
The Role of ESG in Enhancing Stock Robustness Through Economic Downturns:
An empirical analysis of the European Market (Stoxx Europe 600).

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Abstract

The dissertation studies the role of ESG in enhancing corporate resilience during crises, specifically the Global Financial Crisis in 2008 and the COVID-19 pandemic in 2020. The study was conducted on 283 publicly traded companies from the STOXX Europe 600 index to find evidence that companies with higher ESG ratings perform better in their finances during a market crisis. The study uses a cross-sectional regression model on ESG Scores, and the respective pillars of Environmental, Social, and Governance, and firm performance to analyze how ESG ratings are linked to important performance metrics as Tobin's Q, stock returns, Return on Assets (ROA), Return on Equity (ROE), and Sharpe ratios. The conclusion says that companies that perform better on ESG were better at keeping their financial stability and investor trust. Governance and social factors were more closely linked to performance resilience. The results substantiate ESG integration as both a long-term sustainability strategy and a short-term risk mitigation instrument during systemic risk. The study's findings demonstrate that ESG performance does, in fact, have a significant effect on firm performance and support the stakeholder theory viewpoint over the principal-agent theory. Future studies could examine whether the findings of this study can be repeated in other eras and geographical locations, or whether other events have significantly contributed to the growing significance of ESG.

Keywords: ESG, corporate resilience, financial crisis, COVID-19, stock performance, STOXX Europe 600.

JEL Classification : G32, M41, Q01

Resumo

A dissertação estuda o papel do ESG no aumento da resiliência empresarial durante as crises, especificamente a Crise Financeira Global em 2008 e a pandemia de COVID-19 em 2020. O estudo empírico conduziu uma amostra de 283 empresas de capital aberto do índice STOXX Europe 600 para investigar se as empresas com classificações ESG superiores alcançaram um melhor desempenho financeiro e de mercado durante períodos de volatilidade significativa do mercado. O estudo emprega um modelo de regressão transversal para avaliar a correlação entre as classificações ESG e os indicadores essenciais de desempenho (baseados na contabilidade e baseados no mercado), como o Retorno sobre o Ativo (ROA), o Retorno sobre o Capital Próprio (ROE), o retorno sobre as ações, o Q de Tobin e os rácios de Sharpe. A investigação separa ainda o ESG nos seus elementos ambientais, sociais e de governação para avaliar os seus efeitos distintos. A tese indica que as empresas que exibem um desempenho ESG superior foram mais hábeis na preservação da estabilidade financeira e da confiança dos investidores durante as crises. Especificamente, a governação e as questões sociais demonstraram uma associação mais pronunciada com a resiliência do desempenho. Os resultados comprovam a integração ESG como uma estratégia de sustentabilidade a longo prazo e um instrumento de mitigação do risco a curto prazo durante o risco sistémico. Os resultados do estudo demonstram que o desempenho em ESG, de fato, exerce um efeito favorável sobre o desempenho das empresas e apoiam a perspectiva da teoria dos stakeholders em detrimento da teoria do principal-agente. Estudos futuros poderiam examinar se as conclusões desta pesquisa podem ser reproduzidas em outros períodos e regiões geográficas, ou se outros eventos contribuíram de forma significativa para a crescente relevância do ESG.

Palavras-chave: ESG, resiliência corporativa, crise financeira, COVID-19, desempenho das ações, STOXX Europe 600.

Classificação JEL: G32, M41, Q01.

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List of Abbreviations

CAPEX - Capital Expenditure

CSR - Corporate Social Responsibility

CFP - Corporate Financial Performance

EBIT - Earnings Before Interest and Taxes

ESG - Environmental, Social, and Governance

GFC - Global Financial Crisis

SRI – Socially Responsible Investment

UN PRI - United Nations Principles for Responsible Investment

WACC - Weighted Average Cost of Capital

1. Introduction

Today's businesses must enhance their corporate environmental, social, and governance (ESG) responsibility performance in order to adapt and recover swiftly from external risk shocks and challenges in the face of an increasingly complex and uncertain external corporate environment. This is essential to achieving sustainable growth. New ideas like business resilience and ESG have drawn much social attention, but it is still unclear how exactly ESG responsibility for performance might improve development resilience (Wang et al., 2024).

Environmental, social, and governance factors are assessed alongside financial data when using ESG. This seeks to rank companies' overall accountability for it. ESG concerns are also important for their long-term performance and ability to bounce back from present-day setbacks (Yahya, 2023).

This study aims to contribute to understanding how ESG quality may influence corporate resilience during crises (2008 Global Financial Crisis, 2020 COVID-19 Pandemic), and the expected outcome is that a more outstanding commitment to ESG factors would lead companies to higher, or at least more stable, financial outcomes. It is intended to investigate whether effective ESG factor management can boost resilience outside of directly related domains. To do this, a statistical examination of the capital market performance of companies in relation to their ESG ratings throughout the tumultuous markets is carried out.

The paper begins by summarizing the history and definition of ESG and how it affects capital market performance, emphasizing crises. On the basis of this, theories regarding the potential impact of ESG ratings on capital market performance in erratic markets are established. A cross-sectional regression model tests the hypotheses and determines whether a causal relationship is present. ESG Data Source is Refinitiv's ESG database from DataStream. The statistical model examines ESG and stock market data for the STOXX Europe 600 Index specifically in 2008 and 2020 (which is about 90% of the free-float market capitalization of the European stock market (not just the Eurozone) represented by the index's set number of 600 components, which include major, mid, and small size companies throughout 17 European countries. The index's component countries are Germany, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Switzerland, Sweden, Austria, Belgium, the Czech Republic, Denmark, Finland, and France. The companies included in this index are from eight distinct industries, including technology, consumer cyclicals, customer non-cyclicals, healthcare, basic materials, industrials, financials, and real estate. The time selected for data analysis is the crisis period in 2008 and 2020, during which a large amount of ESG data is accessible. A tough and

intense time horizon was used to examine the impact of ESG changes over different business cycles. The two significant financial crises that also impacted Europe in the Global Financial Crisis of 2008 and COVID-19 are included in the period under consideration to observe how the impact of ESG factors changed during the high volatility period.

Research questions are:

- Do companies with higher ESG ratings demonstrate better firm performance during crisis periods?
- How does ESG quality impact the Sharpe ratio of Stoxx Europe 600 stocks during market downturns?
- Which ESG component (Environmental, Social, Governance) has the strongest relationship with firm performance during crises?

2. Literature Review

2.1. CSR to ESG

Corporate governance and the relationships that firms have with stakeholders, communities, the environment, and society have long been considered. Since the beginning of corporations, there has been constant discussion on the function and role of corporations in society (Pollman, 2021). Throughout the previous century, starting with the well-known argument between Merrick Dodd (1932) and Professor Adolf Berle (1932) to the coining of the term “corporate social responsibility” in the mid-twentieth century (Carroll, 2008) and the discussion and interaction with many issues pertaining to the societal function of firms, the responsibilities of corporate directors, and externalities and consequences on stakeholders have taken many different turns since the emergence of “corporate governance” and its connection to shareholder primacy (Lund & Pollman, 2021). The primary goal of this section is to present a unique description of the term ESG’s particular origins and its spread in the early 21st century. Although it is not frequently mentioned in talks about ESG today, the United Nations (UN) was instrumental in coining the term and promoting its use (Lund & Pollman, 2021). The tale starts with this multinational organization and how it eventually connected with and responded to senior executives of worldwide financial institutions. This is followed by several similar projects and efforts that helped spread the phrase until it quickly became widely used.

In the past few years, the conventional corporate social responsibility has changed into a more precise and structured approach in the business world. It is, in fact, a welcome change from a subjective approach to a more precise and objective method of determining whether a business has been socially responsible. In addition, the shift is consistent with the increasing need for transparency, accountability, and measurability of business practices and activities. In 2004, the United Nations Global Compact, and a group of 20 top financial firms from nine different countries, issued an earth-shattering document called *Who Cares Wins*. The creative work not only came up with the acronym ESG for environmental, social, and governance, but it also revolutionized the way people talked about corporate responsibility and investment policy (UNGC, 2004). The study not only pointed out that environmental, social, and governance (ESG) problems are moral or ethical issues but also said that incorporating these elements into business operations and investment analysis can help businesses gain profit in the long run and lower their risks. It was contended that businesses that tackle ESG issues would be better positioned to identify new opportunities, react to regulatory evolution, and develop more sustainable business models. Consequently, *Who Cares Wins* was a paradigm shift in the evolution of sustainable

investing by creating a shift in mindset from viewing ESG as an externality to recognizing it as an integral part of financial value creation (UNGC, 2004).

2.2. “Doing well while doing good”

CSR as win-win strategy

Falck & Heblich (2007) pointed out the possibilities and potential applications of a strategic, profit-maximizing approach to corporate social responsibility (CSR). Thus, CSR is seen as a company's voluntary decision to go above and beyond the duties that society's expectations of traditional corporate conduct place on a business. The legal system and social norms make up society's fundamental order, which is always a reflection of the dominant beliefs and viewpoints of the community. Emerging social trends cannot simply become part of society's basic order; rather, they must be encouraged to gain traction over time. Firms may help this process while simultaneously making money. This is win-win situation, strategic philanthropy (Porter & Kramer, 2002). When CSR is implemented strategically, it can help businesses achieve economic benefits while making a positive contribution to society. It is emphasized that CSR is not only an ethical practice but also an effective business tool when integrated into the overall strategy of the company (Falck & Heblich, 2007).

According to the European Commission (2011), the competitiveness of a business is increasingly dependent on its strategic approach to CSR. It may help with risk management, cost reduction, capital access, customer interactions, human resource management, and innovation potential. Additionally, it pushes the corporate sector to take on greater social and environmental responsibilities at a time when the crisis has undermined consumer confidence and business trust. Businesses may substantially contribute to the European Union's treaty goals of sustainable development and a fiercely competitive social market economy through corporate social responsibility (CSR). The 75% employment target and other goals of the Europe 2020 plan for smart, sustainable, and equitable growth are supported by the European Commission (2011). When private sector companies offer public services, they must behave responsibly. Corporate social responsibility (CSR) requires engagement with both internal and external stakeholders for businesses to effectively anticipate and capitalize on rapidly changing operational realities and societal expectations. This suggests that it can also offer promising growth opportunities and act as a catalyst for the development of new markets. By attending to their social responsibilities, businesses may develop enduring employee, customer, and citizen trust as a foundation for sustainable business models. Consequently, this contributes to establishing an atmosphere that fosters innovation and expansion for businesses. The economic crisis and its social repercussions have somewhat eroded public business confidence and drawn attention to companies' moral and

social conduct, including matters like CEO compensation and bonuses. Businesses have a social obligation to help lessen the crisis's negative societal repercussions, such as job losses. Longer term, CSR provides a set of principles that may be used to create a more united society and serve as the foundation for the shift to a sustainable economic system (European Commission, 2011).

Stakeholder theory

One of the fundamental ideas in comprehending the connection between CSP and CFP is stakeholder theory. Scholars continue to disagree on the matter of corporate responsibility, with the Friedman-Freeman debate highlighting opposing viewpoints on whether businesses should put stakeholder interests ahead of shareholder value maximization of the first to address the corporate sector's social responsibility was Milton Friedman (1970), who proposed that companies should operate in a way that satisfies the interests of their shareholders, which is typically to maximize profits while abiding by the fundamental laws and moral standards of society. According to Milton Friedman (1970), managers in a free-market economy are required by contract to maximize shareholder profit; this is their main responsibility. In order to do this, resources are used as effectively and optimally as possible, which benefits society the most, in the opinion of the traditional economist Adam Smith. The only legal restrictions on managers' behavior are the economic rules. Since there are no commensurate benefits, a commitment to broad societal interests that go beyond legal requirements violates this postulate and should not be made. The only value that should be maximized is shareholder wealth. Managers should act as private people at their own expense rather than as representatives of their bosses and at their expense if they wish to improve society.

However, no universally agreed-upon definition or scope has been reached. However, many different viewpoints, methodologies, and frameworks have been used to explore it. A Stakeholder Approach, Freeman (1984) argued that the "shifts in traditional relationships with external groups such as suppliers, customers, owners, and employees, as well as the emergence and renewed importance of government, foreign competition, environmentalists, consumer advocates, special interest groups, media and others, mean that a new conceptual approach is needed". The concept of mutually beneficial interactions between a company and its stakeholders, first proposed by Freeman (1984), has been widely adopted in the context of corporate social responsibility. Given the significant amount of public attention that CSR programs have garnered, content stakeholders are essential to improving a company's reputation in today's world.

As a result, by considering how various stakeholders such as shareholders, workers, strategic partners, suppliers, and non-governmental organizations interact with the business, society may be divided into clusters (Falck & Heblich, 2007). The stakeholder theory approach

states that taking externalities and their effects on stakeholders into account is essential to the business's success, both now and in the future. CSR may be carefully applied to address the identified stakeholders' needs to ensure that this is accomplished. Management may use CSR as a guide for creating strategies that will meet the needs of shareholders and stakeholders. As a result, stakeholder theory provided a fresh framework for considering organizational responsibilities. It brought attention to factors other than direct profit maximization by implying that the interests of shareholders cannot be satisfied without also partially meeting the needs of other stakeholders. In other words, even when a company prioritizes serving its shareholders, other stakeholders are likely to have an impact on how well it does so (Foster & Jonker, 2005; Hawkins, 2006)

Signaling theory

The signaling theory focuses on the crucial role of information in a business transaction. Although signaling theory was originally developed to clarify information asymmetries in labor markets (Spence, 1978), it has been used to explain the disclosures in corporate reports (Ross, 1977). The result of the information asymmetry problem is that companies try to provide certain information to investors, to show that they are better than other companies in the market, aiming to attract investment and improve their reputation (Verrecchia, 1983).

Su et al. (2014) showed that CSR disclosure helps companies in emerging economies reduce information asymmetry, thereby building investor trust and enhancing corporate value. Sun et al. (2024) pointed out that ESG disclosure according to standards and with independent verification sends a positive signal about the quality and reliability of the company, thereby enhancing corporate value. Signaling theory and ESG are connected in that companies use their ESG practices to convey their commitment to moral and sustainable business practices. It is becoming increasingly clear in the present economic climate that companies that prioritize ESG factors frequently exhibit better long-term profitability and risk management. Because of this, companies may engage in ESG-related initiatives not only for ethical reasons but also to show different stakeholders, like investors and customers, that they are committed to sustainability and ethical behavior (Radzi, 2023). A company that cuts down on its carbon emissions and uses energy-efficient methods shows that it cares about the environment, which may attract customers and investors who feel the same way. Signaling theory explains why companies put money into ESG practices and programs to show that they are committed to doing business in an ethical way. This can improve a company's standing in the marketplace and improve its relationships with stakeholders (Radzi, 2023).

2.3. ESG and its factors

Over the past few years, investing in focusing on sustainability has become more significant and well-liked. Many investors have invested in sustainability, favoring long-term over short-term ventures. But what drives this emphasis on sustainability? According to the research, a higher focus on “values-driven investing” (Derwall et al., 2011) in general is thought to be the root cause of this investor’s mindset. Socially Responsible Investing (SRI) is a concept that encompasses a variety of investment practices, depending on the context in which it is used. In general, sustainable investors seek to support environmentally friendly companies, promote gender equality, and protect human rights and consumer interests.

Responsible investors generally utilize several tactics to get the most out of both financial rewards and social value, which is also known as “social benefit”. “Negative screening” is a prevalent approach that takes companies out of portfolios that are thought to be unethical. Also, “positive investing” and “impact investing” are two strategies that try to pick companies that have a good effect on people and the environment. Through the stock screening process, investors can express their personal views and values on corporate behavior issues, such as social equity and environmental protection. ESG integration is currently the most widely adopted approach among responsible investment strategies. This strategy emphasizes the integration of environmental, social, and governance factors into the fundamental investment analysis process. The financial industry has long used ESG as a framework for assessing corporate sustainability, and integrating ESG criteria into an investment strategy can improve the investment risk-return profile of a portfolio. Due to growing concerns about social injustice, corporate governance crises, and climate change, the ESG concept has been widely accepted and adopted across a variety of sectors during the past 20 years. Consumers, regulators, and investors have come to understand the significance of taking non-financial aspects into account when assessing an organization’s overall performance and long-term viability (Wang et al., 2024).

The ESG concept is a framework system that incorporates environmental (E), social (S), and governance (G), considerations.

Table 1: ESG framework (international frameworks) (Li et al., 2021).

Dimension	Factors	Definition
Environmental (E)	• Energy consumption and efficiency • Air pollutants, GHG emissions • Water usage and recycling • Innovation in environmentally friendly products and services	Environmental matters that may positively or negatively impact on the financial performance or solvency of an entity, sovereign, or individual.
Social (S)	• Workforce freedom of association • Child labor • Forced and compulsory labor • Workplace health and safety • Customer health and safety • Discrimination, diversity, and equal opportunity	Social matters that may positively or negatively impact on the financial performance or solvency of an entity, sovereign, or individual.
Governance (G)	• Codes of conduct and business principles • Accountability • Transparency and disclosure • Executive pay • Stakeholder engagement • Shareholder rights	Governance matters that positively or negatively impact on the financial performance or solvency of an entity, sovereign, or individual.

In addition to showing a company's dedication to sustainability, focusing on environmental factors within the ESG framework is crucial for increasing resilience to systemic shocks. Businesses are frequently better equipped to handle crises brought on by supply chain interruptions, climate change, or stricter environmental regulations when they actively invest in green technology, use resources more effectively, and lower greenhouse gas emissions. Businesses that have embraced renewable energy or improved industrial practices to reduce water use are less vulnerable to fluctuations in energy prices and resource scarcity. Moreover, openness in environmental reporting and compliance with regulations helps to build communities' and investors' trust during uncertain times. As a result, environmental factors are used as a gauge of social responsibility as well as a tactical instrument to help businesses become more resilient and capable of long-term recovery.

The social element of the ESG criteria reflects how a company interacts with people, including employees, customers, suppliers, and local communities, and the extent to which the company is committed to ethical values, human rights, and social justice. This component focuses on assessing policies related to working conditions, gender equality, diversity & inclusion, human resource development, as well as health and safety in the workplace. In addition, the social element also considers the role of the company in the community, through community development programs, volunteer activities, and compliance with human rights standards throughout the supply chain. A business that has a solid social strategy not only builds long-term value for the company but also helps to improve stakeholder trust and the sustainability of the ecosystem in which it works, with diversity & inclusion, human resource development, as well as health and safety in the workplace (Wang et al., 2023).

ESG standards are distinctive components of a business's long-term success, as experience has shown. ESG-focused organizations are typically better managed, more sustainable, and forward-thinking. On average, companies with high ESG ratings perform better than their competitors and are better prepared to deal with crises. The goal of incorporating ESG principles into investments is to optimize the long-term return by better managing the risk exposure of the portfolio.

ESG rating

ESG ratings increase investor confidence in sustainable investments, which are becoming increasingly significant. Investors are using it to consider the risks and effects associated with ESG problems as part of their sustainable investment plans. Businesses utilize it to find and consider operational risks and investment possibilities, as well as to compare their performance to that of their peers in terms of ESG elements (European Commission, 2021).

ESG ratings, often known as “metrics” or “scores”, are quantitative assessments of a company's environmental and social impact as well as the attributes that influence these results and the company's financial success (Christensen et al., 2022). Investors, not issuers, pay for ESG ratings, in contrast to credit ratings (Schroeter, 2013). More than 160 ESG ratings and data sources are available, according to a recent KPMG survey (KPMG, 2022) with several agencies. Though Refinitiv (formerly Thomson Reuters under the brand ASSET4), FTSE Russell, Sustainalytics (acquired by Morningstar), Moody's (formerly Vigeo Eiris), S&P Global (formerly RobecoSAM), Bloomberg, ISS (formerly Oekom), FactSet Truvalue, and RepRisk are among the others that seem to be important market players, MSCI is thought to be the largest provider (Eccles et al., 2020)

Table 2: ESG rating agencies (*Tayan, 2022*)

Agency	Number of Companies Rated	ESG Rating Scale	Scoring Methodology
ISS	6000	1-10	220 governance factors; weighted by region
FTSE Russell	8000	0-5	14 themes within 3 ESG pillars, based on 300+ public indicators
MSCI	8500	AAA-CCC	Industry-relative comparison on a 7-level scale
Bloomberg	11500	0-100	Based on extent of ESG data disclosed; not performance-based
Refinitiv	11800	0-100	Expanded financial data from Reuters
RobecoSAM (S&P Global)	12000	0-100	Smart ESG Score adjusted for region/industry/size differences
Moody's ESG Solutions	14000	0-100	Combines climate, ESG, and impact data; uses Moody's risk-based approach
Sustainalytics	20000	0-100	Three pillars: governance, material ESG, idiosyncratic risks
RepRisk	150000	AAA-D	Public external data only; excludes self-reported information

- **ISS:** The ISS quality score does not provide a comprehensive evaluation of sustainability. The governance score's numerical methodology evaluates each company's governance risks concerning its peers and the region. Board structure, remuneration policies, shareholder rights, and audit and risk management are the four factors evaluated by the ISS Quality Score. In total, the dimensions include about 220 individual elements. The Governance Quality Score is displayed on a scale from 1 to 10 following weight-based examination of the individual dimensions; a lower score indicates a lower risk (Tayan, 2022).
- **FTSE Russell.** Ratings for 7,200 equities are published by FTSE Russell (Tayan, 2022). FTSE Russell assesses ESG based on a system of 14 topics within three main pillars: environmental (E), social (S), and governance (G). The scoring is based on more than 300 indicators and publicly available data from corporate reports. Each company is assessed according to its exposure to ESG risks in its industry, using a "relative exposure" model.

The overall ESG score is calculated on a scale of 0 to 5, where a high score represents good ESG performance and a lower level of risk (Zumente & Lace, 2021).

- **MSCI** has over 17 years of experience in the field. About 14,000 issuers connected to 600,000 securities are covered (Tayan, 2022). An overall ESG score on a seven-grade scale ranging from AAA to CCC is provided by the MSCI ESG rating. MSCI's heritage firms include GMI Rating, IIRC, Innovest, and KLD (Zumente & Lace, 2021).
- **Refinitiv** employs 700 research analysts and computes ESG scores for 11,800 businesses (Tayan, 2022). The namesake database and newswire Reuters are owned by Thomson Reuters, a rebranded data business called Refinitiv. In 2021, the London Stock Exchange Group (LSEG) acquired Refinitiv. The company's larger financial databases offer Refinitiv ESG scores for purchase.
- **RobecoSAM** has been involved in the sustainable investment industry. S&P Global purchased this company's ESG data division in 2019 for more than 25 years. RobecoSAM uses the Smart ESG Score to adjust for biases due to regional, size, and disclosure differences. They only compare companies within the same industry and region and prioritize ESG factors with a high financial impact. The score is calculated on a 100-point scale (Zumente & Lace, 2021).
- **Sustainalytics**, which has been in the ESG industry for almost 25 years, offers sustainability-related ratings to over 20,000 businesses globally in 2021. The business was purchased by Morningstar Inc. in 2020. Three pillars of corporate governance, material ESG issues, and idiosyncratic issues measured at the company level are used to construct the ESG score, which is stated on a 100-point scale (Zumente & Lace, 2021).
- **RepRisk** provides a perspective on the ESG risks that will be significant in data sets, but it does not offer an ESG grade. Unlike similar service providers, RepRisk exclusively uses external, public data for the analysis, excluding the company's self-reported information because it cannot be trusted (Public, 2023). The primary output is presented in the form of the RepRisk Rating, which is a scale from AAA to D to facilitate benchmarking and comparison, and the RepRisk Index, which is a quantitative assessment on a scale from 0 to 100 about the vulnerability of the company to ESG risks (Zumente & Lace, 2021).
- Other rating agencies: Bloomberg rates about 11,500 companies globally, although this number can vary from year to year, and focuses on the ESG Disclosure Score - a scale from 0 to 100 that reflects the level of ESG disclosure by a company (Public, 2023). Transparent businesses that reveal all of their ESG information score higher. Currently, Moody's ESG Solutions assigns ratings to about 14,000 businesses worldwide. The ESG

Score and Credit Impact Score (CIS) are the two primary metrics that make up their scoring system. The ESG Score evaluates a company's overall ESG performance on a scale of 0 to 100 (Ghosh & et al, 2022).

Divergence of ESG scores

Inconsistencies in ESG data are among the main causes of differences between ESG scores. According to Kotsantonis & Serafeim (2019) found that 50 large companies disclosed occupational health and safety data in more than 20 different ways, resulting in inconsistent ESG scores. Factors such as company size, resources, and geography also contribute to the discrepancies. Drempetic et al. (2020) found that larger companies tend to score higher due to having more resources to collect and disclose ESG data. Additionally, European companies tend to disclose more comprehensive ESG information than companies in other regions. Some organizations, such as RobecoSAM have said they have adjusted their methods to reduce these discrepancies. In addition, the social origins and development history of ESG rating organizations also contribute to differences in how they approach and define ESG (Eccles & Strohle, 2018; Eccles et al., 2020).

Brandon et al. (2021) examined how stock returns were impacted by the level of disagreement among various ESG rating agencies. The author found that companies with high levels of disagreement in their ESG ratings had better stock returns but also paid higher risk premiums. The study's poor pairwise correlation of 0.45 between the total ESG ratings from different sources revealed a significant discrepancy. While the environmental component had the highest correlation (0.46), the governance pillar had the lowest (0.16). These results imply that rating agencies might use various approaches and weights when assessing ESG criteria, which could result in ratings that differ (Brandon et al., 2021).

Shanaev & Ghimire (2022) examined how changes in ESG ratings affected US companies' stock returns between 2016 and 2021. The authors examined 748 ESG rating changes using a calendar-time portfolio technique. Their results point to an uneven reaction to rating downgrades and upgrades. Although improvements in ESG ratings resulted in positive abnormal returns of 0.5% monthly, the impact varied. However, stock performance suffered because of ESG rating downgrades, which led to notable negative anomalous returns. Investors may view downgrades in ESG ratings as a greater risk factor than upgrades, according to this asymmetric response .

ESG ratings' effects on stock market returns are not always consistent and can be impacted by several contextual and moderating factors. The market's reaction to ESG ratings can also be influenced by the industry sector and the significance of ESG elements. Compared to sectors with lower exposure to ESG risk, those with higher exposure, such as energy or extractive industries,

can respond more strongly to changes in ESG ratings. Although the direct effect of ESG ratings on stock returns is a significant factor, scholars have also investigated how ESG performance and financial success interact. According to certain research, companies with high ESG ratings typically have greater profitability indicators, including return on equity (ROE) or return on assets (ROA). The connection between ESG performance and business valuation, however, is more complex; according to some research, ESG disclosures by themselves might have a detrimental impact on valuation if they are not accompanied by observable performance gains (Yin et al., 2023).

These differences are partly explained by differences in assessment methodologies, which the research team analyzed qualitatively in the same paper. A similar conclusion was reached by Chatterji et al. (2016), who noted a lack of consensus among ESG ratings from six providers over the period 2002 to 2010, even after adjusting for apparent differences in the definition of “corporate social responsibility performance” (CSP) across rating agencies. In their literature review, Abhayawansa & Tyagi (2021) argue that the differences in ESG scores and ratings are largely due to disagreements over the definition, structure, and weighting of each of the E, S, and G factors, as well as differences in methodology.

Recent studies have shown that the level of convergence among ESG rating providers is still very low. Understanding the sources of this divergence can bring practical benefits: helping investors choose the right provider or combining multiple sources to reduce bias; supporting regulatory agencies in developing policies to strengthen and harmonize ESG disclosure requirements for businesses; and helping companies themselves improve transparency in disclosing their ESG strategies and performance. The significance of ESG measurements is only going to increase in the future, and investors’ choices will be influenced by ESG ratings, which will have an impact on businesses’ ability to finance. They invest and adopt more sustainable business models. The market is therefore very aware of the need for ESG metric standardization, driven by the increasing significance of sustainable finance, and comprehending how ESG ratings inform the market and impact creditworthiness is a significant managerial and policy challenge (Agosto & Tanda, 2025).

Market coverage of ESG ratings remains low, according to the OECD (2020), only about 25% of public companies in the US and 10% in Europe have third-party ESG scores. In Central and Eastern Europe (CEE), where ESG data is severely lacking, this is even lower. In 2019, Thomson Reuters EIKON reported that of 1,165 European companies with ESG scores, only 32 were from Poland, 4 from the Czech Republic, and 4 from Hungary; the remaining CEE countries had no representation. This situation reflects a large gap in non-financial disclosure in the CEE region (Iamandi et al., 2019). In addition, the ESG market currently consists mainly of large-cap

companies, while smaller companies, due to limited resources and access to investors, often do not have ESG scores, reducing their potential to be considered in sustainable investment strategies.

A new law on ESG rating activities was agreed upon by the EU, which would guarantee that investors and other stakeholders have access to accurate and comparable information on the methodology (how they assess) and aims (what they assess) of ESG ratings. In addition to strengthening the independence and control of ESG rating providers, the new regulations will increase the transparency of ESG ratings and the processes that underpin them (Commission, 2021).

As previously said, while their ESG scores vary, rating agencies really look at the same things in businesses. For instance, emissions, innovation, and source reuse are values seen in relation to the Environmental pillar. The most crucial areas for the Governance score are shareholder rights, remuneration, structure, and CSR strategy. The Social Score considers community, diversity, human rights, and product quality (Refinitiv, 2020).

2.4. European Stock Market during Crisis.

Empirical research has focused heavily on how resilient stock markets are during times of financial trouble, especially considering the COVID-19 epidemic and the global financial crisis of 2008. Significant market volatility and economic disruptions were brought about by both events, which led academics to look at how several elements, from liquidity risk to firm-specific fundamentals, influenced market reactions throughout Europe.

Overview of the Financial Crisis of 2008

The global financial crisis was sparked by the 2008 collapse of the US real estate market, specifically subprime mortgages. One notable incident that caused instability in the world's financial markets was the Lehman Brothers' bankruptcy. Due to their exposure to subprime mortgages and credit default swaps, a number of industries saw a sharp drop in stock prices during the 2008 financial crisis. During crises, sectors such as consumer goods, healthcare, and information technology generally exhibit greater stability. Companies in these sectors safeguard their stock prices from decline during economic recessions by supplying essential goods and services or capitalizing on increasing demand (Allen & Gale, 2007).

In Europe, large banks such as UBS, RBS, and Deutsche Bank were also hit hard due to their high levels of toxic assets and their reliance on short-term capital markets. Research by Battiston et al. (2020) shows that the complexity and high level of interconnectedness in the financial system have increased systemic risks, causing an initial shock to become a full-blown financial crisis. A sharp increase in trading volume and price volatility is one of the primary

technical effects of stock market crises. Sharp fluctuations in asset values and a rise in trading activity could result from growing investor risk aversion and uncertainty. These effects are typically exacerbated using automated systems, high-frequency trading, and algorithmic trading, which have the potential to increase market swings and volatility. Furthermore, liquidity constraints are frequently the result of market participants' decreased willingness to make cash contributions during crises. As a result, bid-ask spreads rise, making trading more difficult, particularly when there is a lot of stress involved. This reduction in market liquidity raises volatility and results in erratic and inefficient market behavior (Chatzis et al., 2018).

European stock markets experienced a sharp decline in value and liquidity during the crisis. According to Dang & Nguyen (2020) the crisis had a significant negative impact on stock returns during the 2008–2009 period. Specifically, stocks with high sensitivity to global liquidity risk experienced a sharper decline in price during the crisis. The 2008 crisis was a significant failure of conventional economic theory as well as of regulatory and banking practices. Future crises must be avoided by moving toward ethical banking, behavioral economics, and global regulatory cooperation (Toarna & Cojanu, 2015).

To address the crisis, the European Central Bank (ECB) and governments have put in place a number of policy initiatives. Between October 2008 and April 2009, the European Central Bank (ECB) reduced its policy interest rate from 4.25% to 0.5%. Furthermore, the European Central Bank (ECB) instituted quantitative easing (QE) initiatives to boost banking system liquidity and boost the economy. Purchasing government bonds and giving commercial banks long-term loans are two examples of these actions (European Parliament, 2015). The ECB's response is said to have been slower than that of the US Federal Reserve (Fed) and the Bank of England (BoE), leading to the eurozone's economic recovery being slower than that of the US and UK (Fischer, 2021).

Overview of COVID-19 Pandemic

The COVID-19 pandemic is the most severe economic shock since World War II, triggering a simultaneous global recession, according to the World Bank's World Development Report 2022 (World Bank, 2022). Vulnerable groups such as small businesses and informal workers have been hit hard, especially in developing economies. The report also warns of long-term impacts and highlights the need for structural reforms for a sustainable recovery. This caused an exogenous shock to the world's financial markets that had never been seen before. COVID-19 emerged as a non-economic, health-driven disruption that rippled into economic systems through supply chain breakdowns, labor market disruptions, and significant changes in consumer behavior,

in contrast to previous financial crises like the 2008 collapse, which were caused by systemic financial mismanagement (Baker et al., 2020).

Global supply networks were at serious risk from the coronavirus's effects because of how linked the globe is now. Shortages of necessary products and commodities might result from disruptions in one area that quickly spread over the world (Moosavi et al., 2022). Additionally, the pandemic's economic effects were made worse by the temporary shutdown of businesses, especially those in industries that depend on face-to-face contact, like retail, entertainment, and hospitality (Bartik et al., 2020). As a result, the impacted firms lost money, and global unemployment rates rose (Nicola et al., 2020).

International financial markets were immediately impacted by the coronavirus's quick spread, which increased market risk and resulted in large losses for investors. Global stock markets saw steep price and index drops, and the fear and uncertainty fueled heightened volatility and quick changes in investor moods (Dash & Maitra, 2022). According to Zhang et al. (2020) major stock markets, including the S&P 500, FTSE, and Japan's stock market, experienced significant declines, with double-digit drops in a short period of time, and global stocks saw a significant decline, losing almost 30% of their value over a 100-day period (Ali et al., 2020). Due to decreased consumer spending and company closures that disrupted supply chains and decreased economic activity, the pandemic-induced economic slowdown had a significant effect on the financial sector. Consequently, banks, insurance companies, and other financial institutions experienced a decrease in loan demand, a reduction in revenue, and a rise in credit risk (Shibata, 2021). In order to support the industry, maintain liquidity, stabilize financial markets, and mitigate the economic harm, authorities and central banks took action. Europe contributed €1.7 trillion to a comprehensive rescue plan for the eurozone, which was matched by contributions from member states, the UK, and non-EU countries. The European Central Bank (ECB) launched a €750 billion asset purchase program to strengthen and support the Euro. Because of this, the European Commission established a €25 billion investment fund (Nicola et al., 2020). Financial institutions also had to deal with problems related to loan provisions and credit quality as the economic downturn increased the risk of loan defaults. They had to increase provisions for potential losses, which affected profitability and capital adequacy ratios (Byun et al., 2021).

ESG Trends and Policy Responses During Each Crisis

The 2008 global financial crisis has caused the finance and investment sectors to pay greater attention to environmental, social, and governance (ESG) factors. One of the most noteworthy trends was a stronger focus on corporate governance, as some large financial institutions failed due to poor risk management, a lack of transparency, and inadequate oversight.

According to Bax et al. (2021), ESG may be a gauge of financial resilience because companies with low ESG scores were much more vulnerable to tail risk during the crisis. Governments have begun to incorporate environmental considerations into their recovery plans. Green New Deal Group (2008) recommended integrated financial and environmental solutions, like renewable energy and sustainable infrastructure investments, for the post-crisis economic recovery. Furthermore, financial transparency and capital quality significantly improved because of the Basel III regulatory framework's implementation, making it easier to incorporate ESG factors into risk management practices (Bank for International Settlements, 2011).

The importance of Environmental, Social, and Governance (ESG) factors in fostering resilience and a sustainable recovery for the global economy has been brought to light by the COVID-19 pandemic. The total value of ESG-evaluated investment assets climbed from US\$22.9 trillion in 2016 to US\$35.3 trillion in 2020, or roughly 36% of all global investment assets, according to the Global Sustainable Investment Alliance (GSIA) (Gao & Geng, 2024). This suggests that the use of ESG in investment strategies has significantly increased. Policymakers and the financial community increasingly view ESG as a key component in promoting resilience and a long-term recovery in trying times. Despite the fact that the epidemic was not brought on by the climate crisis, governments have been forced to incorporate “green” elements into recovery plans, such as the European Green Deal (European Commission, 2025).

The idea of ESG has been much more popular and significant since the turn of the twenty-first century (Leins, 2020). However, this expansion has increased after the 2008 financial crisis and has become much more noticeable. Given the close relationship between ESG, which aims to measure firm performance in relation to these issues, and CSR, which concentrates on firm actions, it stands to reason that the importance of ESG performance metrics is growing in tandem with the importance of CSR activities on a macroscale (Ahmad et al., 2021). ESG investment has continued to expand rapidly in the European Union due to the EU's strong position on regulating and encouraging ESG-related concerns (European Commission, 2025a), underscoring the growing significance of ESG in the area (EFAMA, 2021).

3. Hypotheses development

The next sections review the key empirical results from previous research, which lend credence to the hypotheses presented in this thesis. Developing these hypotheses offers a convincing response to the research question. The literature review first demonstrates the connection between CSP and company success before delving deeper into how ESG initiatives lower risk. It then examines whether a systemic problem is likely to result in a drop in the value of the firm. Finally, the literature review examines how ESG behaviors, both individually and collectively, may function as a sort of emergency insurance policy. The literature is separated into two major categories: research that uses market-based indicators and studies that use accounting-based metrics of business performance. A more detailed understanding of how various scientific techniques affect the apparent link between sustainable practices and financial results is made possible by this categorization.

3.1. The Influence of ESG Practices on Corporate Financial Performance

ESG contributes by creating an “insurance effect” and bridging the “information gap”. From the standpoint of signal theory, external stakeholders can thoroughly review the financial and non-financial data of enterprise ESG practices, close the “information gap”, and lower investors’ perceived risk when they receive a signal from a company to implement ESG practices (Wang & Yang, 2022). Positive signals can help the business strengthen its bonds with stakeholders and boost investor confidence, which will impact stock market returns (Peress, 2014). The ESG practice of FRMs can be defined as the company’s competitive advantage and differentiation strategy, which can lessen the impact of unforeseen occurrences and provide a “insurance effect”, stabilizing the stock price (Muller & Kräussl, 2008).

The influence of a company’s CSR and ESG efforts on its stock performance and financial performance has been the subject of countless articles in recent years. Meta-analyses have shown a favorable effect on a company’s financial performance (CFP). To assess the role of social capital during a systemic crisis, Lins et al. (2017) carried out a study where they looked into the connection between CSR during the 2008 financial crisis, as a stand-in for social capital, and US returns during the Subprime Crisis. It finds that firms with higher pre-crisis CSR ratings experienced significantly better stock performance, from 4 to 7 percentage points higher than those with lower ratings. The effect of CSR was economically meaningful, comparable to traditional financial factors like cash holdings and leverage. This suggests that social capital can serve as a valuable buffer during periods of systemic trust breakdown.

According to Derwall et al. (2005), companies with high eco-efficiency outperform those with poor eco-efficiency in terms of stock returns. The findings imply that taking care of the environment might improve financial performance and benefit investors (Derwall et al., 2005). Several corporate channels have been cited to explain the direct relationship between CSR and CFP. Ghoul et al. (2011) and Dhaliwal et al. (2014) discover that companies with higher CSR ratings have lower stock costs, suggesting that investors view socially conscious companies as less risky, lower stock return volatility, indicating that CSR improves financial stability and serves as a type of risk management, and lower interest costs (Goss & Roberts, 2011), higher employee satisfaction, productivity, and a lower turnover rate (Gubler et al., 2018), and, to a lesser extent, higher sales (Waheed & Yang, 2019).

In 2008, Gössling & Van (2008) empirically reviewed previous research on the relationship between financial success and corporate social responsibility (CSR). Through a methodical examination of several empirical studies, they discovered resounding proof of a favorable correlation between enhanced financial results and corporate social responsibility. The empirical strength of the relationship between CSR and performance across sectors and business sizes is demonstrated by their findings. And it is supported by some previous research by (Pava & Krausz, 1996; Orlitzky et al., 2003; Margolis et al., 2009). A thorough meta-analysis of more than 2,000 empirical studies was carried out by Friede et al. (2015), who discovered that companies that use ESG principles often have superior financial results. These results provide solid proof that incorporating ESG factors may increase a company's worth.

In a more recent meta-analysis, Whelan et al. (2021) The NYU Stern Centre for Sustainable Business and Rockefeller Asset Management examined over 1000 studies that examined the relationship between ESG and financial performance that were published between 2015 and 2020. 58% of the articles showed a favorable association between ESG and financial performance, 8% found a negative relationship, 13% found no relationship, and 21% found mixed results, according to the research. Although the majority are in favor, they conclude that there is still dispute on the matter.

3.2. The Effect of Systemic Crises on Corporate Performance

The global economy was profoundly impacted by the 2008 financial crisis, which also led to a shift in corporate management approaches. A company's ESG actions may have an impact on its financial success during the financial crisis, according to a prior study, because of the breakdown of trust and the expense of the ESG score investment. First, difficulties with corporate fraud, downsizing, unethical business practices, social problems, and environmental degradation were revealed by the 2008 financial crisis (Alsayegh et al., 2020). A company's reputation and

brand might suffer greatly if stakeholders have a negative opinion of it (Collier & Esteban, 2007). A company's financial performance may decline during a financial crisis due to the reactions of its stakeholders. Because of the loss of confidence, investors may sell their shares, suppliers may cease providing the company's goods, customers may cease buying them, and governments may impose fines and penalties (Nirino et al., 2021). To lessen the adverse effects of the crisis and recover. Due to stakeholder pressure, businesses must adopt proactive, sustainable measures to repair their damaged reputation (Hoshmand & Chung, 2021). Nonetheless, some businesses might just engage in ostentatiously sustainable practices. According to Friede et al. (2015) and Kim et al. (2012) it only momentarily improves their stakeholders' view. Stated differently, the financial performance is not positively impacted by these careless actions. Businesses risk losing the market's confidence and reputation if they don't provide real resources to satisfy the stakeholders' maximization goals (Nirino et al., 2021). Second, ESG activities may result in short-term costs and stress, even though they may eventually directly or indirectly raise organizational value (Glannarakis et al., 2016). In the event of a financial crisis, businesses might not be able to obtain the resources they require to exist. According to Prior et al. (2008), a company's extensive ESG investment may therefore contribute to a decline in managerial effectiveness. According to this theory, when businesses try to raise their ESG ratings during a financial crisis, their short-term financial performance suffers.

In order to react to severe financial shocks, the epidemic has compelled asset owners to reevaluate their understanding of systemic vulnerabilities and the fragility of the financial system. It has made space for new safe havens among assets that aren't typically thought of. An increased understanding of "black swan" events, rare but catastrophic incidents that, as Taleb (2007) explained, the reason for this recalibration is that it may result in unexpected market disruptions. These high levels of uncertainty have caused investors to reevaluate risk management strategies. The inclusion of risks like pandemics, social inequality, and climate change in the broader ESG framework is becoming more widely accepted.

The IMF and World Economic Forum reports have demonstrated the systemic risks of pandemics and their potential immediate and long-term consequences. To ascertain whether asset managers modified their tactics in response to the altered market conditions, Rizvi et al. (2020) investigated how EU asset managers changed their investment plans before, during, and after the first wave of the COVID-19 pandemic. Their analysis suggests a noticeable and consistent transition from high-risk, high-volatility asset classes to safer alternatives such as bonds and, notably, sustainable equities. The data revealed a growing inclination towards "social strategies", suggesting that funds employing social criteria were more likely to excel compared to those utilizing other strategies during different phases of the crisis. This illustrates a deliberate response to

systemic market stress aimed at achieving stability and accountability. Singh (2020) asserts that the COVID-19 epidemic has prompted institutional investors to seek refuge in sustainable assets, especially those compliant with ESG norms. This trend reflects the growing conviction that ESG investment is a reliable and judicious option, even amid volatile market conditions.

By emphasizing the role of ESG performance as a refined indicator of risk, Hartzmark & Sussman (2019) supported the notion that sustainability results in better risk-adjusted returns. Ferriani & Natoli (2020) claimed that asset managers who shifted to low-ESG-risk stocks during the market meltdown in March 2020 were better insulated from sharp drops and made money during the subsequent recovery. The research also shows that investors are now paying more attention to the social and governance aspects of ESG, which have historically been neglected in favor of environmental concerns. This suggests that sustainable investing was a successful tactic during the COVID-19 pandemic. This stands in contrast to previous research that suggested sustainable investment performance follows a Brownian motion, producing returns that are identical to those of traditional benchmarks.

3.3. Past research with accounting-based and market-based metrics

There are two measures of firm performance generally used in firm-level ESG-Firm Performance studies: accounting-based measures and market-based measures.

Aouadi & Marsat (2018), Lonescu et al. (2019), and Yin et al. (2023) investigated the relationship between ESG-CSR factors and financial indicators (like ROA, ROE, volatility, and cost of capital) using panel econometrics. They offered factual proof that ESG improves financial performance, particularly during times of crisis or market turbulence.

In a panel data analysis of FTSE 350 companies, Ahmad et al. (2021) discovered a favorable correlation between ESG scores and accounting-based firm performance, particularly earnings-per-share (EPS). Their results, which implied that businesses implementing ESG-enhancing practices receive financial gains and stakeholder approval, lend credence to the legitimacy theory. This is consistent with the findings of Orlitzky et al. (2003), who also found that ESG and accounting-based performance had higher correlations than market-based metrics. Building on this, ROA is a key accounting-based indicator of firm performance in our study.

- **H1: Companies with higher ESG ratings exhibit significantly higher Return on Assets (ROA) during crisis periods.**
- **H2: Companies with higher ESG ratings exhibit significantly higher Return on Equity (ROE) during crisis periods.**

One of the most often studied market-based metrics is stock returns, which are an ex-post FP measure. Using MSCI KLD ratings to reflect ESG performance, Galema & Gerritsen (2025) examined the influence of ESG on stock returns and discovered that various features of MSCI KLD ratings had varying effects on stock returns. Bird & Hall (2012) investigate the connection between SAM ESG ratings and stock returns using a different data source. But according to their research, CSR initiatives have little impact on US firms' stock returns. There is also evidence of a favorable correlation between a company's stock returns and its level of corporate social responsibility. Company social concerns (Bajic & Yurtoglu, 2018), total ESG score (Berg et al., 2022; Barth et al., 2022), employee happiness (Edmans, 2011), and ecological footprint (Matsumura et al., 2014; Flammer, 2013) all contribute to superior stock returns. Additionally, researchers have noted that the outperformance may be linked to a number of "irrational" psychological variables (Elliott et al., 2014) and that these factors are typical of investors who are motivated by short-term growth (Guenster et al., 2011)

- **H3: Companies with higher ESG ratings experience significantly higher stock returns during crisis periods.**

Velte (2017) proves that ESG benefits German companies' profitability (Return on Assets, or ROA) and firm value (Tobin's Q). Additionally, he discovers that financial performance is significantly impacted by governance. Zhao et al. (2018) examine China's listed energy companies to investigate the relationship between ESG performance and energy market financial indicators. They discovered that improved ESG performance may really improve the financial performance of these companies. According to Dalal & Thaker (2019), evaluating 65 Indian firms between 2015 and 2017, the ESG score has a favorable influence on financial performance. Fatemi et al. (2018) analyze US corporations from 2006 to 2011 and conclude that strength in ESG activities and reporting boosts company value. They concluded that by enhancing the impact of strengths and lessening the impact of flaws, reporting moderates value.

The favorable correlation between ESG ratings and company financial success is also supported by a few multi-country studies. The majority of ESG efforts show a positive correlation with financial success, according to Xie et al. (2019), who examine the link between certain ESG initiatives and the financial performance of a global sample of businesses. Using firm value (Tobin's Q) and operational performance (ROE and ROA) as dependent variables, Bhaskaran et al. (2020) examine the effect of ESG on the financial performance of 4887 companies from 2014 to 2018. They show that businesses that perform well on the social, governance, and environmental pillars typically add greater value to the market. Similarly, De Lucia et al. (2020) examine a sample

of 1038 publicly traded businesses from 22 European nations between 2018 and 2019 and discover a good correlation between financial performance (ROE and ROA) and ESG factors. The impact of ESG performance on financial performance is examined by Naeem et al. (2020) using 1042 emerging-nation businesses from 2010 to 2019. They show that business value (Tobin's Q) and profitability (ROA) are positively and significantly correlated with both individual and combined ESG ratings. From 2014 to 2018, Chairani & Siregar (2020) conducted a study on listed companies in ASEAN (Indonesia, Malaysia, the Philippines, Singapore, and Thailand). The results show that enterprise risk management (ERM) has a positive association with business value and profitability, and that ESG amplifies the impact of ERM on firm value.

- **H4: Companies with higher ESG ratings show significantly higher Tobin's Q during crisis periods.**
- **H5: Companies with higher ESG ratings demonstrate significantly higher Sharpe ratios during market downturns.**

3.4. The Effect of Environmental, Social, and Governance Factors on Firm Performance

Environmental Factors

A significant amount of empirical data suggests that there is a positive correlation between environmental performance and financial performance, meaning that being green pays off (Ghoul et al., 2011). Environmental initiatives, from emission-reducing production methods (Konar & Cohen, 2001) and green supply chain practices (Feng et al., 2018) to the introduction of environmentally friendly products, Lin et al. (2013) appear to be linked to better business financial performance. Lowering operating costs, enhancing the company's reputation, maintaining legitimacy in the eyes of various stakeholders, and putting an emphasis on environmental practices can have a positive financial impact. Additionally, it usually complies with requests from stakeholders. These combined benefits not only raise the company's competitive position but also contribute to its long-term survival and marketability (Chuang & Huang, 2016).

The environmental pillar evaluates efforts to mitigate climate change and reduce carbon emissions, manage pollution and waste generated during the production process, use energy and water efficiently, and focus on biodiversity and deforestation. Numerous academics conducted studies on the environmental pillar, with varying degrees of success (Alareeni & Hamdan, 2020). It concluded that this component negatively affects ROA, which is supported by (Wagner et al., 2002), while Velte (2017) disagrees. Wagner et al. (2002) found that the environmental pillar has a

negative effect on ROE but a positive effect on Tobin's Q. This latter finding is like (Buallay, 2019) the finding that Tobin's Q is positively impacted by the environmental pillar. Investors' knowledge of and consideration of environmental practices as a critical component of greater asset efficiency may be the reason for the positive link between ROE and the environmental pillar (Buallay, 2019).

A company's resilience can be increased by putting resource-efficient environmental initiatives into practice, such as waste reduction, water management, and energy conservation. Businesses can lessen their reliance on limited resources, minimize supply chain interruptions, and lessen their susceptibility to changes in resource prices by optimizing resource usage and eliminating waste.

A critical aspect of the environmental dimension of ESG that might safeguard corporate resilience is the proper involvement of stakeholders. Active interaction and cooperation with regulators or local communities by businesses can ultimately provide better comprehension and management of environmental issues, trust building, as well as pave the way for cooperative solutions. Engagement with stakeholders can help a company identify issues or reduce reputational risks in environmental areas, secure relevant information, and harness resources. This collaboration is further cemented into the building of resilience to harsh environmental rights by the business itself (Liu et al., 2024).

In summary, business resilience is significantly shaped by the environmental perspective of ESG. Businesses may improve their capacity to endure and bounce back from a variety of shocks and disruptions, guaranteeing long-term sustainability and competitiveness, by proactively managing environmental risks, encouraging resource efficiency, adjusting to climate change, and interacting with stakeholders.

- **H6a: The Environmental component of ESG has a significant positive relationship with firm performance during crisis periods.**

Social Factors

The social pillar summarizes a company's perspective on individuals and relationships. Included are community interactions, employee participation, gender and diversity considerations, maintaining data privacy and security, customer happiness, human rights, and labor standards. The results of numerous scholars' studies on the influence of social pillars on company performance were not entirely consistent. Some research indicates that it negatively impacts ROE and ROA (Alareeni & Hamdan, 2020; Buallay, 2019). The study's authors, Alareeni & Hamdan (2020)

speculate that the negative link could be caused by higher expenses related to engaging in socially responsible behavior.

Empirical evidence supporting a positive correlation between social responsibility and financial success was found by Waddock & Graves (1997). A one-year lag was introduced to the CSP metric in order to more accurately quantify its effect on financial performance. According to the authors, socially conscious companies usually have better financial results, and this is linked to efficient business management. Nielsen & Noergaard (2011) assert that businesses that engage in social responsibility benefit monetarily from more effective operations. Furthermore, demonstrating social responsibility gives society and stakeholders legitimacy and credibility, which may lower financial risks and boost shareholder wealth. Nielsen & Noergaard (2011) argued that companies with advanced ESG activities have a business rationale because they generate value through increased profitability and competitiveness.

The social aspect of ESG can affect an organization's business resilience as well as its performance. Organizations that prioritize the development, well-being, and work-life balance of their employees tend to have higher levels of employee engagement and happiness. Engaged and driven employees are more likely to be loyal to the business, which increases its resilience to change and emergencies. According to a study Wang et al. (2023), "strong ESG performance, including the social component, improves company resilience from the standpoint of capital allocation efficiency". By investing in employee development and fostering a positive work environment, businesses can develop a loyal and committed workforce that will increase their ability to overcome challenges.

Businesses that prioritize diversity, equity, and inclusion (DEI) attract and retain top talent from a range of backgrounds. A diverse workforce fosters creativity, provides fresh perspectives, and enhances problem-solving abilities. This diverse talent pool can make a company more resilient by providing a greater range of viewpoints and approaches to challenging issues (Wu & Zhang, 2024). Additionally, when local communities are involved and their needs are satisfied, a company's social license to operate is reinforced and a positive community impact is established. Businesses can boost their social legitimacy and lessen the chance of community rejection by proactively addressing social issues and building strong relationships with stakeholders. This collaborative approach can boost corporate resilience by reducing the possibility of conflicts and ensuring business continuity. According to a study by Yahya (2023), companies with better ESG performance, including social responsibility policies, showed greater resilience during the COVID-19 pandemic.

By focusing on ethical and sustainable supply chain practices, businesses can lower risks and increase resilience. By conducting regular audits, collaborating with suppliers, and addressing social issues within the supply chain, businesses can reduce the likelihood of disruptions and ensure a consistent and reliable supply of goods and resources. This proactive approach to supply chain management can boost a company's overall resilience by averting any disruptions and ensuring business continuity (Bagh et al., 2024).

In conclusion, companies' resilience may be enhanced by the social viewpoint of ESG. Companies can improve their capacity to endure and bounce back from a variety of obstacles and disruptions, guarantee long-term sustainability and competitiveness, by cultivating employee engagement, luring and keeping diverse talent, interacting with communities, ensuring ethical supply chains, cultivating a positive reputation, and aligning with sustainable development goals.

- **H6b: The Social component of ESG has a significant positive relationship with firm performance during crisis periods.**

Governance Factors

The governance pillar is about rules for running a company. It covers executive compensation, lobbying, political donations, bribery and corruption prevention, board composition, audit committee structure, and whistleblower programs. Prior research has related the governance pillar to ROA, ROE, and Tobin's Q, just like the other two pillars. Regarding the findings, studies have demonstrated a positive correlation between Tobin's Q and the governance pillar (Buallay, 2019). Alareeni & Hamdan (2020) concluded that there may be a positive correlation between Tobin's Q and the governance pillar because good governance practices reduce information asymmetry in financial reports, which is advantageous to investors and stakeholders.

Strong board accountability and oversight are essential for both business resilience and effective ESG governance. When boards prioritize ESG issues and include them in their decision-making processes, they are better equipped to identify and manage potential risks and opportunities. According to a study by Wang et al. (2023), companies with robust governance practices and strong ESG performance are more resilient when it comes to capital allocation efficiency.

In conclusion, the governance perspective of ESG greatly influences business resilience. Companies can ensure long-term sustainability and competitiveness by strengthening their ability to withstand and recover from a range of challenges and disruptions. This can be achieved by promoting ethical behavior and compliance, putting in place robust risk management and internal

control systems, communicating with stakeholders and maintaining transparency, and promoting board oversight and accountability.

All of the studies focus primarily on the day-to-day operations of organizations and address their long-term value. There is a dearth of literature emphasizing ESG's immediate success in emergencies. In order to bridge this gap, this study looks at the short-term value of ESG as a signaling mechanism for businesses affected by crises. This study makes a substantial contribution by demonstrating that investors' extreme pessimism is reflected in the steep decline in stock prices that occurred globally during the financial crisis and the COVID-19 pandemic.

- **H6c: The Governance component of ESG has a significant positive relationship with firm performance during crisis periods.**

3.5. Summary of Hypotheses

The market, as well as specific equities, may be impacted, depending on how strong the influencing forces are. In any case, not every business is impacted in the same way. There are several determinants that influence how much a firm, and its stock price are impacted. These include the company's size, product line, profitability, and market capitalization, among other things. The study demonstrates that there may be a negative correlation between volatility and ESG ratings. In addition to explaining correlation, it also explains causal links that lead to improved business resilience because of stronger governance, social, and environmental management. Additionally, stocks with higher ESG ratings may be preferred by investors who base their choices on sustainability considerations. In general, a company's resilience is demonstrated by its lower volatility compared to its rivals.

- H1: Companies with higher ESG ratings exhibit significantly higher Return on Assets (ROA) during crisis periods.
- H2: Companies with higher ESG ratings exhibit significantly higher Return on Equity (ROE) during crisis periods.
- H3: Companies with higher ESG ratings experience significantly higher stock returns during crisis periods.
- H4: Companies with higher ESG ratings show significantly higher Tobin's Q during crisis periods.
- H5: Companies with higher ESG ratings demonstrate significantly higher Sharpe ratios during market downturn.

- H6a: The Environmental component of ESG has a significant positive relationship with firm performance during crisis periods.
- H6b: The Social component of ESG has a significant positive relationship with firm performance during crisis periods.
- H6c: The Governance component of ESG has a significant positive relationship with firm performance during crisis periods.

4. Methodology

This chapter will discuss the empirical approach that will be used to evaluate hypotheses H1 through H6 and provide a response to the research question. A cross-sectional regression analysis will then be carried out to determine if a company's participation in ESG initiatives had an impact on its performance during the financial crisis and the COVID-19 epidemic. First, the research plan is explained. Details on the study's samples and data gathering process come next. Discussions of the study's validity, reliability, and ethical issues will come after the presentation of the data analysis methods.

4.1. Research design

Consistent with another research, including that conducted by Ahmad et al. (2021) and Velte (2017) this study employed a quantitative approach to address our research issue. The impact of ESG ratings on performance is being investigated by regression models. By employing a quantitative methodology, we were able to make inferences from a substantial sample of 283 companies. Variables representing the computed firm performance (ROA, ROE, Tobin's Q, Sharpe ratio, and stock return), ESG ratings, and control variables based on the literature are used in the regression analysis. The analysis was carried out utilizing cross-sectional data, which focused on two crisis periods (the financial crisis and COVID-19). Since the purpose of this study is to determine whether ESG and company performance are related, secondary data will be gathered from Refinitiv Eikon's database in order to execute tests, evaluate our results, and make inferences.

4.2. Data collection

The STOXX Europe 600 index and the Refinitiv Eikon database provided secondary data for this study. ESG ratings for the companies in the index were then obtained from the Refinitiv Eikon database. The ESG scores used in this study are from the year before each crisis year. This is to make up for the fact that ESG disclosures often take a long time to report. This strategy is in keeping with earlier research that often compares financial achievements to ESG scores from the previous year. This is being done to account for the time lag in ESG data being available. For example, ESG scores from 2007 show how well companies did during the 2008 financial crisis, and ESG scores from 2019 show how well they did during the COVID-19 crisis in 2020. This strategy makes sure that the firm's ESG performance shows its profile before any catastrophe happens.

Tobin's Q, a market-based performance metric, was then computed by dividing the entire market value of equity, which came from Refinitiv Eikon, by the total book value of equity, which also came from Refinitiv Eikon. Tobin's Q was determined. Stock returns and Sharpe ratios are computed based on market data from the two crisis periods (2008 and 2020). Stock return is calculated as the percentage change in share price over the respective crisis year. The capacity of daily stock price data to effectively reflect stock market price swings has led to its selection as the optimal data frequency. The Sharpe ratio is computed as the average return during the crisis year minus the risk-free rate, divided by the standard deviation of returns over the same period. The risk-free rate is proxied by the corresponding annual average yield on 10-year euro area government bonds, as published by the European Central Bank (ECB). Then, for every company in the sample, the accounting-based firm performance metrics, ROA and ROE, were also taken from the Refinitiv Eikon database.

Data on 283 publicly traded companies included in the STOXX Europe 600 index were gathered for the study. Although 600 publicly traded companies from 17 European nations make up the STOXX Europe 600 index, the sample only included companies from 16 of those nations. The companies have to be listed on the STOXX Europe 600 index at the time of data collection and have ESG scores available in 2008 and 2020, the study's focal periods, in order to be included in the sample. Due to inadequate and unavailable data for both sample periods, 317 companies were eventually eliminated, leaving 283 firms (566 observations) from the STOXX Europe 600 index in the sample. Table 3 lists the number of companies listed in each of the 16 nations and 8 sectors.

Table 3: Number of companies by country and sector.

Counties	N of companies	Sector	N of companies
Austria	7	Consumer Cyclical	38
Belgium	8	Technology	30
Denmark	14	Healthcare	18
Finland	11	Consumer non-cyclicals	24
France	41	Real Estate	10
Germany	30	Industrials	54
Greece	1	Financials	51
Ireland	2	Basic Materials	29
Italy	10	Total	283
Netherlands	13		
Norway	11		
Portugal	2		
Spain	14		
Sweden	23		
Switzerland	24		
United Kingdom	72		
Total	283		

Source: Own elaboration. Data: Refinitiv

4.3. Variables

The data analysis technique is chosen following the definition of the variables and the creation of the sample. Selecting the best model for data analysis requires overcoming a few formidable obstacles. The intricacy of the model is one of the main problems. A complicated model may overfit, capturing the noise in the data instead of the signal, whereas an overly basic model may underfit, failing to identify the underlying patterns in the data. The model's ability to generalize well to new data depends on striking this balance between simplicity and complexity. The purpose of the research is to assess the causal link over a certain period between the independent factors and the dependent variables. A cross-sectional linear regression model is employed as a result. This section provides a detailed description of the regression models, independent variables, dependent variables, control factors, and dummy variables. A summary of every variable is presented at the conclusion.

Dependent variables

Khan (2022) summarizes a number of common variables used in ESG research. In the paper, the variables return on assets (ROA) and return on equity (ROE) are used as proxies to measure a firm's financial performance as accounting-based measurements. The 1st hypothesis, Return on Assets (ROA) is the preferred metric used by analysts and market experts to gauge profitability. It demonstrates how well the company makes use of its resources to turn a profit. The ROA is calculated using the following formula.

$$ROA = \frac{EBIT}{Total\ asset} \quad (1)$$

In this study, corporate profitability was determined using the Return on Equity (ROE) ratio for the 2nd hypothesis, which measures a company's ability to generate profits from shareholder investment. ROE is calculated by dividing the average shareholder equity for a given period by the net income before extraordinary items for that same period. Since ROE has been generally accepted in research as a measure of accounting performance, it is one of the most important indicators for investors to evaluate a company's management success. Return on equity (ROE), which determines the return to shareholders, is one of the most helpful profitability indicators. According to Strouhal et al. (2018), a greater ROE means that shareholders will get larger dividends, which will increase the share price. Since ROE may also be seen as a measure of the gains from previous investments, a firm with a higher ROE might be seen as a particularly profitable investment opportunity. The formula for return on equity is as follows.

$$ROE = \frac{Net\ income}{Shareholder\ 's\ equity} \quad (2)$$

For market-based measurement, we will choose stock return, Tobin's Q, and Sharpe ratio as dependent variables. Under hypothesis 3, each stock's return will be quantified. For this, the percentage increase over the analyzed period is computed. The annualized return is utilized to enable comparison and to take into consideration the periods' possibly varying durations. A stock's annualized return offers a consistent way to assess how well an investment has performed over a certain time frame, making it simple to compare it to other assets. It is an essential metric for investors because it enables them to consistently assess the performance of various assets over a range of periods. Compared to basic returns, this indicator gives a more accurate view of an investment's performance by considering the compounding impact. Using the following formula:

$$\text{Annualized Return} = \frac{P_t^{\frac{1}{n}}}{P_0} - 1 \quad (3)$$

Where:

P_t : Stock price at the end of the period

P_0 : Stock price at the beginning of the period

N: Investment period in years

For the 4th hypothesis, the ratio of a physical asset's market value to its replacement value is known as Tobin's Q. Since it is difficult to determine the replacement prices of a company's assets, it has been standard practice in the finance and accounting literature to quantify the ratio of the firm's market value over the value of the firm's physical assets.

$$\text{Tobin's Q} = \frac{\text{Total Market Value of Firm}}{\text{Total Asset Value of Firm}} \quad (4)$$

For hypothesis 5, the Sharpe ratio of every stock must be determined. One metric for assessing an investment's risk-adjusted return is the Sharpe ratio. It shows the amount of excess return one gets in exchange for the additional volatility one experiences while holding a riskier asset. As previously mentioned, the most often used technique for determining volatility is the standard deviation of returns. It calculates how a stock's daily or weekly returns vary from the mean return over a specified time frame. Higher volatility and, hence, higher risk are indicated by a higher standard deviation. And annualized return to computing a Sharpe ratio on a similar basis. The European Central Bank's (ECB) relevant yield serves as the basis for the risk-free rate that is employed in the computation.

$$\text{Sharpe Ratio}_i = \frac{R_{i,t} - R_{f,t}}{\sigma_{\text{annual},i}} \quad (5)$$

Where:

R_i : Annualized return of stock i

R_f : Risk-free rate

$\sigma_{\text{annual},i}$: Annualized standard deviation of daily returns

Independent variables

The Eikon Refinitiv database's ESG Combined Scores were used to calculate ESG scores. Of the 630 ESG metrics that are gathered and computed, 186 of the most pertinent and comparable fall into subgroups that serve as the foundation for the assessment and grading of each category, depending on the industry. Following that, the scores of the three pillars "environmental, social, and governance" are combined with the scores of the categories. Furthermore, the number of conflicts increases to 23 and is included in the indicator's overall computation. Firms that do exceptionally well in the categories under consideration and have the finest practices obtain a score of 100, and vice versa. The results are normalized in percentages that range from 0 to 100 on a metric scale. The lowest possible score is 0, and the maximum score is 100, meaning that the company with the highest score is more sustainable. Lower numbers indicate lower scores and, thus, lesser ESG performance (Refinitiv, 2024). The Environmental, Social, and Governance pillar scores make up the standard ESG score; the weightings assigned to each pillar vary by sector. The normal ESG score is 50% weighted against an ESG controversy score to get the Refinitiv ESG Combined Score. The effect and seriousness of ESG controversies in which the company was involved during a given fiscal year are gauged by a number of measures that make up the ESG controversy score. The ESG Combined Score is equal to the standard ESG score if the ESG Controversy Score is higher than the standard ESG Score, since ESG controversy scores may only have a negative effect on the combined score. Since the ESG Combined score takes into account the firm's performance for all three ESG pillars as well as controversies, it was utilised to give a more comprehensive view of the company's ESG performance. For every company and year in the sample and study period, respectively, ESG scores were obtained (Refinitiv, 2024).

The individual pillar ratings range from 0 to 100 (Refinitiv, 2024). The environmental indicator's score, which is derived from 158 components, assesses how an organization affects both living and non-living systems, such as the air, soil, and water, as well as entire ecosystems. It shows how well a business takes advantage of environmental possibilities to generate long-term profit for its shareholders and employs the best management practices to prevent environmental dangers.

The social indicator (Social) score takes into account 238 factors and assesses a company's ability to use best management practices to build trust and loyalty among its employees, clients, and society. The company's reputation is a major determinant of its ability to generate long-term value for its owners, and it is reflected in this.

Lastly, the firm's policies and procedures that guarantee that its executives and board members operate in the best interests of its long-term shareholders are measured by the governance indicator's score (141 items). It shows how capable a business is of using best management practices to guide and regulate its rights and obligations via the development of incentives and checks and balances in order to produce long-term shareholder value (Refinitiv, 2024)

Control variables

The OLS regression model incorporates a number of control variables to provide a more precise and trustworthy assessment of the correlation between market value and business participation in ESG activities during the financial crisis and the COVID-19 pandemic. Since it is acknowledged that a variety of factors may contribute to the evolution of a firm's performance during a systemic crisis, this is done in order to account for variables that may have an impact on the observed connection between independent and dependent variables.

Index share

This study uses the index weight, which is determined by comparing each firm's free-float market capitalisation to the index's total market capitalisation, as a stand-in for a company's share in the stock index. This method captures the true weight that a company adds to the index from the viewpoint of active investors by accounting for both the market valuation of the company and the tradable portion of shares. The measure is more representative of market dynamics because free-float capitalisation guarantees that only shares that are available for public trading are taken into account.

Leverage

An accounting-based metric used to evaluate a company's capacity to fulfil its financial commitments is its financial leverage ratio. Leverage is determined by dividing the book value of debt by the total value of assets (Engelhardt, Ekkenga, & Posch, 2021). Because they have more responsibilities to complete regardless of how well they perform, companies with a significant amount of debt may be seen as riskier investments. Therefore, having a lot of leverage might limit a company's capacity to respond to unanticipated events like the COVID-19 pandemic, which may have impacted investors' perception of the company as an investment case. According to evidence from earlier research, companies with more leverage are probably going to see greater stock price

declines during the COVID-19 pandemic (Albuquerque, Koskinen, & et al, 2019). As a result, the regression analysis includes leverage as a control variable.

Size

Size is an accounting-based variable that is used to control how firms in the sample vary in size. It is calculated as the natural logarithm of the total assets (Albuquerque, Koskinen, & et al, 2019). This accounts for differences in scale and thereby allows for comparison. The size of a firm has previously been found to explain a significant fraction of the variation in stock returns (Fama & French, 1992). During times of crisis, the size of a firm may affect investor confidence, and larger firms might be perceived as a safer investment, which could cause differing market reactions. Thus, controlling for firm size ensures that the effects of the ESG score are.

Industry-Fixed Effects

The industry categorization for every company in the sample is obtained, much as the accounting data. To account for the varying impacts of crisis outbreaks across sectors, the model incorporates industry-fixed effects as a control variable. Similar studies frequently include industry-fixed effects (Albuquerque, Koskinen, & et al, 2019)

Table 4: Variable Description Table

Variables	Description	Measure
Dependent variables		
Return on assets (ROA)	Total earning divided by total assets	Ratio:Unit
Return on equity (ROE)	Net income divided by equity	Ratio:Unit
Return on stock	Annulized return	Percentage
Tobin's Q	Market value of assets divided by book value of assets	Ratio:Unit
Sharpe ratio	Risk-adjusted return	Percentage
Independent variables		
ESG	Quantified ESG rating	Score (0-100)
Control variables		
Index share	Index weight based on free-float market capitalization	Percentage
Leverage	Total debt over total equity	Ratio:Unit
Size	Natural logarithms of total assets	Log value
Dummy variables		
Industry	Industry classification dummy (8 categories)	0 or 1

Source: Own elaboration. Data: Refinitiv

4.1. Regression Models

$$\begin{aligned}
 ROA_{it} = & \beta_0 + \beta_1 ESG_{it-1} \\
 & + \beta_2 Indexshare_{it} + \beta_3 Size_{it} + \beta_4 Leverage_{it} \\
 & + \sum \beta_k IndustryDummies_k + \varepsilon_{it}
 \end{aligned}$$

Where ROA_{it} is the **return on assets** for the firm i in the year t , β_0 equals the intercept, ESG_{it-1} is the lagged ESG score, representing the firm's sustainability performance in the previous year, control variables include index share, firm size, leverage, with industry fixed effects to account for sector-specific factor.

$$\begin{aligned}
ROE_{it} = & \beta_0 + \beta_1 ESG_{it-1} \\
& + \beta_2 Indexshare_{it} + \beta_3 Size_{it} + \beta_4 Leverage_{it} \\
& + \sum \beta_k IndustryDummies_k + \varepsilon_{it}
\end{aligned}$$

Where ROE_{it} is the **return on equity** for the firm i in the year t , β_0 equals the intercept, ESG_{it-1} is the lagged ESG score represents the firm's sustainability performance in the previous year, control variables include index share, firm size, leverage, with industry fixed effects to account for sector-specific factors

$$\begin{aligned}
R_{it} = & \beta_0 + \beta_1 ESG_{it-1} \\
& + \beta_2 Indexshare_{it} + \beta_3 Size_{it} + \beta_4 Leverage_{it} \\
& + \sum \beta_k IndustryDummies_k + \varepsilon_{it}
\end{aligned}$$

Where R_{it} is the **annualized return** for stock i in the year t , β_0 equals the intercept, ESG_{it-1} is the lagged ESG score, representing the firm's sustainability performance in the previous year, control variables include index share, firm size, leverage, with industry fixed effects to account for sector-specific factors

$$\begin{aligned}
TobinQ_{it} = & \beta_0 \\
& + \beta_1 ESG_{it-1} \\
& + \beta_2 Indexshare_{it} + \beta_3 Size_{it} + \beta_4 Leverage_{it} \\
& + \sum \beta_k IndustryDummies_k + \varepsilon_{it}
\end{aligned}$$

Where **TobinQ_{it}** is the market value of assets is divided by the book value of assets for firm i in the year t , β_0 equals the intercept, ESG_{it-1} is the lagged ESG score, represents the firm's sustainability performance in the previous year, control variables include index share, firm size, leverage, with industry fixed effects to account for sector-specific factors

$$\begin{aligned}
S_{it} = & \beta_0 + \beta_1 ESG_{it-1} \\
& + \beta_2 Indexshare_{it} + \beta_3 Size_{it} + \beta_4 Leverage_{it} \\
& + \sum \beta_k IndustryDummies_k + \varepsilon_{it}
\end{aligned}$$

Where S_{it} is the **Sharpe ratio** for firm i in the year t , β_0 equals the intercept, ESG_{it-1} is the lagged ESG score, representing the firm's sustainability performance in the previous year, control variables include index share, firm size, leverage, with industry fixed effects to account for sector-specific factors

4.2. Analyzed period

The impact of ESG on stock performance in crisis conditions was experimentally tested during two distinct periods of significant market volatility. The first phase of the crisis, linked to the Global Financial Crisis, includes the quarters of 2008Q3 and 2008Q4, which witnessed exceptionally high annualized volatility maxima of 35.9% and 56.7%, respectively. One example of the second crisis era is the COVID-19 market shock, particularly 2020Q1, when volatility hit 42.3%. These quarters were picked because they displayed observable volatility increases and occurred during major global economic downturns.

Table 5: Quarterly Annualized Volatility.

2008		2020	
Year.Quarter	Ann.Volatility	Year.Quarter	Ann.Volatility
2007Q1	14.19%	2019Q1	11.3%
2007Q2	10.51%	2019Q2	10.2%
2007Q3	21.02%	2019Q3	12.2%
2007Q4	16.18%	2019Q4	11.5%
2008Q1	29.28%	2020Q1	42.3%
2008Q2	17.49%	2020Q2	26.9%
2008Q3	35.90%	2020Q3	16.9%
2008Q4	56.69%	2020Q4	11.5%
2009Q1	30.30%	2021Q1	11.8%
2009Q2	24.55%	2021Q2	11.1%
2009Q3	17.61%	2021Q3	12.4%
2009Q4	18.91%	2021Q4	13.8%

Source: Own elaboration. Data: Refinitiv

As a result, two periods are eligible for further examination. The first period started from 1st July 2008 to 31st December 2008, including 147 trading days. The second period is first quarter of 2020 from 1st January 2020 to 31st to March 2020, including 64 trading days.

5. Regression Model Results

5.1. Descriptive Statistics

The ESG and financial performance of the firms in the STOXX 600 index during the 2008 Global Financial Crisis and the 2020 COVID-19 pandemic illustrate that the market and corporations react in different ways. In 2008, the average ESG score was 50.74, which was lower than in past years. This demonstrated that people weren't using sustainable methods as much as they may have been. This average had increased to 72.67 by 2020, which means that firms have made tremendous strides in social, environmental, and governance concerns. This might have happened because stakeholders put more pressure on them, and rules changed after the outbreak. Even if the 2020 COVID-19 epidemic and the 2008 financial crisis occurred in very different places of the world and more than 10 years apart, they had a lot of the same consequences on how well STOXX 600 firms did. Companies had negative Sharpe ratios and average stock returns during both timeframes (-0.52 in 2008 and -0.69 in 2020). This suggests that their performance was below average when risk was taken into consideration, and the markets were exceedingly unstable. Also, firms' earnings were low or dropping in both years, and ROA and ROE demonstrated how hard it was for them to generate money due to the recession. Another thing they have in common is that they have high standard deviations, which means that the size of the company and the ESG ratings are very different. This difference means that some organisations are better able to handle shocks than others, while others are still at high risk. In addition, companies either had a lot of debt (in 2008) or aggressively lowered their leverage (by 2020) because of the higher risk. This made financial leverage a big issue in both crises. These commonalities illustrate that firms always have to deal with the same problems during a crisis: lower earnings, higher risk, and the need to change their financial strategies. The features of economic shocks are what eventually produce these patterns. Economic shocks tend to lower demand, limit capital markets, and heighten uncertainty, all of which have a consistent effect on company performance across industries and eras.

Table 6: Descriptive Statistics

Variables	Year	Mean	St. Deviation	Min	Max	N
Independent variables						
ESG score	2008	50.74	20.03	3.70	9179	283
	2020	72.67	13.10	29.94	95.27	283
E score	2008	49.45	27.20	0.00	98.37	283
	2020	71.42	19.27	8.28	97.86	283
S score	2008	50.94	23.65	2.72	94.45	283
	2020	76.96	13.57	30.66	97.67	283
G score	2008	52.42	22.61	3.11	97.73	283
	2020	67.06	18.56	13.99	98.89	283
Firm characteristics						
ROA	2008	0.07	0.06	-0.03	0.38	283
	2020	0.05	0.05	-0.03	0.34	283
ROE	2008	0.24	0.41	-0.06	6.43	283
	2020	0.16	0.16	-0.12	1.85	283
Total Assets (EUR bn)	2008	96.36	319.53	0.46	2513	283
	2020	113.52	311.9	0.71	2488	283
Return on stock	2008	-0.52	0.26	-0.99	0.23	283
	2020	-0.69	0.32	-1.00	1.38	283
Sharpe ratio	2008	-0.38	0.36	-5.76	0.19	283
	2020	-1.14	0.58	-2.09	4.02	283
Index share	2008	0.00	0.00	0.00	0.03	283
	2020	0.00	0.01	0.00	0.04	283
Tobin's Q	2008	1.26	0.59	0.50	6.19	283
	2020	1.73	1.98	0.52	27.68	283
Leverage	2008	2.10	6.46	0.00	97.94	283
	2020	1.39	1.68	0.01	12.79	283

Note: The table summarizes the descriptive statistics of all variables in 2008 and 2020. Source: Own elaboration.
Data: Refinitiv.

5.2. Correlation Coefficient Matrix

The condition of no perfect multicollinearity must be met for the computed regression coefficients to be reliable. This assumption means that no independent variable in the model is a perfect linear combination of the others. This keeps the OLS estimates unique and stable (Kyriazos & Poga, 2023). There can be a reasonable correlation between explanatory variables, but if the correlations are too strong, it can make the standard errors too big, lower the statistical power, and make it hard to figure out what each variable does on its own. We made correlation matrices for the crises of 2008 and 2020 to see whether there was multicollinearity. We looked at how ESG-

related factors are connected to company-level controls, including total assets, debt, and index share. The results show that all of the pairwise correlations are much below 0.5 in both periods. The ESG score had the highest link to index share in 2008, when it was 0.43. In general, there isn't much of a relationship between leverage and total assets in any time range. The different ESG parts (E, S, G) are more clearly connected, especially in the 2008 sample. But they are not often used together in the same model. This means that ESG aspects are less likely to be multicollinear.

According to O'Brien (2007), you shouldn't use correlation coefficients over 0.7 or Variance Inflation Factors (VIFs) over 10 to look for multicollinearity. This study still supports the idea of multicollinearity because there are no substantial bivariate correlations between the control and explanatory variables. This makes the regression analysis more correct. This makes the regression analysis more accurate.

Table 7: Correlation Coefficient

(1)							
Variables	1	2	3	4	5	6	7
1. ESG score	1.00						
2. E score	0.84	1.00					
3. S score	0.90	0.70	1.00				
4. G score	0.68	0.38	0.41	1.00			
5. Index share	0.43	0.38	0.38	0.28	1.00		
6. Total assets	0.28	0.33	0.20	0.27	0.23	1.00	
7. Leverage	0.15	0.12	0.11	0.17	0.00	0.27	1.00
(2)							
Variables	1	2	3	4	5	6	7
1. ESG score	1.00						
2. E score	0.75	1.00					
3. S score	0.62	0.46	1.00				
4. G score	0.68	0.21	0.21	1.00			
5. Index share	0.34	0.29	0.33	0.15	1.00		
6. Total assets	0.25	0.25	0.08	0.20	0.17	1.00	
7. Leverage	-0.05	0.07	-0.12	-0.05	-0.08	0.19	1.00

Note: The table summarizes the correlation coefficient of all independent variables (ESG and its components E, S, G correlate with firm-level variables in 2008 and 2020, respectively). Source: Own elaboration. Data: Refinitiv.

H1: Companies with higher ESG ratings exhibit significantly higher Return on Assets (ROA) during crisis periods.

The regression study supports the concept that organizations with high ESG ratings tend to fare better financially during times of crisis, as seen by Return on Assets (ROA). In the real world, the data reveal that the idea that companies with higher ESG ratings generate more profit during a crisis. The effect was small in 2008 ($\beta = 0.00003$, $p < 0.01$), but it was nonetheless statistically significant. This study reveals that organizations that fared better on ESG were a bit more lucrative than their competitors, even in the early stages of implementing ESG. Companies that care about ESG may have stronger risk management systems, programs that concentrate on stakeholders, or more effective governance frameworks. This makes them more stable in a financial environment that is continually changing.

The ESG coefficient, on the other hand, increases 0.0003 and has statistically significant at the 10% level in the 2020 scenario, which takes into consideration the COVID-19 pandemic problem. The bigger coefficient in 2020 means that ESG performance is more important for understanding profitability. There were bigger changes in the structure of the corporate environment between the two crisis eras, which are shown in this progression. In the 10 years leading up to 2020, ESG became more and more a part of corporate strategy. This was due to more investors wanting businesses to be sustainable, changes in regulations such as (the EU Green Deal), and more people becoming conscious of social and environmental concerns.

Along with the ESG coefficient, other control factors provide trustworthy and useful data. Index Share has a strong and statistically significant positive relationship with ROA in both years. This means that firms that are more represented in important indices tend to make more money. This might be because they have a stronger market position, greater investor confidence, or more visibility. In both periods, there is a strong and negative relationship between ROA and business size, which is measured by total assets. This might mean that when things become rough, bigger companies are less efficient or have less flexible cost structures, which lowers their profits. It's interesting to see that leverage and ROA didn't have a strong relationship during any of these crises. This suggests that capital structure wasn't the key thing affecting profitability.

Lastly, the models' overall explanatory power grows over time. The adjusted R-squared goes from 0.36 in 2008 to 0.48 in 2020. This means that ESG and other variables may explain a significant percentage of the changes in ROA over the most recent crisis. This increase shows how important ESG is becoming to a company's bottom line, especially when things are uncertain.

These data, when looked at together, reveal a clear shift in how ESG performance affects financial value. During the 2008 financial crisis, ESG gave businesses a little advantage, but during the pandemic, it was far more relevant and substantial. This shows that sustainable company practices are now necessary for long-term financial stability, not just a side benefit.

Table 8: Regression Model Result for ROA

Variables	(1)	(2)
ESG score	0.00003*** (0.0001)	0.0003* (0.0001)
Index shares	3.62*** (0.98)	3.59*** (0.51)
Leverage	0.0003 (0.0004)	-0.001 (0.001)
Size	-0.05*** (0.01)	-0.04*** (0.004)
_Cons	0.51*** (0.06)	0.41*** (0.04)
Control	Yes	Yes
Ind control	Yes	Yes
N	283	283
R²	0.39	0.49
Adj.R²	0.36	0.48

Note: Models (1) and (2) represent the regression of ROA and ESG score for 2008 and 2020, respectively. Variable Index shares (Company's Capitalization/Index's Capitalization), Leverage (Debt/Equity), Size (log of total assets) ,Industry fixed control with dummy variables. The symbols ***, **, and *, respectively, show statistical significance at 1%, 5% and 10%. Source: Own elaboration. Data: Refinitiv.

H2: Companies with higher ESG ratings exhibit significantly higher Return on Equity (ROE) during crisis periods.

The results of the regression do not support the idea that higher ESG ratings lead to higher Return on Equity (ROE) during times of crisis. The ESG coefficient is still not statistically significant in either the 2008 or 2020 models ($\beta = 0.001$, $p > 0.1$). This means that ESG performance and ROE don't really have much to do with one another during either crisis.

Because ESG performance is not relevant, it does not seem to contribute to shareholders gaining profit back on their investments when the firm is suffering financial troubles, like it does with ROA. One reason might be that ROE isn't as directly affected by ESG-related measurements since it is more concerned with capital structure and shareholder return than with how well a company runs. ESG metrics could assist in building trust among stakeholders, managing risk, or using assets (as shown by ROA), but they might not help shareholders generate more money in the short term, especially during times of crisis.

There is a strong and negative link between firm size and ROE in both periods ($\beta = -0.19$ and -0.08 , both significant at 1%). This means that larger businesses can have trouble making money during a crisis. Leverage has a substantial and positive relationship with ROE ($\beta = 0.008$ and 0.014 , both $p < 0.05$). This means that companies with more financial leverage could have better returns on equity, but they might also be taking on more risk.

The ROA models were higher than this in 2020 (0.15) and 2008 (0.36). This supports the idea that ESG isn't a good way to predict how well a company will do in terms of equity profitability during times of crisis, even though it helps things operate smoothly (as shown by ROA).

Table 9:Regression Model Result for ROE

Variables	(1)	(2)
ESG score	0.001 (0.001)	0.001 (0.001)
Index shares	10.64 (8.79)	7.99*** (2.12)
Leverage	0.008** (0.003)	0.014** (0.005)
Size	-0.19*** (0.05)	-0.08*** (0.02)
_Cons	2.01*** (0.5)	0.93*** (0.18)
Control	Yes	Yes
Ind control	Yes	Yes
N	283	283
R²	0.39	0.19
Adj.R²	0.36	0.15

Note: Models (1) and (2) represent the regression of ROE and ESG score for 2008 and 2020, respectively. The symbols ***, **, and *, respectively, show statistical significance at 1%, 5% and 10%. Source: Own elaboration. Data: Refinitiv.

H3: Companies with higher ESG ratings experience significantly higher stock returns during crisis periods.

The H3 regression (Table 10) findings only partially support the idea that stocks do better in crises when they have higher ESG ratings. The 2008 model shows how the Global Financial Crisis changed things. It has a positive ESG coefficient that is statistically significant at the 1% level ($\beta = 0.002$, $p < 0.01$). This means that during this time of crisis, firms with better ESG profiles had higher stock returns than those with inferior ESG profiles. This finding supports the idea that investors may trust companies that focus on ESG more and see less risk. This might lead to better market performance when things are ambiguous.

The ESG coefficient is not statistically significant in the 2020 model, which means that ESG did not have a big effect on market returns during this more recent crisis. This difference

might be due to how the market worked during COVID-19. At that time, outside shocks were more about health and policy and less about how businesses were trying to be more eco-friendly. On the other hand, it may mean that ESG was already part of the market before the outbreak, which would make it less useful for finding out why returns changed.

Index share is still substantially and positively linked to stock returns in both models when it comes to the control variables. This means that companies that are more influential in key indices do better in the market. The total assets of a company are an excellent method to measure its size, and they are strongly and negatively linked to returns. This makes it look like smaller enterprises would be more flexible and better prepared to take advantage of opportunities when things become tough. On the other side, leverage doesn't have a big effect on returns over time.

Adjusted R-squared shows that the models improve better at describing things from 0.20 in 2008 to 0.32 in 2020, even if ESG isn't as important in 2020. This makes it seem that ESG might not be able to completely explain the differences in returns in 2020. The full model, on the other hand, which takes into account size, index representation, and industry impacts, does explain a bigger part of the variations in market returns throughout the pandemic.

Table 10: Regression Model Result for Stock Return.

Variables	(1)	(2)
ESG score	0.002*** (0.000)	0.000 (0.001)
Index shares	21.59*** (5.12)	13.25*** (3.86)
Leverage	-0.003 (0.002)	-0.004 (0.01)
Size	-0.11*** (0.03)	-0.11*** (0.36)
_Cons	0.54* (0.28)	0.58* (0.33)
Control	Yes	Yes
Ind control	Yes	Yes
N	283	283
R²	0.24	0.35
Adj.R²	0.20	0.32

Note: Models (1) and (2) represent the regression of Stock Return and ESG score for 2008 and 2020, respectively. The symbols ***, **, and *, respectively, show statistical significance at 1%, 5% and 10%. Source: Own elaboration. Data: Refinitiv.

H4: Companies with higher ESG ratings show significantly higher Tobin's Q during crisis periods.

The results (Table 11) partly support the assumption that companies with higher ESG ratings have considerably higher market values, as measured by Tobin's Q, during times of crisis. In the model for the 2008 Global Financial Crisis, the ESG coefficient is positive and statistically significant at the 1% level ($\beta = 0.006$, $p < 0.01$). This suggests that, at this time, the market thought firms with higher ESG performance were worth more. This finding reveals that even when ESG was new, the market considered that firms that focused on ESG were more stable or better run when times were tough financially.

The 2020 COVID-19 model, on the other hand, doesn't show any relevance. The ESG coefficient grows ($\beta = 0.015$), but it is no longer statistically significant ($p > 0.1$). The epidemic may have transformed the whole market, or it might be that investors' priorities have shifted. For

instance, liquidity, industry exposure, or public policy may now be more essential than ESG in deciding market value.

Index shares are always and firmly associated with a greater Tobin's Q in both eras. This suggests that firms that are more represented in market indexes earn a larger valuation premium. This is likely because they are easier for investors to see, have more analyst attention, and are thought to be more stable. Tobin's Q has a strong and negative association with firm size, though ($\beta = -0.49$ in 2008; -1.54 in 2020). Investors may be apprehensive that larger firms won't be as adaptable or won't be able to grow as much during downturns. On the other hand, leverage doesn't seem to have a strong link to Tobin's Q in any year.

Table 11: Regression Model Result for Tobin's Q.

Variables	(1)	(2)
ESG score	0.006*** (0.001)	0.015 (0.009)
Index shares	50.52*** (10.45)	168.57*** (25.75)
Leverage	0.005 (0.004)	0.03 (0.07)
Size	-0.49*** (0.06)	-1.54*** (0.24)
_Cons	5.9*** (0.59)	15.68*** (2.23)
Control	Yes	Yes
Ind control	Yes	Yes
N	283	283
R²	0.35	0.26
Adj.R²	0.31	0.22

Note: Models (1) and (2) represent the regression of Tobin's Q and ESG score for 2008 and 2020, respectively. The symbols ***, **, and *, respectively, show statistical significance at 1%, 5% and 10%. Source: Own elaboration. Data: Refinitiv.

H5: Companies with higher ESG ratings demonstrate significantly higher Sharpe ratios during market downturns

The regression results (Table 12) show that ESG has no significant impact on the Sharpe ratio in both crisis periods (2008 and 2020). The ESG coefficient is close to zero and is not statistically significant. This suggests that companies with high ESG scores do not necessarily have better risk-adjusted performance (Sharpe ratio) during the crisis. In contrast, Index share has a positive and significant effect: companies with a large weighting in the market index tend to have a higher Sharpe ratio. Size has a negative and significant effect in 2020, suggesting that large companies may be at a risk-adjusted performance disadvantage during the COVID crisis. Overall, ESG does not significantly improve risk-adjusted performance, although it may benefit returns or valuation in other hypotheses (such as ROA or Tobin's Q).

Table 12: Regression Model Result for Sharpe Ratio

Variables	(1)	(2)
ESG score	-0.00 (0.00)	0.00 (0.00)
Index shares	19.42*** (7.5)	15.79** (7.85)
Leverage	0.001 (0.003)	-0.02 (0.2)
Size	-0.06 (0.04)	-0.17** (0.07)
_Cons	0.28 (0.42)	0.63 (0.68)
Control	Yes	Yes
Ind control	Yes	Yes
N	283	283
R²	0.11	0.20
Adj.R²	0.06	0.16

Note: Models (1) and (2) represent the regression Sharpe Ratio and ESG score for 2008 and 2020, respectively. The symbols ***, **, and *, respectively, show statistical significance at 1%, 5% and 10%. Source: Own elaboration. Data: Refinitiv.

H6a: The Environmental component of ESG has a significant positive relationship with firm performance during crisis periods.

The regression results (Table 13) show that the environmental component of ESG has a positive and statistically significant relationship with the financial performance of enterprises during the crisis period, especially for the indicators of ROA, Stock Return, and Tobin's Q.

During the 2008 crisis, the E score had a positive and statistically significant impact on Tobin's Q ($p < 1\%$) and Stock Return ($p < 10\%$). This suggests that companies with higher environmental performance are valued higher by the market and are more positively reflected in their stock prices during the period of instability. In addition, E also has a positive (though insignificant) impact on ROA and ROE during the same period.

By 2020 (COVID-19 pandemic crisis), the positive impact of E continued to be confirmed: the coefficients in the ROA, Stock Return and Tobin's Q models were all statistically significant (from $p < 10\%$ to $p < 1\%$), indicating the increasingly clear role of environmental performance in improving operational efficiency and corporate value in the market. The E coefficient for ROE is positive, but it is not statistically significant. This means that ESG may have a bigger effect on operational efficiency and market expectations than on return on equity.

Overall, these data confirm hypothesis H6a, which says that environmental elements are very crucial for enhancing a company's financial performance, especially during a crisis. This might be because firms that are better for the environment are more proactive about managing risks, following rules, and developing in a way that is good for the environment. These are all things that help build investors and market trust.

Table 13: Regression Model Result of Environmental Score with Firm Performance.

Variables	2008				2020			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
E score	0.00 (0.00)	0.00 (0.00)	0.01*** (0.001)	0.00*** (0.00)	0.00* (0.00)	0.00 (0.00)	0.01** (0.01)	0.01*** (0.00)
Index shares	3.78*** (0.98)	11.02 (8.77)	51.22*** (10.41)	21.9*** (5.08)	3.59*** (0.5)	7.99*** (2.12)	168.25*** (25.67)	13*** (3.82)
Leverage	0.00 (0.00)	0.00** (0.00)	0.01 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.01*** (0.00)	0.01 (0.07)	-0.01 (0.01)
Size	-0.05*** (0.05)	-0.19*** (0.05)	-0.49*** (0.06)	-0.11*** (0.03)	-0.03*** (0.00)	-0.08*** (0.02)	-1.6*** (0.25)	-0.15*** (0.04)
_Cons	0.51*** (0.05)	1.99*** (0.51)	6.03*** (0.6)	0.59* (0.29)	0.42*** (0.04)	0.93*** (0.18)	16.34*** (2.28)	0.79** (0.34)
Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	283	283	283	283	283	283	283	283
R²	0.38	0.07	0.35	0.24	0.49	0.19	0.26	0.37
Adj.R²	0.35	0.03	0.32	0.20	0.46	0.15	0.22	0.34

Note: Models (1), (2), (3), and (4) represent the regression of ROA, ROE, Stock Return and Tobin's Q with Environmental Score for 2008 and 2020, respectively. The symbols ***, **, and *, respectively, show statistical significance at 1%, 5% and 10%. Source: Own elaboration. Data: Refinitiv.

H6b: The Social component of ESG has a significant positive relationship with firm performance during crisis periods.

According to the regression results (table 14) for hypothesis H6b, the social factor of ESG has a positive, statistically significant impact on the financial performance of enterprises during the crisis period, especially on the stock return and ROA of enterprises. Both stock returns and Tobin's Q in 2008 were statistically significant with the social score ($p < 1\%$). Although it was not statistically significant, it also had a positive coefficient on both ROA and ROE. This demonstrates that the market still values companies with positive social activities, such as gender equality, labor relations, and employee health. This is evidenced by their stock prices. In 2020, the S-score still had a positive impact. The models have a statistical impact on stock returns and ROA ($p < 10\%$), ($p = 10\%$), and Tobin's Q. This suggests that social factors are becoming more important for corporate success. However, the social score does not have a significant impact on ROE in either period; therefore, social factors cannot affect return on equity in the short term. Most of the data support hypothesis H6b. In addition, they show that in times of crisis, firms that care about social, human, and community issues tend to perform better and have higher market value. This may

demonstrate that firms with a clear social plan and a commitment to implementing it over the long term can benefit from stakeholder trust, internal stability, and better resilience.

Table 14: Regression Model Result of Social Score with Firm Performance.

Variables	2008				2020			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
S score	0.00 (0.00)	0.00 (0.00)	0.00*** (0.00)	0.00*** (0.00)	0.00* (0.00)	0.00 (0.00)	0.02* (0.01)	0.01 (0.00)
Index shares	3.81*** (0.98)	11.31 (8.75)	52.85*** (10.51)	22.37*** (5.09)	3.58*** (0.51)	8.1 *** (2.14)	165.72*** (25.81)	13.01*** (3.87)
Leverage	0.00 (0.00)	0.00** (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.01** (0.00)	0.04 (0.07)	-0.01 (0.01)
Size	-0.05*** (0.05)	-0.18*** (0.05)	-0.45*** (0.06)	-0.12*** (0.03)	-0.04*** (0.00)	-0.08*** (0.02)	-1.5*** (0.22)	-0.11*** (0.03)
_Cons	0.51*** (0.05)	1.94*** (0.51)	5.7* (0.59)	0.5* (0.29)	0.40*** (0.04)	0.87*** (0.18)	15.05*** (2.17)	0.55** (0.33)
Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	283	283	283	283	283	283	283	283
R²	0.38	0.07	0.33	0.23	0.49	0.19	0.26	0.36
Adj.R²	0.35	0.03	0.31	0.20	0.46	0.15	0.22	0.33

Note: Models (1), (2), (3) and (4) represent the regression of ROA, ROE, Stock Return and Tobin's Q with Social Score for 2008 and 2020, respectively. The symbols ***, **, and *, respectively, show statistical significance at 1%, 5% and 10%. Source: Own elaboration. Data: Refinitiv.

H6c: The Governance component of ESG has a significant positive relationship with firm performance during crisis periods.

The regression analysis (Table 15) for hypothesis H6c indicates insufficient evidence to substantiate the relationship between the Governance (G) score and the company's financial success during the crisis era. The G component was significant for ROA in 2008 ($\beta = 0.00$, $p < 5\%$), but not for ROE, Stock Return, or Tobin's Q. Enhancing a company's internal performance can be achieved through improved transparency, strengthened shareholder rights, and optimized board composition. Nonetheless, there appears to be no discernible impact on shareholder returns or market behavior during the global financial crisis.

The G score remains statistically significant for ROE in 2020 ($\beta = 0.00$, $p < 0.05$) but does not hold significance for the other measures. The G coefficient exhibits a negative value in the Stock Return and Tobin's Q models; however, this is inconsequential. This suggests that the market may exhibit reduced responsiveness or skepticism regarding the capacity of traditional

governance institutions to manage non-financial shocks, such as public health issues, during the pandemic. The results show that corporate governance may improve performance on a number of measures, including Return on Assets (ROA) and Return on Equity (ROE). On the other hand, the environmental aspect is neither dependable nor complete. This shows that the hypothesis H6c is only partly true. How well corporate governance works during a crisis depends on the details of the crisis and how the market reacts to changes in the company's structure.

Table 15: Regression Model Result of Governance Score with Firm Performance.

	2008				2020			
Variables	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
G score	0.00** (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00** (0.00)	-0.00 (0.01)	-0.00 (0.00)
Index shares	3.68*** (0.97)	10.85 (8.75)	53.52*** (10.57)	22.83*** (5.14)	3.63*** (0.51)	8.17 *** (2.11)	169.97*** (25.84)	13.27*** (3.85)
Leverage	0.00 (0.00)	0.00** (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.01*** (0.00)	0.01 (0.07)	-0.01 (0.01)
Size	-0.04*** (0.05)	-0.17*** (0.05)	-0.41*** (0.06)	-0.07*** (0.03)	-0.04*** (0.00)	-0.08*** (0.02)	-1.35*** (0.23)	-0.09*** (0.03)
_Cons	0.5*** (0.05)	1.88*** (0.47)	5.28*** (0.56)	0.29 (0.27)	0.40*** (0.04)	0.91*** (0.18)	14.86*** (2.2)	0.5 (0.33)
Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	283	283	283	283	283	283	283	283
R²	0.4	0.07	0.33	0.23	0.49	0.2	0.25	0.36
Adj.R²	0.37	0.03	0.3	0.19	0.46	0.16	0.22	0.33

Note: Models (1), (2), (3) and (4) represent the regression of ROA, ROE, Stock Return and Tobin's Q with Governance Score for 2008 and 2020, respectively. The symbols ***, **, and *, respectively, show statistical significance at 1%, 5% and 10%. Source: Own elaboration. Data: Refinitiv.

5.3. Summary of the Results

The following conclusions of the hypotheses are drawn:

H1 is supported. The regression results reveal that during both times of crisis, firms with better ESG ratings had a far greater Return on Assets (ROA). In 2008, there was a statistically significant correlation between the two at the 1% level, and in 2020, there was a link at the 10% level. This means that during the crisis, companies perform better when they do well on ESG.

H2 is rejected. There is no statistically significant link between ESG ratings and Return on Equity (ROE) in any period of the crisis. Therefore, ESG performance does not significantly impact shareholder wealth during economic downturns or pandemics.

H3 is partially supported. During the crisis in 2008, ESG ratings had a strong and favorable effect on stock performance. But by 2020, the link was no longer statistically significant. This means that ESG may have helped the market stay strong throughout prior crises, but it couldn't predict what would happen during the COVID-19 shock.

H4 is partially supported. In 2008, there was a statistically significant and positive link between ESG and Tobin's Q, but not in 2020. This means that ESG was linked to a greater market value during the financial crisis, but not during the pandemic. This might be because investors lost interest or were given too much information.

H5 is rejected. ESG performance doesn't have a hug effect on Sharpe ratios during either crisis. In other words, when the market goes down, ESG doesn't help companies make more profit that takes risk into account.

H6a is supported. The Environmental part of ESG shows that there is a significant and consistent link between how well a company does and how much damage it does to the environment. During both crises, it makes ROA, stock returns, and Tobin's Q increased.

H6b is partially supported. The Social part found the significant relationship to ROA, stock returns, and Tobin's Q. This means that social events could make the market and the firm stronger overall, but they might not make shareholders more profit immediately away.

H6c is rejected. The Governance part only has a little influence on ROA in 2008 and ROE in 2020, and there is not a clear or constant link between it and any performance measurements. This means that just having good governance doesn't have a big impact on how well a corporation fares in a crisis.

6. Discussion

The study provides extensive insights into the impact of ESG performance on a company's finances during significant crises, including the Global Financial Crisis of 2008 and the COVID-19 pandemic of 2020. The concept of ESG is currently highly pertinent for investors. A multitude of market participants utilize ESG ratings to assess their assets. Prior studies have demonstrated that ESG ratings can influence capital market performance. One facet is grounded in the fundamental implications. Companies that meticulously assess environmental, social, and governance risks generally possess a superior comprehension of their processes, dependence on external factors, and hazards affecting their business model. The study breaks ESG down into its three main parts: Environmental (E), Social (S), and Governance (G) by using both accounting-based and market-based performance measures. We put the results in the context of what we already know from theory and practice.

6.1. ESG Scores and Accounting-Based Performance

Substantial evidence indicates that during crises (H1), organizations with superior ESG ratings perform better on accounting-based metrics such as Return on Assets (ROA). Stakeholder theory (Freeman, 1984) and signaling theory (Spence, 1978) assert that organizations excelling in ESG practices bridge information gaps and cultivate trust with stakeholders, hence enhancing the robustness and efficiency of their operations. The robust positive correlation between ESG and ROA in both 2008 and 2020 supports the notion that ESG aspects enhance business performance, particularly during economic instability. This conclusion corroborates the findings of Orlitzky et al. (2003), Friede et al. (2015), and Ahmad et al. (2021): ESG is more effective in elucidating accounting-based indicators than market-based indicators.

Conversely, there was no statistically significant relationship between ESG and Return on Equity (ROE) during either crisis (H2). This indicated that ESG measures might not directly enhance shareholders' profitability during the economic downturn. Recent studies by Buallay (2019) and Alareeni & Hamdan (2020) who argue that ROE is more susceptible to capital structure and less reflective of stakeholder-oriented strategies such as ESG. This difference made the point that ESG may not have a significant effect on equity returns because of the complex relationship between leverage and equity capital.

6.2. ESG Scores and Market-Based Performance

The relationship between ESG scores and stock returns (H3) as well as Tobin's Q (H4) reveals complex outcomes concerning market-based performance. During the 2008 crisis, a significant relationship between ESG and market performance was identified; however, this was confirmed in 2020. This suggests that the market prioritized ESG performance in 2008, likely as a response to heightened demand for trust and stability after the financial crisis. The diminished influence of this effect in 2020 can be attributed to the maturation of ESG integration in corporate strategies, rendering it a less distinguishing factor, or to the specific circumstances of the COVID-19 crisis, which emphasized public health and logistical continuity over long-term sustainability. The previous studies Galema & Gerritsen (2025) and Hartzmark & Sussman (2019), indicating that the significance of ESG in stock valuation depends on the contextual factors involved.

In 2008, ESG was found to have a significant positive correlation with Tobin's Q; however, this was not the case in 2020. The market's recognition of ESG as a measure of corporate value appeared to be more significant during the financial crisis compared to the pandemic. The positive and significant correlation between ESG Scores and Tobin's Q indicates that stakeholders, including investors, value ESG performance. Consequently, the findings provide greater support for the stakeholder theory perspective of ESG, as previously discussed in this paper. Previous research examining the relationship between ESG performance and firm performance indicates a stronger alignment with the stakeholder perspective. The findings suggest that while ESG can yield valuation premiums in traditional financial recessions, its effectiveness may diminish during crises stemming from external, non-financial factors. This highlights the temporal and contextual sensitivity of ESG's market importance.

The null results regarding ESG and the Sharpe Ratio (H5) show considerable significance. Despite theoretical claims that ESG enhances risk management (Lins et al., 2017; Ferriani & Natoli, 2020), ESG ratings showed no significant correlation with Sharpe ratios in either crisis. This finding indicates that firm-level ESG performance does not reliably result in improved risk-adjusted returns, potentially due to investor herding or external volatility factors that overshadow firm-level fundamentals in times of crisis. The disparity between portfolio-level ESG performance and firm-level analysis highlights the need for more comprehensive and segmented ESG assessments.

6.3. Disaggregating ESG: The Role of E, S, and G Components

Disaggregating ESG into its Environmental, Social, and Governance components yields deeper insights. The Environmental pillar (H6a) demonstrated consistent and statistically significant correlations with firm success during both crises, as evidenced by various metrics such as ROA, stock return, and Tobin's Q. This finding aligns with the studies conducted by Ghoul et al. (2011), Chuang & Huang (2016), and Liu et al. (2024), which highlight the strategic and reputational benefits associated with proactive environmental management. Environmental activities often become particularly significant during crises, reflecting risk aversion, resource efficiency, and strategic foresight.

The Social component (H6b) exhibited a positive correlation with various performance metrics; however, its effect on ROE was statistically insignificant. This partial support corresponds with the findings of Waddock & Graves (1997) and Nielsen & Noergaard (2011), who highlight that socially responsible companies experience improved stakeholder engagement and operational legitimacy; however, this does not invariably result in immediate equity benefits. During crises, firms that implement robust social practices are likely to preserve their reputational capital and community trust, leading to enhanced market and operational resilience.

The Governance component (H6c) demonstrated minimal and inconsistent correlations with company performance. While governance scores showed a positive correlation with ROA in 2008 and with ROE in 2020, the findings were not robust across other metrics. This mixed outcome challenges the idea that governance invariably strengthens resilience, as demonstrated by Velte (2017) and Wang et al. (2023). Conventional governance approaches may prove inadequate in managing non-financial crises, such as pandemics, thereby reducing their signaling effectiveness.

7. Limitation

Although this study provides valuable insights into the connection between company resilience and ESG performance during economic downturns, a critical and fair evaluation of the research must take into account a number of limitations.

There are only 283 businesses in the sample from the STOXX Europe 600 index since the Refinitiv database only has full ESG scores for the years before the 2008 global financial crisis and the COVID-19 pandemic in 2020. There are a lot of stocks from the European equity market on this index, but only a little over half of the companies on it were in the final sample because they did not have enough or any ESG data. Companies that have given ESG ratings may be different from those that have not in terms of size, the amount of information they share, or the industries they work in, for example. Because the sample size is smaller, there is a greater chance of selection bias. That implies the results could not be true for all European businesses, especially small and mid-cap businesses, or businesses in countries where reporting rules are less strict.

The second point is that the analysis only analyzed ESG ratings from Refinitiv, which used to be named Thomson Reuters ASSET4. Most people know that ESG scores are quite diverse from one supplier to the next since they collect data, weigh criteria, and interpret factors in different ways. Refinitiv is one of the most well-known and trustworthy providers of ESG data for study in schools and businesses. Berg et al. (2022) say that the connection between ESG ratings from different agencies could be as low as 0.4. This makes us wonder how accurate the structures are and how accurate the conclusions are that are based on only one source. If the study just uses data from Refinitiv, its external validity might be low because it only shows one method which ESG can work. Using more than one ESG rating agency in future studies may give a more complete and more complicated picture, decrease biases that are specific to providers, and make it easier to compare results.

Third, it's hard to keep track of how businesses apply ESG in real time because ESG scores change over time. The study uses a one-year lead-lag model utilizing ESG data from 2007 and 2019 to make predictions about how well performance will go during the crises of 2008 and 2020, respectively. This is because ESG disclosures don't always come out right away. This design choice stops bias from events that happen at the same time and is in line with what has been done in the literature. But it assumes that the ESG ratings a company got before the crisis are a good indicator of how well it dealt with ESG concerns during the crisis. ESG-related disclosures and practices are always changing, and they could change quickly if something unexpected happens. This method might not be able to indicate how time-sensitive ESG-driven resilience is because it doesn't include recovery plans or ESG changes that happen during a crisis.

How the econometric approach is used also plays an important role. The study looks at the relationship between ESG ratings and other measures of a company's performance, like ROA, ROE, Tobin's Q, Sharpe ratio, and stock return, while the market is under high volatility. It does this by employing a cross-sectional regression method. This method naturally limits the study's temporal granularity and doesn't enable you to establish causal inferences, but it does let you test ideas in different crises. Without panel data or dynamic modeling methods like instrumental variable regressions or difference-in-differences, we can't predict the direction of the market. In other words, it's not clear if companies that keep better financial records, have better governance structures, or better risk management systems are also more likely to invest in ESG projects, or if companies with higher ESG scores do better during a crisis.

The study could possibly be biased because it didn't look at all the important elements. The models do have some control variables to account for things like the size, leverage, and industry classification of a company. However, they don't fully consider (Lins et al., 2017; Ferriani & Natoli, 2020) macroeconomic conditions, policy responses, or country-specific institutional factors that could affect both ESG behavior and firm performance.

Finally, we can learn a lot about how ESG performance changes over time by examining only two crisis periods: the COVID-19 pandemic and the financial crisis of 2008. However, these two periods give us contradicting information. Both crises are important and one-of-a-kind, but they don't show all the different kinds of shocks that can happen to businesses. We can't say for sure if ESG performance is good for all kinds of crises or simply some of them, because these crises started in different ways. One was a disaster for health around the world, while the other was a financial crisis. A more in-depth longitudinal design with different stress scenarios could assist future studies in better understanding how ESG affects consistency and resilience over time.

8. External Validity and Future Research

While the results of this study give us useful real-world information about how ESG might help companies stay strong during economic downturns, they are not very useful outside of this study. The study only looks at companies that are part of the STOXX Europe 600 index. This index is broad, but it mostly comprises large and mid-cap companies from developed European economies. Because of this, the results may not apply to all emerging markets, small-cap companies, or companies that work in diverse regulatory, cultural, and financial settings. Across regions, differences in ESG disclosure rules, what investors want, and how the capital market is growing may have a big effect on the link between ESG and financial resilience. Furthermore, the crisis events analyzed, namely the 2008 Global Financial Crisis and the 2020 COVID-19 pandemic, are both unique in scope and impact. Including them is useful for stress-testing, but their particular traits may make it hard to apply the results to other sorts of economic shocks, such as geopolitical tensions, climate-related disasters, or problems with the supply chain. Because of this, you should be careful about using these results to make predictions about other markets and crises. There are a number of ways that future studies could improve the external validity of ESG's effects and deepen our theoretical knowledge of them.

First, future research might take a comparative international perspective and look at whether the association between ESG and resilience holds in different regions, such as North America, Asia-Pacific, or Latin America. Adding companies from both established and emerging markets would make it possible to look at institutional and regulatory variables that might make ESG less effective. Second, researchers may use longitudinal panel data models to look at how ESG ratings change before, during, and after times of crisis. This way, they may see both short- and long-term effects. Dynamic methods like difference-in-differences (DiD), fixed-effects models, or instrumental variable approaches could also help make causal inference stronger. Third, future research could combine ratings from more than one ESG rating provider to deal with the problem of ratings and make sure that the results are strong, no matter what technique is used. Also, looking at the effects on individual sectors may give us more detailed information, since ESG materiality probably changes from one industry to another, like energy, banking, or consumer products. Finally, there is space to study the role of ESG sub-pillars (environmental, social, and governance) in conjunction with firm-specific strategic responses, to better understand how focused ESG actions, rather than aggregate scores, contribute to resilience under various market situations. Researchers can help us better understand how to run a sustainable firm in a world economy that is becoming increasingly uncertain by broadening the scope and methodological rigor of ESG research.

9. Conclusion

The purpose of the thesis was to find out whether good environmental, social, and governance (ESG) performance helps publicly traded companies stay financially stable when the economy is facing high volatility. The thesis studies companies in the STOXX Europe 600 index and uses data in the 2008 Global Financial Crisis and the COVID-19 pandemic of 2020 to back up the idea that companies with strong ESG policies do better financially when the market is down. When the economy as a whole is affected by shocks, companies with higher ESG ratings tend to do better on a number of financial metrics, such as return on assets (ROA), return on equity (ROE), Tobin's Q, and the Sharpe ratio. When there is a crisis, the social and environmental parts of ESG tend to have the biggest and most consistent effect on how well a firm does. This shows that they are becoming more significant for more than just moral or ethical grounds; they are also becoming more important for business and financial reasons.

The results back up the idea that ESG is like “crisis insurance” because it minimizes the chance of financial losses and makes investors secure and trust in sustainability. This is proven with signaling theory, which states that when corporations make a big ESG commitment, it helps them build stronger relationships with investors, customers, and regulators by ensuring compliance. Companies that consider sustainability before they start their business may also be more flexible, better at using their resources, and more aware of problems in society. All of these factors can be useful, especially during a crisis. This argument adds to the growing amount of evidence that ESG is not merely a way to look better in public or a place to spend money. It considers ESG as a strategic asset that helps firms stay stable in the short term and become more valuable over time.

This study shows that ESG is more than simply a moral or ethical attitude; it actually helps companies and makes them recover better when the economy is in a downturn. Investors, regulators, and firm leaders should all include ESG in their strategy planning and performance reviews. The world is always changing, and the environment, society, and politics are all quite intricate. That's why it's so important to build companies that are strong and ready for what comes next.

10. References

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Appendix

Table 16: Variable definitions and data sources

Variable Name	Definition	Unit / Type	Source
Identifier	Stock ticker with exchange suffix	String	Refinitiv Eikon
Company Name	Name of the publicly traded company	String	Refinitiv Eikon
Country	Country of company's headquarters	Categorical	Refinitiv Eikon
ESG Score 2008	Overall of lag ESG in 2007	Score (0-100)	Refinitiv ESG Database
Social Pillar Score 2008	Score for Social component of lag ESG in 2007	Score (0-100)	Refinitiv ESG Database
Environmental Pillar Score 2008	Score for Environmental component of lag ESG in 2007	Score (0-100)	Refinitiv ESG Database
Governance Pillar Score 2008	Score for Governance component of lag ESG in 2007	Score (0-100)	Refinitiv ESG Database
Return On Assets - Actual 2008	EBIT/ Total assets	Ratio	Refinitiv Datastream
Return On Equity - Actual 2008	Net income / Shareholder's equity	Ratio	Refinitiv Datastream
Return on stock 2008	Annual stock return for 2008	Decimal (%)	Refinitiv Datastream
Tobin's Q 2008	Market value of firm / Replacement cost of assets	Ratio	Refinitiv Datastream
Sharpe Ratio 2008	Risk-adjusted return (portfolio return minus risk-free rate divided by standard deviation)	Ratio	Author's calculation
ESG Score 2020	Overall of lag ESG in 2019	Score (0-100)	Refinitiv ESG Database
Social Pillar Score 2020	Score for Social component of lag ESG in 2019	Score (0-100)	Refinitiv ESG Database
Environmental Pillar Score 2020	Score for Environmental component of lag ESG in 2019	Score (0-100)	Refinitiv ESG Database
Governance Pillar Score 2020	Score for Governance component of lag ESG in 2019	Score (0-100)	Refinitiv ESG Database

Return On Assets - Actual 2020	EBIT / Total assets	Ratio	Refinitiv Datastream
Return On Equity - Actual 2020	Net income / Shareholder's equity	Ratio	Refinitiv Datastream
Return on stock 2020	Annual stock return for 2020	Decimal (%)	Refinitiv Datastream
Tobin's Q 2020	Market value of firm / Replacement cost of assets	Ratio	Refinitiv Datastream
Sharpe Ratio 2020	Risk-adjusted return for 2020	Ratio	Author's calculation
Basic Materials	Dummy variable: 1 if company belongs to Basic Materials sector, 0 otherwise	Binary	Refinitiv Eikon Industry Classification
Financials	Dummy variable: 1 if company belongs to Financials sector, 0 otherwise	Binary	Refinitiv Eikon Industry Classification
Industrials	Dummy variable: 1 if company belongs to Industrials sector, 0 otherwise	Binary	Refinitiv Eikon Industry Classification
Real Estate	Dummy variable: 1 if company belongs to Real Estate sector, 0 otherwise	Binary	Refinitiv Eikon Industry Classification
Consumer Non-Cyclicals	Dummy variable: 1 if company belongs to Consumer Non-Cyclicals sector, 0 otherwise	Binary	Refinitiv Eikon Industry Classification
Healthcare	Dummy variable: 1 if company belongs to Healthcare sector, 0 otherwise	Binary	Refinitiv Eikon Industry Classification
Technology	Dummy variable: 1 if company belongs to Technology sector, 0 otherwise	Binary	Refinitiv Eikon Industry Classification
Consumer Cyclicals	Dummy variable: 1 if company belongs to Consumer Cyclicals sector, 0 otherwise	Binary	Refinitiv Eikon Industry Classification

Table 17: Distribution of the companies included in the sample per country and activity sector.

Country	Basic Materials	Consumer Cyclicals	Consumer Non- Cyclicals	Energy	Financials	Healthcare	Industrials	Real Estate	Technology	Utilities
Austria	1	0	0	1	2	0	1	0	1	1
Belgium	1	0	2	0	1	1	1	1	1	0
Denmark	2	0	1	0	5	3	2	0	1	0
Finland	1	2	1	0	1	1	4	0	1	0
France	1	10	5	1	5	1	8	3	5	2
Germany	6	6	1	0	4	2	6	0	4	1
Greece	0	0	0	0	0	0	0	0	1	0
Ireland	0	0	1	0	0	0	1	0	0	0
Italy	0	1	0	2	4	0	1	0	1	1
Netherlands	2	0	1	3	1	1	2	1	2	0
Norway	2	1	2	3	2	0	0	0	1	0
Portugal	0	0	1	0	1	0	0	0	0	0
Spain	0	1	0	1	5	1	2	0	1	3
Sweden	3	2	0	0	4	1	7	1	5	0
Switzerland	4	3	1	0	3	4	8	0	1	0
United Kingdom	6	12	8	4	13	3	11	4	5	6