. The abnormal returns however lost their significance after

Table 4.1: ESG Scores and Returns

	RawReturn	AbnormalReturn	RawReturn	AbnormalReturn
ESG Score	0.00126^{**}	0.02554^{*}	0.00191^{***}	0.02040
	(0.00054)	(0.01378)	(0.00062)	(0.01576)
lnMktCap			-0.01169^{**}	-0.00614
			(0.00573)	(0.14669)
Momentum			-0.00009	-0.02269^{*}
			(0.00050)	(0.01284)
Book-to-Market			-0.03713^{***}	-0.19198
			(0.01401)	(0.35895)
Profitability			0.00231	-0.06642^{*}
			(0.00154)	(0.03952)
Long-Term Debt			-0.00145	-1.63454
			(0.07151)	(1.83203)
Short-Term Debt			0.04977	0.66007
			(0.07343)	(1.88118)
Cash Holdings			0.08715	-6.35533^{**}
			(0.10354)	(2.65250)
Idiosyncratic risk			0.01683	0.27255
			(0.02835)	(0.72624)
Negative B/M			-0.06671	1.16101
			(0.10985)	(2.81408)
Constant	-0.39727^{***}	-2.57141^{***}	-0.31806^{***}	-3.22688
	(0.02310)	(0.58647)	(0.11615)	(2.97568)
Country Dummies	Yes	Yes	Yes	Yes
Sector Dummies	Yes	Yes	Yes	Yes
R^2	0.01059	0.00673	0.05893	0.03825
Adj. R^2	0.00864	0.00477	0.03617	0.01499
Num. obs.	509	509	509	509

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

we employ control variables as in the previous case. These results indicate that firms with higher ESG ratings perform better to the tune of 10 percentage points but we observe no out-performance when compared to the market. The results from tables 4.1 and 4.2 support our first hypothesis that Higher ESG scores of firms help with higher returns during crisis but there is no significant effect on out-performance of the firms.

Table 4.2: ESG Quartiles and Returns

	RawReturn	AbnormalReturn	RawReturn	AbnormalReturn
ESG_top	0.07036^{**}	1.27545^{*}	0.10700^{***}	0.94591
	(0.02916)	(0.74194)	(0.03238)	(0.83247)
ESG_second	0.00326	0.93743	0.01114	0.88136
	(0.02916)	(0.74194)	(0.02935)	(0.75459)
ESG_third	0.02458	1.01240	0.04206	0.73514
	(0.02916)	(0.74194)	(0.02986)	(0.76760)
lnMktCap			-0.01200^{**}	0.01973
			(0.00561)	(0.14430)
Momentum			-0.00011	-0.02299^{*}
			(0.00050)	(0.01288)
Book-to-Market			-0.03830^{***}	-0.19030
			(0.01399)	(0.35975)
Profitability			0.00246	-0.06892^{*}
			(0.00155)	(0.03977)
Long-Term Debt			0.00136	-1.62892
			(0.07142)	(1.83617)
Short-Term Debt			0.05701	0.71611
			(0.07354)	(1.89068)
Cash Holdings			0.09106	-6.28198^{**}
			(0.10374)	(2.66723)
Idiosyncratic risk			0.01428	0.28283
			(0.02835)	(0.72889)
Negative B/M			-0.06616	1.19689
			(0.10966)	(2.81935)
Constant	-0.37363^{***}	-2.40377^{***}	-0.28706^{**}	-3.40983
	(0.02058)	(0.52360)	(0.11697)	(3.00732)
Country Dummies	Yes	Yes	Yes	Yes
Sector Dummies	Yes	Yes	Yes	Yes
R^2	0.01444	0.00666	0.06583	0.03848
Adj. R^2	0.00859	0.00076	0.03935	0.01123
Num. obs.	509	509	509	509

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

4.2 Hypothesis 2 Results

In Tables 4.3 to 4.5, we repeat the analyses but with the individual pillar scores of environmental, social and governance pillars. All models include the full set of other control variables employed in Tables 4.1 and 4.2. Table 4.3 illustrates the effect of environmental pillar score on raw and abnormal returns before the control variables in the first and second columns. We see an improvement in confidence interval levels for environmental pillar score after the addition of control variables. The effect of environmental pillar score on Raw Returns has increased from 0.07 percentage points to 0.1 percentage points. This shows that there was a downward bias in our results like the ESG scores results before the addition of control variables. We can explain this with the higher correlation of 0.84 between ESG scores and Environmental Pillar scores as seen in Table 3.2. for it being a proxy for behavior of ESG score on the returns and so the behavior is similar when it comes to the effect on stock returns and abnormal returns.

Table 4.3: Environmental Pillar Scores and Returns

	RawReturn	AbnormalReturn	RawReturn	AbnormalReturn
Environmental Pillar Score	0.00073^{*}	0.01404	0.00114^{**}	0.00818
	(0.00040)	(0.01008)	(0.00044)	(0.01134)
lnMktCap			-0.00960^{*}	0.03823
			(0.00563)	(0.14388)
Momentum			-0.00009	-0.02254^{*}
			(0.00050)	(0.01288)
Book-to-Market			-0.03800^{***}	-0.20209
			(0.01408)	(0.36015)
Profitability			0.00225	-0.06806^{*}
			(0.00155)	(0.03965)
Long-Term Debt			-0.00034	-1.65430
			(0.07183)	(1.83706)
Short-Term Debt			0.04400	0.56270
			(0.07368)	(1.88444)
Cash Holdings			0.08419	-6.52918^{**}
			(0.10426)	(2.66646)
Idiosyncratic risk			0.01492	0.27583
			(0.02859)	(0.73130)
Negative B/M			-0.06103	1.25849
			(0.11024)	(2.81941)
Constant	-0.36989^{***}	-2.00118^{***}	-0.30757^{***}	-3.17621
	(0.01536)	(0.38980)	(0.11677)	(2.98664)
Country Dummies	Yes	Yes	Yes	Yes
Sector Dummies	Yes	Yes	Yes	Yes
R^2	0.00666	0.00382	0.05355	0.03602
Adj. R^2	0.00469	0.00185	0.03060	0.01265
Num. obs.	508	508	508	508

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Like environmental pillar score, the social pillar score has a significant relationship with firm's stock returns during crisis as shown in columns 1 and 3 of Table 4.4. However, there is no evidence that social performance helps the firm to outperform during the crisis, as shown by the results in columns 2 and 4. The effect of social pillar score on stock returns can be attributed to its high correlation with ESG score which is 0.88 which showed similar behavior.

Table 4.4: Social Pillar Scores and Returns

	RawReturn	AbnormalReturn	RawReturn	AbnormalReturn
Social Pillar Score	0.00122^{**}	0.01341	0.00178^{***}	0.00623
	(0.00048)	(0.01218)	(0.00053)	(0.01365)
lnMktCap			-0.01143^{**}	0.05495
			(0.00559)	(0.14375)
Momentum			-0.00010	-0.02249^{*}
			(0.00050)	(0.01289)
Book-to-Market			-0.03911^{***}	-0.20800
			(0.01402)	(0.36024)
Profitability			0.00259^{*}	-0.06804^{*}
			(0.00155)	(0.03985)
Long-Term Debt			-0.00562	-1.70364
			(0.07143)	(1.83589)
Short-Term Debt			0.04667	0.53992
			(0.07334)	(1.88505)
Cash Holdings			0.06269	-6.75770^{**}
			(0.10269)	(2.63940)
Idiosyncratic risk			0.02168	0.32684
			(0.02832)	(0.72780)
Negative B/M			-0.07748	1.23491
			(0.10994)	(2.82565)
Constant	-0.39563^{***}	-2.11445^{***}	-0.29454^{**}	-3.19111
	(0.02104)	(0.53594)	(0.11639)	(2.99161)
Country Dummies	Yes	Yes	Yes	Yes
Sector Dummies	Yes	Yes	Yes	Yes
R^2	0.01262	0.00239	0.06227	0.03542
Adj. R^2	0.01067	0.00042	0.03954	0.01203
Num. obs.	508	508	508	508

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 4.5 illustrates that governance score has no effect on raw returns as seen in columns 1 and 3 but it seems to have significant effect on the outperformance of firm. The significance level drops after adding the control variables but it still shows that there is 2.3 percentage points of effect on abnormal returns with changes in Governance Pillar Score. Our finding is in line with studies by Lucian A. et al (2013) which suggested that the use of information on governance practices by market participants influences abnormal returns(Bebchuk, Cohen, & Wang, 2013) and by Lins et al which showed the evidence of better performance of firms during crisis when they were better governed(Lins et al., 2013). The results from tables 4.3 to 4.5 suggest that higher governance pillar score helps firms outperform during the time of financial crisis while environmental and social pillar scores help with higher returns during crisis acting as proxies for overall ESG scores with their high correlation. These findings support our hypothesis 2 that at least one factor drives the outperformance of firms in times of crisis.

Table 4.5: Governance Pillar Scores and Returns

	RawReturn	AbnormalReturn	RawReturn	AbnormalReturn
Governance Pillar Score	0.00026	0.02585**	0.00031	0.02269*
	(0.00046)	(0.01172)	(0.00049)	(0.01242)
lnMktCap			−0.00425	0.01364
			(0.00531)	(0.13465)
Momentum			−0.00005	−0.02265*
			(0.00051)	(0.01282)
Book-to-Market			−0.03749***	−0.15150
			(0.01418)	(0.35938)
Profitability			0.00195	−0.07097*
			(0.00155)	(0.03936)
Long-Term Debt			−0.00773	−1.59850
			(0.07218)	(1.82901)
Short-Term Debt			0.03858	0.84168
			(0.07432)	(1.88334)
Cash Holdings			0.05350	−6.09363**
			(0.10472)	(2.65366)
Idiosyncratic risk			0.02080	0.26046
			(0.02860)	(0.72477)
Negative B/M			−0.05104	1.29142
			(0.11074)	(2.80631)
Constant	−0.36116***	−2.81512***	−0.33310***	−3.88036
	(0.02420)	(0.61047)	(0.11787)	(2.98696)
Country Dummies	Yes	Yes	Yes	Yes
Sector Dummies	Yes	Yes	Yes	Yes
R^2	0.00060	0.00950	0.04140	0.04145
Adj. R^2	−0.00137	0.00754	0.01821	0.01826
Num. obs.	509	509	509	509

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

5 | Robustness Check

In this section, we report the results of additional tests conducted to determine whether our main findings are robust. We first focus on measuring ESG performance at different points in time other than 2006. In our baseline models reported in Tables 4.1 to 4.5, we measure ESG performance at the end of 2006, more than one year before the onset of the financial crisis and the regulatory changes in macro factors. While the use of 2006 ESG scores instead of 2007 assures us the exclusion of any possible anticipatory ESG policy changes that occurred in 2007 preempting the crisis, we did not consider the policy changes that might have taken place in 2006 due to the better returns experienced in 2006 in general. There could have been an unobservable factor in 2006 which is associated with the abnormal returns achieved during crisis. To investigate this possibility, we check whether firm's ESG and individual pillar scores measured in 2005 are positively related to crisis-period stock returns since as of 2005, we assume there wasn't any visible anticipation of a financial crisis.

In the first two columns of Table 5.1, we estimate model stated below, using ESG scores measured in 2005 as the variable of interest. We employ the same control variables as proxies for firm's financial performance in all panel regressions as employed in the base line models. we use a within estimator with firm fixed effects and time dummies.

$$\text{Raw Return}_{i,t} = \beta_0 + \beta_1 ESG_{i,t} \text{x} CrisisPeriod_t + \beta_2 ESG_{i,t} \text{x} Post - CrisisPeriod_t + \Sigma\beta_i X_{i,t} + firmfixedeffects + timedummies + e_{i,t}$$

$$\text{Abnormal Return}_{i,t} = \beta_0 + \beta_1 ESG_{i,t} \text{x} CrisisPeriod_t + \beta_2 ESG_{i,t} \text{x} Post - CrisisPeriod_t + \Sigma\beta_i X_{i,t} + firmfixedeffects + timedummies + e_{i,t}$$

As shown in column 1 of Table 5.1, the effect on raw returns is not same as the effect using 2006 ESG scores. However, the ESG scores of 2005 show more pronounced effect on the abnormal returns i.e., the out performance of the firm. We then conduct the same test using 2007 and 2008 ESG scores. The results reported in columns 4

and 6 are different from our baseline results. ESG scores seem to have a significant and positive effect on abnormal returns. It is also interesting to note the relationship between abnormal returns post crisis with the ESG scores is negative while with raw returns is significant and positive.

Table 5.1: ESG Scores and Returns

Raw return is the monthly raw or market-model adjusted return and ESG_t is our proxy for ESG score, measured at year-end 2005, 2007, or 2008. $CrisisPeriod_t$ is a dummy variable set to one in the period August 2008 to March 2009, $Post - Crisis_t$ is a dummy variable set to one in the period April 2009 to August 2013, and X_i is a vector of control variables. The control variables included in all models are the same as those employed in Tables 4.1 to 4.5 and they include firms' financial characteristics as well as sector and country dummies. The financial characteristics based on accounting data are updated three months after each fiscal year-end. The characteristics based on market data (momentum, size, market-to-book) are updated monthly. Factors are re-estimated each month based on the previous 60 months' data. The regression is estimated over the period 2007-2013. Financial firms are removed from the sample. Except when otherwise indicated, numbers in parentheses are heteroskedasticity-consistent standard errors.

	2005		2007		2008	
	RawReturn	AbnormalReturn	RawReturn	AbnormalReturn	RawReturn	AbnormalReturn
ESG ScoresXCrisis period	-0.00002	0.01411^{***}	-0.00004^{**}	0.01442^{***}	-0.00004^{**}	0.01472^{***}
	(0.00002)	(0.00227)	(0.00002)	(0.00219)	(0.00002)	(0.00211)
ESG X Post Crisis Period	0.00835^{***}	-1.61233^{***}	0.00919^{***}	-1.74934^{***}	0.00963^{***}	-1.83372^{***}
	(0.00073)	(0.09575)	(0.00084)	(0.11009)	(0.00089)	(0.11586)
R^2	0.02084	0.02394	0.02094	0.02408	0.02100	0.02426
Adj. R^2	0.00423	0.00738	0.00433	0.00752	0.00439	0.00770
Num. obs.	31049	31049	31049	31049	31049	31049

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

We estimate the individual pillar scores' effect on returns using the panel regression model employed for results in Table 5.1 to check the robustness of our baseline results reported in tables 4.3 to 4.5. The variable of interest changes from environmental pillar scores termed as EScores in Table 5.2 to Social pillar score termed as SScores in Table 5.3 and finally Governance Pillar Scores termed as GScores in Table 5.4.

The results in Tables 5.2 indicate the effect of environmental pillar score is similar to that of ESG scores here.The effect is statistically significant on the abnormal returns as shown in row 1 of columns 2,4 and 6 which is during crisis period for the ESG scores at the end of 2005,2007 and 2008 respectively, while a significant negative relationship emerges between environmental pillar score and abnormal returns in post crisis periods. There is a significant relationship between the raw returns and environmental pillar scores during post crisis periods but it is negative during crisis periods which is different from our baseline results in table 4.3. The fact that the behavior of environmental pillar scores is similar to ESG scores can be explained by the high correlation seen in Table A.1 of the appendix.Since the results aren't consistent with baseline results, we can't conclude the magnitude of environmental pillar's effect on either raw returns or abnormal returns.

Table 5.2: Environmental Pillar Scores and Returns

Raw return is the monthly raw or market-model adjusted return and $EScores_t$ is our proxy for Environmental Pillar score, measured at year-end 2005, 2007, or 2008. $CrisisPeriod_t$ is a dummy variable set to one in the period August 2008 to March 2009, $Post-Crisis_t$ is a dummy variable set to one in the period April 2009 to August 2013, and X_i is a vector of control variables. The control variables included in all models are the same as those employed in Tables 4.1 to 4.5 and they include firms' financial characteristics as well as sector and country dummies. The financial characteristics based on accounting data are updated three months after each fiscal year-end. The characteristics based on market data (momentum, size, market-to-book) are updated monthly. Factors are re-estimated each month based on the previous 60 months' data. The regression is estimated over the period 2007-2013. Financial firms are removed from the sample. Except when otherwise indicated, numbers in parentheses are heteroskedasticity-consistent standard errors.

	2005		2007		2008	
	RawReturn	AbnormalReturn	RawReturn	AbnormalReturn	RawReturn	AbnormalReturn
EScoresXcrisisPeriod	-0.00002	0.01136^{***}	-0.00002	0.01109^{***}	-0.00003^{**}	0.01059^{***}
	(0.00001)	(0.00169)	(0.00001)	(0.00161)	(0.00001)	(0.00164)
EScoresXPost-crisisPeriod	0.00810^{***}	-1.41229^{***}	0.00840^{***}	-1.56861^{***}	0.00916^{***}	-1.63161^{***}
	(0.00052)	(0.06791)	(0.00064)	(0.08391)	(0.00073)	(0.09562)
R^2	0.02086	0.02414	0.02087	0.02422	0.02099	0.02404
Adj. R^2	0.00425	0.00758	0.00426	0.00766	0.00438	0.00748
Num. obs.	31049	31049	31049	31049	31049	31049

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

The results in Table 5.3 show that there is significant relationship between abnormal returns and social pillar scores during crisis period for the ESG values at the end of 2005, 2007 and 2008 .This is very interesting as the effect of social pillar scores on abnormal returns with the scores at the end of 2006 isn't significant at all. This can also be explained by the high correlation of social pillar scores with ESG scores as seen in appendix table A.1. This finding is also in line with Alex Edmans' study that showed there is a significant relationship between outperforming firms and their employee satisfaction, which is related to one of the prominent social factors – management of employees(Edmans, 2011). Since the results aren't consistent with baseline results, we can't conclude the magnitude of social pillar's effect on either raw returns or abnormal returns. The post crisis period results however show the same pattern as shown for ESG scores and Environmental pillar scores which is that a significant negative relationship emerges between social pillar score and abnormal returns and there continues to exist a strong significant relationship between the raw returns and social pillar scores during post crisis periods.

Table 5.3: Social Pillar Scores and Returns

Raw return is the monthly raw or market-model adjusted return and $SScores_t$ is our proxy for Social Pillar score, measured at year-end 2005, 2007, or 2008. $CrisisPeriod_t$ is a dummy variable set to one in the period August 2008 to March 2009, $Post - Crisis_t$ is a dummy variable set to one in the period April 2009 to August 2013, and X_i is a vector of control variables. The control variables included in all models are the same as those employed in Tables 4.1 to 4.5 and they include firms' financial characteristics as well as sector and country dummies. The financial characteristics based on accounting data are updated three months after each fiscal year-end. The characteristics based on market data (momentum, size, market-to-book) are updated monthly. Factors are re-estimated each month based on the previous 60 months' data. The regression is estimated over the period 2007-2013. Financial firms are removed from the sample. Except when otherwise indicated, numbers in parentheses are heteroskedasticity-consistent standard errors.

	2005		2007		2008	
	RawReturn	AbnormalReturn	RawReturn	AbnormalReturn	RawReturn	AbnormalReturn
SScoresXcrisisPeriod	-0.00001	0.01137^{***}	-0.00004^{**}	0.01534^{***}	-0.00005^{***}	0.01513^{***}
	(0.00002)	(0.00214)	(0.00001)	(0.00185)	(0.00001)	(0.00181)
SScoresXPost-crisisPeriod	0.00810^{***}	-1.52858^{***}	0.00923^{***}	-1.80810^{***}	0.00990^{***}	-1.87223^{***}
	(0.00072)	(0.09418)	(0.00075)	(0.09862)	(0.00080)	(0.10449)
R^2	0.02081	0.02360	0.02100	0.02489	0.02114	0.02494
Adj. R^2	0.00420	0.00704	0.00438	0.00834	0.00453	0.00839
Num. obs.	31049	31049	31049	31049	31049	31049

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

The governance pillar score as shown in Table 5.4 however has a significant effect on abnormal returns in crisis period returns for the ESG scores of 2005 and 2008. The effect changes to negative with 2007 score contradicting our baseline results. The negative relationship in the post crisis periods continue to hold for governance pillar as well. We believe that the negative relationship between abnormal returns and scores can, at least partially, be explained by the significant changes in the correlation between scores of different crisis years. We believe that this change in correlation can be due to changes in CSR activities during the crisis. This hypothesis is confirmed by different studies. Firstly, Yelkikalan and Köse state that during the crisis period, companies prioritized liquidity management, and shaped their actions to overcome the difficulties they were experiencing. Saving has been one of the main strategies pursued by firms during the financial crisis (Yelkikalan & Köse, 2012) . As natural, saving strategy starts with cutting the activities and investments less necessary for company's survival. In 2008 Financial Crisis, it has been observed that CSR activities were, as well, impacted by these crisis-management strategies. For example, economic uncertainty and financing difficulties brought by the financial crisis have led many companies to lower their levels of production, which resulted in downsizing and reducing staff. For this reason, the rising unemployment rates reached during the crisis can be suggested to have caused significant effect on ESG performance while maintaining abnormal returns. Multiple studies show that firms allocated funds to other prioritized activities while curtailing for ESG related activities (Lauesen, 2013; Jacob, 2012; Kemper & Martin, 2010; Mia & Al Mamun, 2011; Karaibrahimoglu, 2010).

The robustness check helps us to prove that the findings hold good with 2005 and 2008 scores as well but fail to show the same using 2007 scores. The significance of governance factor in the case of 2005 and 2008 assures us that there is scope for further exploration of effect of governance factor on abnormal returns in times of crisis.

Table 5.4: Governance Pillar Scores and Returns

Raw return is the monthly raw or market-model adjusted return and $GScores_t$ is our proxy for Governance Pillar score, measured at year-end 2005, 2007, or 2008. $CrisisPeriod_t$ is a dummy variable set to one in the period August 2008 to March 2009, $Post-Crisis_t$ is a dummy variable set to one in the period April 2009 to August 2013, and X_i is a vector of control variables. The control variables included in all models are the same as those employed in Tables 4.1 to 4.5 and they include firms' financial characteristics as well as sector and country dummies. The financial characteristics based on accounting data are updated three months after each fiscal year-end. The characteristics based on market data (momentum, size, market-to-book) are updated monthly. Factors are re-estimated each month based on the previous 60 months' data. The regression is estimated over the period 2007-2013. Financial firms are removed from the sample. Except when otherwise indicated, numbers in parentheses are heteroskedasticity-consistent standard errors.

	2005		2007		2008	
	RawReturn	AbnormalReturn	RawReturn	AbnormalReturn	RawReturn	AbnormalReturn
GScoresXcrisisPeriod	-0.00001	0.00908^{***}	0.00000	-0.00096	0.00001	0.00400^{**}
	(0.00001)	(0.00184)	(0.00001)	(0.00196)	(0.00002)	(0.00202)
GScoresXPost-crisisPeriod	0.00817^{***}	-1.52289^{***}	0.00747^{***}	-1.05748^{***}	0.00725^{***}	-1.30383^{***}
	(0.00075)	(0.09878)	(0.00081)	(0.10627)	(0.00086)	(0.11305)
R^2	0.02082	0.02347	0.02079	0.02270	0.02080	0.02282
Adj. R^2	0.00420	0.00690	0.00418	0.00612	0.00418	0.00624
Num. obs.	31049	31049	31049	31049	31049	31049

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

6 | CONCLUSION

6.1 Findings

We investigated the effects of both ESG scores, and individual pillar scores recorded for firms at the end of 2006 on Raw and Abnormal returns during the global financial crisis of 2008-09, specifically during the period August 2008 to March 2009 in 508 European public firms. We find that high ESG scoring firms had higher stock returns compared to low ESG scoring firms in our baseline results but during robustness tests, the results were different. While there was no significant effect of ESG scores on raw returns, a significant effect was observed on out-performance of the firms which didn't allow us to draw conclusive results. When we test for the effect of individual pillar scores on returns, we find that governance factor has higher significance when compared to the other two factors for the out-performance of firms in times of global financial crisis. The significance of the scores continued to hold when ESG scores of 2005 and 2008 were used to check for robustness expanding the period till 2013 but attenuated when we used the scores for the end of 2007. Though the results couldn't support our hypotheses , there is a scope for further exploration of governance factor in times of other crises to establish its significance.

6.2 Limitations

We could not conclusively prove our hypotheses. There could be other unobserved variables which we haven't considered for our study such as policy changes that might not have been entirely covered by our country and sector variables, which could be the reason for changes in results when we changed the year of scores considered during robustness checks. The number of public firms in Europe is 11000+ while we had

ESG data available only for 614 firms for the period considered and after adding the accounting data for 2007 and removing financial firms, we were left with 508 firms which might not be a sufficient representation of the entire population.

6.3 Future research avenues

Financial crises have occurred in the past and will continue to occur in the future(DeLong, Cooper, & Friedman, 1999). The global financial crisis was generally touted as the biggest financial crisis the world has seen. It will be beneficial for investors to have tools to navigate these times of crises. While there can never exist a simple solution for complex problems, we bring the nuance of how governance factor in ESG is important not only for firm's long-term success but also during the crisis. A recent study by Dyck et al points to how improving governance factor can be crucial to improving environmental performance, and that strongly supports our point that governance is a crucial factor to be considered by investors, both individual and institutional, when taking investment decisions (Dyck, Lins, Roth, Towner, & Wagner, 2020). It will be beneficial for firms to improve their governance for staying attractive to investors and helping themselves stay afloat during crisis as well. For future research, the study could be extended to other financial crises occurred between global financial crisis and now, for which ESG data is available to test whether governance is a factor that drives superior performance during other financial crises.

Bibliography

Albuquerque, R., Koskinen, Y., Yang, S., & Zhang, C. (2020). Resiliency of environmental and social stocks: An analysis of the exogenous covid-19 market crash. *The Review of Corporate Finance Studies*, *9*(3), 593–621.

Almeida, H., Campello, M., Laranjeira, B., & Weisbenner, S. (2009). *Corporate debt maturity and the real effects of the 2007 credit crisis* (Tech. Rep.). National Bureau of Economic Research.

Bebchuk, L. A., Cohen, A., & Wang, C. C. (2013). Learning and the disappearing association between governance and returns. *Journal of financial economics*, *108*(2), 323–348.

Bennani, L., Le Guenedal, T., Lepetit, F., Ly, L., Mortier, V., Roncalli, T., & Sekine, T. (2018). How esg investing has impacted the asset pricing in the equity market. *Available at SSRN 3316862*.

Broadstock, D. C., Chan, K., Cheng, L. T., & Wang, X. (2021). The role of esg performance during times of financial crisis: Evidence from covid-19 in china. *Finance research letters*, *38*, 101716.

Cai, L., & He, C. (2014). Corporate environmental responsibility and equity prices. *Journal of Business Ethics*, *125*(4), 617–635.

Carhart, M. M. (1997). On persistence in mutual fund performance. *The Journal of finance*, *52*(1), 57–82.

Clark, G. L., Feiner, A., & Viehs, M. (2015). From the stockholder to the stakeholder: How sustainability can drive financial outperformance. *Available at SSRN 2508281*.

Cornett, M. M., Erhemjamts, O., & Tehranian, H. (2016). Greed or good deeds: An examination of the relation between corporate social responsibility and the financial performance of us commercial banks around the financial crisis. *Journal*

of Banking & Finance, *70*, 137–159.

Daniel, K., & Titman, S. (2005). *Evidence on the characteristics of cross-sectional variation in stock returns*. Princeton University Press.

DeLong, J. B., Cooper, R. N., & Friedman, B. M. (1999). Financial crises in the 1890s and the 1990s: Must history repeat? *Brookings papers on economic activity*, *1999*(2), 253–294.

Demers, E., Hendrikse, J., Joos, P., & Lev, B. (2021). Esg did not immunize stocks during the covid-19 crisis, but investments in intangible assets did. *Journal of Business Finance & Accounting*, *48*(3-4), 433–462.

Deng, X., Kang, J.-k., & Low, B. S. (2013). Corporate social responsibility and stakeholder value maximization: Evidence from mergers. *Journal of financial Economics*, *110*(1), 87–109.

Derwall, J., Guenster, N., Bauer, R., & Koedijk, K. (2005). The eco-efficiency premium puzzle. *Financial Analysts Journal*, *61*(2), 51–63.

Díaz, V., Ibrushi, D., & Zhao, J. (2021). Reconsidering systematic factors during the covid-19 pandemic–the rising importance of esg. *Finance Research Letters*, *38*, 101870.

Dissanaike, G., Faasse, J., & Jayasekera, R. (2014). What do equity issuances signal? a study of equity issuances in the uk before and during the financial crisis. *Journal of International Money and Finance*, *49*, 358–385.

Dorfleitner, G., Halbritter, G., & Nguyen, M. (2015). Measuring the level and risk of corporate responsibility–an empirical comparison of different esg rating approaches. *Journal of Asset Management*, *16*(7), 450–466.

Døskeland, T., & Pedersen, L. J. T. (2016). Investing with brain or heart? a field experiment on responsible investment. *Management Science*, *62*(6), 1632–1644.

Duchin, R., Ozbas, O., & Sensoy, B. A. (2010). Costly external finance, corporate investment, and the subprime mortgage credit crisis. *Journal of financial eco-*

nomics, *97*(3), 418–435.

Dyck, I., Lins, K. V., Roth, L., Towner, M., & Wagner, H. F. (2020). Renewable governance: Good for the environment? *Karl V. and Roth, Lukas and Towner, Mitch and Wagner, Hannes F., Renewable Governance: Good for the Environment*.

Edmans, A. (2011). Does the stock market fully value intangibles? employee satisfaction and equity prices. *Journal of Financial economics*, *101*(3), 621–640.

El Ghoul, S., Guedhami, O., Kwok, C. C., & Mishra, D. R. (2011). Does corporate social responsibility affect the cost of capital? *Journal of Banking & Finance*, *35*(9), 2388–2406.

Engelhardt, N., Ekkenga, J., & Posch, P. (2021). Esg ratings and stock performance during the covid-19 crisis. *Sustainability*, *13*(13), 7133.

Engle, R. F., Giglio, S., Kelly, B., Lee, H., & Stroebel, J. (2020). Hedging climate change news. *The Review of Financial Studies*, *33*(3), 1184–1216.

Escrig-Olmedo, E., Fernández-Izquierdo, M. Á., Ferrero-Ferrero, I., Rivera-Lirio, J. M., & Muñoz-Torres, M. J. (2019). Rating the raters: Evaluating how esg rating agencies integrate sustainability principles. *Sustainability*, *11*(3), 915.

Fama, E. F., & French, K. R. (1995). Size and book-to-market factors in earnings and returns. *The journal of finance*, *50*(1), 131–155.

Ferrell, A., Liang, H., & Renneboog, L. (2016). Socially responsible firms. *Journal of financial economics*, *122*(3), 585–606.

Ferriani, F., & Natoli, F. (2021). Esg risks in times of covid-19. *Applied Economics Letters*, *28*(18), 1537–1541.

Fulton, M., Kahn, B., & Sharples, C. (2012). Sustainable investing: Establishing long-term value and performance. *Available at SSRN 2222740*.

Goyal, A., & Santa-Clara, P. (2003). Idiosyncratic risk matters! *The journal of finance*, *58*(3), 975–1007.

Harford, J., Klasa, S., & Maxwell, W. F. (2014). Refinancing risk and cash holdings.

The Journal of Finance, *69*(3), 975–1012.

Jacob, C. K. (2012). The impact of financial crisis on corporate social responsibility and its implications for reputation risk management. *J. Mgmt. & Sustainability*, *2*, 259.

Karaibrahimoglu, Y. Z. (2010). Corporate social responsibility in times of financial crisis. *African journal of Business management*, *4*(4), 382.

Kemper, A., & Martin, R. L. (2010). After the fall: The global financial crisis as a test of corporate social responsibility theories. *European Management Review*, *7*(4), 229–239.

Klassen, R. D., & McLaughlin, C. P. (1996). The impact of environmental management on firm performance. *Management science*, *42*(8), 1199–1214.

Lauesen, L. M. (2013). Csr in the aftermath of the financial crisis. *Social Responsibility Journal*.

Lins, K. V., Servaes, H., & Tamayo, A. (2017). Social capital, trust, and firm performance: The value of corporate social responsibility during the financial crisis. *the Journal of Finance*, *72*(4), 1785–1824.

Lins, K. V., Volpin, P., & Wagner, H. F. (2013). Does family control matter? international evidence from the 2008–2009 financial crisis. *The Review of Financial Studies*, *26*(10), 2583–2619.

Mia, P., & Al Mamun, A. (2011). Corporate social disclosure during the global financial crisis. *International Journal of Economics and Finance*, *3*(6), 174–187.

Nelson, J. (2018). Collective action on business standards, goals, and metrics to achieve scale and impact for the sdgs. *From Summits to Solutions: Innovations in Implementing the Sustainable Development Goals*, 80.

Nofsinger, J., & Varma, A. (2014). Socially responsible funds and market crises. *Journal of Banking & Finance*, *48*, 180–193.

Omura, A., Roca, E., & Nakai, M. (2021). Does responsible investing pay during

economic downturns: Evidence from the covid-19 pandemic. *Finance Research Letters*, *42*, 101914.

Palmi, P., Morrone, D., Miglietta, P. P., & Fusco, G. (2018). How did organizational resilience work before and after the financial crisis? an empirical study. *International Journal of Business and Management*, *13*(10), 54–62.

Refinitiv. (2021). *Esg scores.* Retrieved from https://www.refinitiv.com/en/sustainable-finance/esg-scores#contribute/~{}uno/abcde.html

Renneboog, L., Ter Horst, J., & Zhang, C. (2008). The price of ethics and stakeholder governance: The performance of socially responsible mutual funds. *Journal of corporate finance*, *14*(3), 302–322.

Rubbaniy, G., Khalid, A. A., Ali, S., & Naveed, M. (2021). Are esg stocks safe-haven during covid-19? *Available at SSRN 3779430*.

Simonek, C., & Verhagen, T. (2021). *Esg investing official training manual*. CFA Institute.

Singh, A. (2020). Covid-19 and safer investment bets. *Finance research letters*, *36*, 101729.

Sokolovska, I., & Kešeljević, A. (2019). Does sustainability pay off? a multi-factor analysis on regional djsi and renewable stock indices. *Economic research-Ekonomska istraživanja*, *32*(1), 423–439.

Tran, Q. T. (2020). Financial crisis, shareholder protection and cash holdings. *Research in International Business and Finance*, *52*, 101131.

Verheyden, T., Eccles, R. G., & Feiner, A. (2016). Esg for all? the impact of esg screening on return, risk, and diversification. *Journal of Applied Corporate Finance*, *28*(2), 47–55.

Whitelock, V. G. (2019). Multidimensional environmental social governance sustainability framework: Integration, using a purchasing, operations, and supply chain

management context. *Sustainable Development*, *27*(5), 923–931.

Yelkikalan, N., & Köse, C. (2012). The effects of the financial crisis on corporate social responsibility. *International Journal of Business and Social Science*, *3*(3).

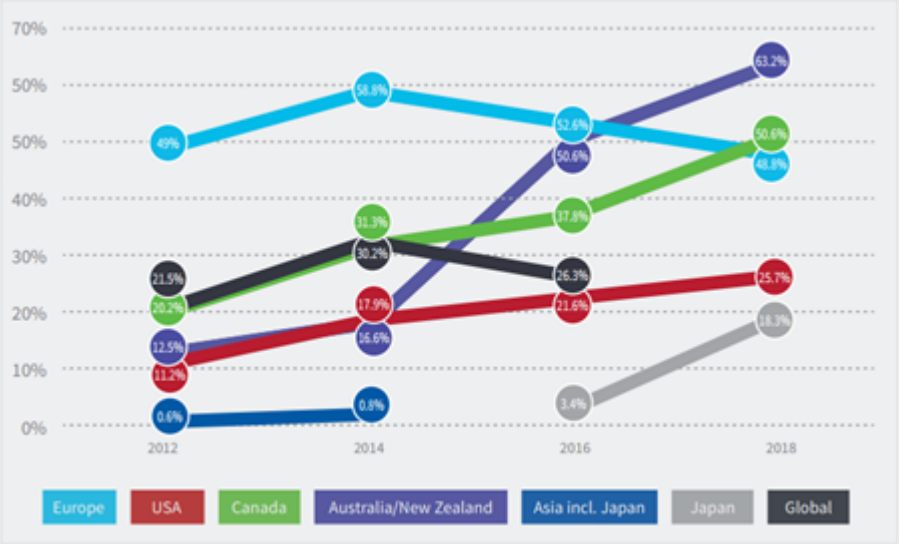
A | Figures & Tables

Figure A.1: Growth of ESG assets by region

REGION	2012 (US$BN)	2014 (US$BN)	2016 (US$BN)	2018 (US$BN)
Europe	8,758	10,775	12,040	14,075
USA	3,740	6,572	8,723	11,995
Japan		7	474	2,180
Asia excl. Japan		45	52	
Asia incl. Japan	40			
Canada	589	729	1,086	1,699
Australia/New Zealand	134	148	516	734
Total	13,261	18,276	22,891	30,683

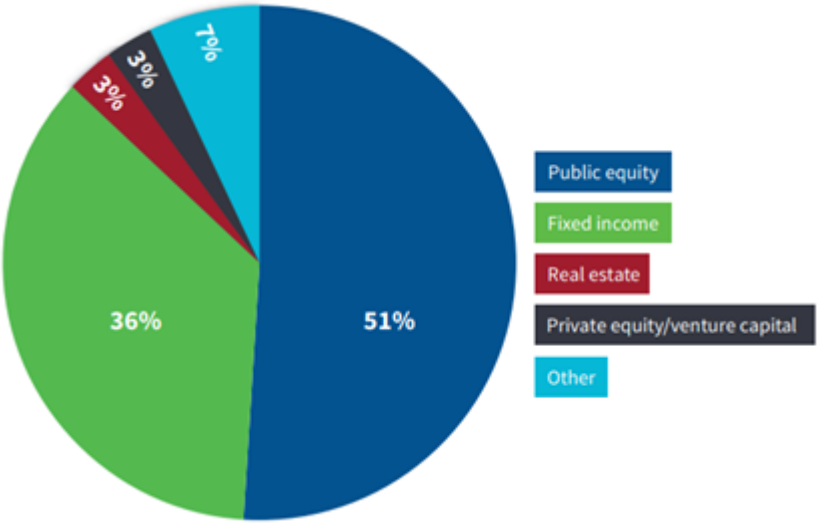
Source: CFA Institute

Figure A.2: Proportion of sustainable investing relative to total managed assets



Source: CFA Institute

Figure A.3: Asset classes in global ESG investing (2018)



Source: CFA Institute

Figure A.4: ESG focused equities

	U.S.		World ex-U.S.		Emerging markets	
	Traditional	ESG Focus	Traditional	ESG Focus	Traditional	ESG Focus
Annualized return	15.8%	15.8%	10.5%	11.1%	7.8%	9.1%
Volatility	9.5%	9.6%	11.4%	11.6%	14.4%	14.3%
Sharpe ratio	1.62	1.60	0.88	0.92	0.51	0.61
Maximum monthly drawdown	-13.9%	-13.8%	-23.3%	-22.6%	-35.2%	-33.0%
Price-to-earnings	19.4	19.5	17.2	17.1	13.3	13.7
Dividend yield	2.1%	2.1%	3.2%	3.2%	2.7%	2.8%
Number of stocks	620	293	1,011	419	831	288
ESG score	5.2	6.6	6.5	7.9	4.4	6.2

Source: BlackRock Investment institute, data from MSCI (2018)

Table A.1: Correlationmatrix for Robustness Tests Data

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1.RR																					
2.AR	0.00																				
3.ESG 2005	-0.02	0.03																			
4.ESG 2007	-0.03	0.03	0.73																		
5.ESG 2008	-0.04	0.03	0.68	0.91																	
6. E2005	-0.02	0.02	0.76	0.67	0.64																
7. S2005	-0.02	0.02	0.81	0.70	0.66	0.64															
8.G2005	-0.02	0.04	0.64	0.50	0.46	0.36	0.42														
9.E2007	-0.03	0.03	0.63	0.84	0.80	0.74	0.59	0.33													
10.S2007	-0.03	0.04	0.66	0.89	0.84	0.58	0.72	0.39	0.70												
11.G2007	-0.02	-0.01	0.46	0.64	0.61	0.30	0.34	0.55	0.39	0.41											
12.E2008	-0.03	0.03	0.59	0.79	0.85	0.67	0.57	0.33	0.88	0.68	0.41										
13.S2008	-0.03	0.04	0.62	0.83	0.89	0.57	0.65	0.36	0.68	0.90	0.40	0.71									
14.G2008	-0.02	0.01	0.44	0.58	0.64	0.33	0.36	0.50	0.40	0.43	0.76	0.42	0.44								
15.Cash Holdings	0.01	-0.09	-0.06	-0.08	-0.11	-0.10	-0.05	-0.06	-0.10	-0.06	-0.05	-0.14	-0.09	-0.05							
16.Long-Term Debt	-0.01	-0.01	-0.05	-0.03	-0.01	-0.02	0.04	0.00	-0.04	0.02	-0.06	-0.06	0.05	-0.07	-0.21						
17.ROA	0.04	-0.09	-0.03	-0.04	-0.06	-0.02	-0.03	0.00	-0.06	-0.02	-0.01	-0.09	-0.04	-0.02	0.28	-0.16					
18.B/M	0.01	0.02	-0.04	0.00	0.00	-0.02	-0.02	-0.06	0.03	-0.01	0.00	0.02	-0.03	0.03	-0.07	-0.05	-0.18				
19.Size	-0.02	0.00	0.44	0.46	0.48	0.45	0.41	0.29	0.42	0.43	0.22	0.41	0.44	0.23	0.02	-0.13	0.17	-0.24			
20.Short-Term Debt	0.00	0.00	-0.04	-0.04	-0.04	-0.08	-0.04	-0.03	-0.04	-0.04	0.02	-0.06	-0.06	0.00	0.17	-0.18	0.09	-0.02	-0.13		
21.Momentum	-0.05	0.00	-0.03	-0.05	-0.07	-0.05	-0.03	-0.02	-0.06	-0.04	-0.03	-0.07	-0.05	-0.03	0.05	-0.03	0.02	-0.15	0.11	-0.03	
22.Idiosyncratic Risk	-0.01	0.08	0.10	0.14	0.13	0.18	0.05	0.01	0.18	0.07	0.06	0.19	0.06	0.01	0.04	-0.13	-0.10	0.04	0.14	0.07	0.00
23.Sector	0.00	0.03	0.03	-0.01	0.01	-0.10	0.12	0.02	-0.13	0.04	0.03	-0.07	0.03	0.02	0.00	0.19	-0.02	-0.04	-0.01	0.02	-0.05
24.Country	0.00	0.00	-0.01	-0.03	-0.04	-0.06	0.06	0.00	-0.04	0.03	0.02	-0.06	0.02	0.04	0.00	0.08	0.08	-0.03	-0.16	-0.10	0.06
25.-veB/M	0.00	0.02	-0.06	-0.08	-0.08	-0.07	-0.05	0.01	-0.07	-0.05	-0.04	-0.10	-0.06	-0.06	0.02	0.31	0.04	-0.10	-0.13	0.24	0.01