UNIVERSITY OF TURKU

ABSTRACT

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Abstract

There has recently been a growing interest in sustainability in the business landscape. The awareness of sustainability is also increasingly reflected in legislation, meaning that all responsible actions are no longer voluntary for companies. To sustain their competitive advantage, firms must adapt to the new legal requirements, and they are encouraged to pay more attention to their environmental, social, and governance (ESG) practices.

A growing body of research has investigated the impact of ESG on corporate financial performance (CFP). Although most studies find a nonnegative ESG-CFP relationship, the results have not been consistent. In addition, the prior ESG-CFP research has mainly focused on the US market and often neglected to investigate the potential interaction effects of industry and economic specific characteristics on the ESG-CFP relationship.

This paper aims to contribute to the extant literature by examining the ESG-CFP relationship in the European market, paying special attention to the effect of environmentally sensitive industries and market crises. A panel regression analysis with an unbalanced panel data set is applied to analyze the data from over 900 European firms from 20 countries during 2002–2019. ESG data is obtained from the Asset4 database, and CFP is proxied by return on assets (ROA) and Tobin's Q to measure the impact of ESG on both account and market-based performance.

The results provide evidence of a positive valuation effect of ESG in the European market. The positive ESG-CFP relationship is particularly observed for non-sensitive firms when CFP is measured with Tobin's Q, whereas some findings imply a negative relationship for firms operating in environmentally sensitive industries when ROA is used as a proxy. Furthermore, the results indicate that high-ESG especially pays off when the overall level of trust in corporations and markets suffers a negative shock. Consistent with the stakeholder and legitimacy theory, the findings support that ESG activities enhance stakeholder communication and trust, rewarded with a higher firm value. Also, the findings provide a silver lining for the firms: although firms must increasingly put effort into ESG practices to comply with the legal requirements, improvements in ESG do not negatively affect their market value. Moreover, the results imply that companies investing in ESG practices can better prepare for future market crises.

Key words	ESG, Corporate Social Responsibility, Corporate Financial Performance

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Tiivistelmä

Kiinnostus vastuullisuudesta ja kestävästä kehityksestä on kasvanut yritysmaailmassa viime vuosina. Tietoisuus vastuullisuuden merkityksestä heijastuu myös yhä enemmän lainsäädäntöön. Yritysvastuuseen liittyvät käytänteet ja raportointivaateet eivät ole enää kaikilta osin vapaaehtoisia yrityksille, joten kilpailuedun säilyttämiseksi yritysten on sopeuduttava uusiin lakisääteisiin vaatimuksiin. Tämä kannustaa yrityksiä kiinnittämään toiminnassaan yhä enemmän huomiota ympäristöasioihin, sosiaaliseen vastuuseen ja hyvään hallinnointitapaan (ESG).

ESG:n vaikutusta yritysten taloudelliseen suoriutumiseen on tutkittu laajalti. Vaikka suuri osa tutkimuksista löytää ei-negatiivisen yhteyden, tulokset eivät ole olleet yhteneväisiä. Lisäksi aikaisemmissa tutkimuksissa on pääasiassa keskitytty Yhdysvaltain markkinoihin ja jätetty usein huomioimatta toimialan ja markkinaolosuhteiden mahdolliset interaktiovaikutukset.

Tämä tutkimus pyrkii lisäämään ymmärrystä ESG:n vaikutuksista yrityksen taloudelliseen suoriutumiseen tutkimalla ESG:n vaikutusta Euroopan markkinoilla ja kiinnittämällä erityistä huomiota ympäristösensitiivisiin toimialoihin sekä markkinakriisien vaikutuksiin. Tutkimusmetodina käytetään paneeliregressiota, ja tutkimusaineisto kattaa yli 900 eurooppalaista yritystä 20:stä eri maasta vuosina 2002–2019. Tutkimuksessa käytetään Asset4-tietokannan ESG-dataa. Jotta ESG:n vaikutusta voidaan tutkia sekä tilinpäätös- että markkinaperusteiseen tulokseen, yrityksen taloudellista suoriutumista mitataan sekä koko pääoman tuottoasteella (ROA) että Tobinin Q:lla.

Tulokset viittaavat siihen, että ESG vaikuttaa pääasiassa positiivisesti yrityksen suoriutumiseen Euroopan markkinoilla. Positiivinen vaikutus havaitaan erityisesti ei-sensitiivisillä toimialoilla mitatessa yrityksen suoriutumista Tobinin Q:lla. Negatiivinen vaikutus havaitaan puolestaan ympäristösensitiivisillä aloilla, kun yrityksen suoriutumista mitataan ROA:lla. Lisäksi tulokset osoittavat, että ESG-panostukset kannattavat erityisesti markkinoiden kohdatessa negatiivisen shokin. Sidosryhmä- ja legitimiteettiteorian mukaisesti tulokset tukevat näkemystä, että ESG parantaa yrityksen sidosryhmäviestintää ja -luottamusta, mikä vaikuttaa positiivisesti yrityksen arvoon. Kaiken kaikkiaan tulokset osoittavat, että kiristyvän lainsäädännön takia yritysten kasvavat ESG-panostukset eivät vaikuta negatiivisesti yritysten markkina-arvoon, ja panostamalla ESG-käytäntöihin yritykset voivat varautua tuleviin markkinakriiseihin.

Avainsanat	ESG, yritysvastuu, yrityksen taloudellinen suoriutuminen

UNIVERSITY OF TURKU
Turku School of Economics

IMPACT OF ESG ON FINANCIAL PERFORMANCE

Empirical evidence from the European market 2002–2019

Master's Thesis
in Accounting and Finance

Author:
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1 INTRODUCTION

1.1 Background and motivation

There has recently been a growing interest in sustainability in the business landscape. The resource scarcity, environmental degradation, and the requirements to manage the new responsibility challenges of a changing world are examples of companies' great need to achieve sustainable competitive advantage. History is littered with corporate scandals, such as Enron in 2001 and Volkswagen cheating on emissions reporting in 2015, which have underlined that the investors' trust and a firm's ability to establish a positive relationship with society play a vital role in a firm's survival. Companies are motivated to redesign their eco-friendly practices and encouraged to pay more attention to responsibility in terms of employees and corporate governance. The financial sector is no exception: sustainable investing is growing in significance amongst both retail and institutional investors. It is estimated that sustainable investing assets already stand at $30.7 trillion, and the proportion of sustainable investing is further increasing. For example, sustainable investing assets already make up the majority of total assets under professional management in Canada and Australia/New Zealand, and the proportion is close to 50% in Europe as well. (GSIA 2018; Parida & Wincent 2019; Petitjean 2019; Minutolo et al. 2019; MSCI 2020a.)

Sustainable investing is defined as an investment approach that integrates environmental, social, and governance (ESG) related factors in the investment decision-making process (see, e.g., GSIA 2018; MSCI 2020a). ESG investing is yet well-established neither among practitioners nor academic researchers, and it is often used synonymously with terms such as socially responsible investing (SRI), screening, or mission-related investing (MSCI 2020a). The most common synonym for ESG seems to be corporate social responsibility (CSR) that can broadly be defined as a firm's practices toward the public good (see, e.g., Yoon et al. 2018). While acknowledging the different terms and following the prior research (see, e.g., Garcia et al. 2017), CSR and ESG are somewhat interchangeably used in this study.

ESG rating (or ESG score) is an assessment of a firm's quality, standard, or performance on environmental, social, and governance issues, and it aims to measure a firm's financially relevant ESG risks (SustainAbility 2019; MSCI 2020b). ESG ratings can measure a firm's overall ESG performance or one of the three dimensions of ESG, and

they are continually increasing in importance to the investors as they allow investors to integrate ESG factors into their investment decisions. Today, several third parties evaluate companies based on their ESG performance, and these rating agencies, such as MSCI, Refinitiv, and Bloomberg, have become influential institutions. (Huber & Comstock 2017; GSIA 2018; SustainAbility 2019; García et al. 2019.)

Today, awareness of sustainability is also reflected in legislation. All responsible actions are no longer voluntary for companies, and to sustain their competitive advantage, firms must adapt to the new legal requirements. Over the last years, public authorities, such as the EU, have introduced mandatory actions to promote CSR. For example, based on the non-financial reporting directive (NFRD), the EU requires large companies to report on their practices in operating and managing social and environmental challenges. Since 2018, large companies have been required to report non-financial information in their annual reports, which helps stakeholders evaluate the firm's non-financial practices and encourages firms to conduct their business more responsibly. (European Commission.)

A recent example of how the EU is committed to supporting sustainable finance is the EU Taxonomy that entered into force in 2020. The EU Taxonomy is a classification tool for companies, investors, and financial institutions to identify environmentally friendly activities. It helps companies and issuers to access green financing by setting the thresholds that must be met to be considered sustainable, and it is reputed to be one of the most significant developments in sustainable finance. Against this background, sustainable development will arguably have far-reaching implications for the investors and companies and further for the whole financial industry, especially in the EU. (European Commission; TEG final report on the EU taxonomy 2020.)

As ESG is entering the mainstream, it is bound to raise a question about the effect of ESG on a firm's financial performance. It is thus no wonder that there is a growing body of research investigating the impact of ESG on corporate financial performance (CFP) and that the relationship between ESG and CFP has been a common research topic over the last decade (see, e.g., Halbritter & Dorfleitner 2015; Aouadi & Marsat 2018; Minutolo et al. 2019). However, despite a huge body of literature, the previous ESG research results have not been consistent. For example, Friede et al. (2015) argue that although roughly 90% of the studies that examine the relationship between certain ESG criteria and CFP find a nonnegative ESG-CFP relation, many researchers still claim that the results remain inconclusive.

Many researchers find that European companies are leaders in ESG compared to companies in other geographical areas (see, e.g., Ho et al. 2012). Moreover, in terms of where sustainable investing assets are domiciled globally, Europe manages the highest proportion (GSIA 2018). However, previous academic research has mainly focused on the impact of ESG on the US market (see, e.g., Kempf & Osthoff 2007), and the European market has been less focused (see, e.g., Sassen et al. 2016). As the European companies are leaders in ESG, and the legislation is forcing companies towards responsible behavior particularly in Europe, it is justified to investigate the ESG-CFP relation on the European market.

When applying ESG, it should be noted that ESG risks significantly vary across industries: a financial company and a mining company, for instance, may face utterly different ESG risks (MSCI 2020a). In the academic literature, there is some prior evidence that the value-creating effect of ESG depends on the industry. The effect is different particularly for firms in environmentally sensitive industries (such as oil, gas, paper, mining, and chemical) that are often seen as polluting sectors and perceived as having high environmental risk (see, e.g., Yoon et al. 2018). However, most of the prior studies do not investigate the impact of industries (see, e.g., Sassen et al. 2016). Addressing the scarcity of research, this study takes additional steps towards an improved understanding of whether the ESG-CFP relation differs between sensitive and non-sensitive industries.

In addition to specific industry characteristics, some previous studies show evidence that the ESG-CFP relation is affected by economic specific characteristics. For example, Lins et al. (2017) argue that when the overall level of trust in corporations and markets suffers a negative shock, such as during the financial crisis of 2008–2009, a firm with high ESG performance could perform better than a firm with low ESG performance. However, to the best of the author's knowledge, only a small amount of literature has examined the effect of the market crises on the ESG-CFP relation (see, e.g., Lins et al. 2017), and even less empirical research has been done on the impact of environmental performance on CFP during crisis times (see, e.g., Petitjean 2019). Moreover, the previous studies have mainly focused on the effect of the financial crisis 2008–2009 on the US market, and the effects of other crises, such as the Eurozone crisis, have been largely unexamined. Through this evidence, this study aims to fulfill this research gap by examining whether the ESG-CFP relation, and particularly the linkage between the environmental performance and CFP, is specific to periods of low trust also in the European market.

1.2 Purpose and structure

The main objective of this study is to investigate whether there is a relationship between a firm's ESG and corporate financial performance (CFP) in the European market. Europe is chosen as the locus of this research for a few reasons. First, there is ever-increasing importance of sustainable investing, particularly in Europe. Second, the EU increasingly puts pressure on European firms to take ESG actions. Moreover, ESG research in the European market is somewhat limited.

In addition to employing the overall ESG performance, three ESG factors – environmental, social, and governance – are used as criteria to measure the ESG performance. In line with prior research, corporate financial performance is measured by return on assets (ROA) and Tobin's Q, as the use of these variables allows examining the impact of ESG on both account-based and market-based performance (Velte 2017; Aouadi & Marsat 2018; Atan et al. 2018). The final sample thus includes two types of annual data: ESG data is obtained from Asset4, one of the most comprehensive ESG databases provided by Refinitiv (see, e.g., Halbritter & Dorfleitner 2015, 26; Refinitiv 2019), and all financial data is obtained from the Refinitiv Eikon Datastream.

To answer the research question, panel regression analysis with an unbalanced panel data set is applied to analyze the data from over 900 European firms from 20 countries during 2002–2019. The panel study is used as it is a widely accepted method to investigate the ESG-CFP relation in previous empirical studies (see, e.g., Atan et al. 2018; Aouadi & Marsat 2018; Minutolo et al. 2019). A relatively long period (2002–2019) is chosen as ESG investing is evidenced to be first and foremost a long-term approach (see, e.g., Cajias et al. 2014; Atan et al. 2018). After ensuring the most appropriate estimator for the data, the fixed effect regression, with the set of control variables and clustered standard errors at the firm level, is performed.

To gain more insight into the ESG-CFP relation, the possible effects of industry-specific characteristics are also examined. Yoon et al. (2018) and Miralles-Quirós et al. (2018), who examine the ESG-CFP relation in the emerging markets during 2010–2015, find that the value-creating effect of ESG is lesser for firms operating in environmentally sensitive than in non-sensitive industries. Extending their study, this research tests whether this difference between sensitive and non-sensitive firms also holds in the European market. By following their example, the difference is examined by augmenting the regression model to include an interaction variable that captures the potential valuation

effect of ESG in environmentally sensitive industries. Corresponding to previous literature, a firm is identified as being sensitive if it operates in one of the following sectors: energy, including oil and gas, steel making, chemicals, mining, paper, and pulp (see, e.g., Richardson & Welker 2001; Yoon et al. 2018; Miralles-Quirós et al. 2018; Amor-Esteban et al. 2018).

Furthermore, this study aims to investigate whether the ESG-CFP relationship is specific to periods of low trust. Following Petitjean (2019), the occurrence of the financial crisis 2008–2009 is considered a period of low confidence in the market. Moreover, as this paper covers the European firms from 2002 to 2019, this research extends his work by also considering the Eurozone crisis 2011–2012. Regarding the limited number of previous studies investigating the impact of periods of low trust on the ESG-CFP relation, fruitful results are expected to be found. Corresponding to Petitjean (2019), the effect of periods of low trust is investigated by introducing an interaction term that represents an additional valuation effect of ESG in crisis times.

The structure of this study is organized as follows. First, Section 2 introduces the fundamentals of ESG by highlighting the milestones of the evolution of sustainable investing and corporate responsibility, clarifying the ESG-related terminology, and briefly introducing the ESG rating process and different rating providers. Next, Section 3 focuses on the theoretical view of ESG and corporate financial performance by presenting theories explaining the ESG-CFP relationship, discussing previous empirical research, and including the research hypotheses development. Section 4 provides details about the data and panel regression models used in this study. With the regression estimations and results, the empirical part is introduced in Section 5. Finally, this paper concludes in Section 6 with a summary of the main findings, a discussion of the implications, and a description of the directions for future research.

2 FUNDAMENTALS OF ESG

2.1 Evolution of sustainable investing and corporate responsibility

There has been a significant development in sustainable investing and corporate responsibility during the last several decades. Consequently, the terms and acronyms referring to these activities have been used interchangeably, and, even today, they are yet well-established neither among market participants nor academic researchers. To simplify the topic, the evolution of sustainable investing (SI) and its related fields, such as corporate social responsibility (CSR) and environmental, social, and governance practices (ESG), are next discussed. (Deutsche Bank 2012.)

The evolution of sustainable investing has been neither linear nor consistent. According to a study by Deutsche Bank (2012), four broad and partly overlapping categories that describe this development can be identified. *Ethical Investing* covers the era from the 1500s onwards up until the mid-1990s. For this period, negative screening, which means avoiding investments in companies or industries that do not align with investor's values, was the most popular form of Socially Responsible Investing (SRI). The rationale of this investment approach was mainly religious. For example, in line with the policy of the Church, it was common to oppose alcohol, tobacco, and gambling. Moreover, investors could exclude shares or entire industries if there was some South African apartheid system involvement. (Deutsche Bank 2012; Wallis & Klein 2015; MSCI 2020a.)

The Early Socially Responsible Investing period occurred from the 1960s up until to mid-1990s. At that time, SRI quickly became the umbrella term for ethically-oriented investing, and it was understood as a value-based or exclusionary investment approach. Since the late 1990s, responsible investment began to shift from an ethics approach towards investment strategies that aim to integrate environmental, social, and governance factors into investment decisions. New SRI techniques, such as negative and positive screening, and the best-in-class approach, appeared during this *Current Socially Responsible Investing* period. After that, in the early 2000s, there was a need for a more risk and return driven focus on sustainable investing. At this time, *Responsible Investing,* a new risk and return driven form of SRI, emerged. A significant milestone occurred in 2003, when the UNEP Finance Initiative produced a report, a key finding being that environmental, social, and governance factors affect the long-term shareholder value and are relevant for financial valuation. (Deutsche Bank 2012.)

The development of corporate social responsibility (CSR) has followed alongside the evolutionary phases of SRI. Since the turn of the century, CSR criteria have been expanded to encompass environmental, social, governance, and economic responsibility. Thus, CSR has recently evolved into ESG, and this development has been affected by the demands of society, government, investors, and NGOs. These parties tend to push corporate attention towards responsibility via shareholder engagement and active ownership. On the other hand, at the same time as CSR has evolved, companies themselves have also actively identified risks and opportunities of effectively managing and reporting environmental, social, and governance practices. From this perspective, CSR development evolving into ESG can also be a pull phenomenon. Figure 1 illustrates the confluence of these factors. (Deutsche Bank 2012.)

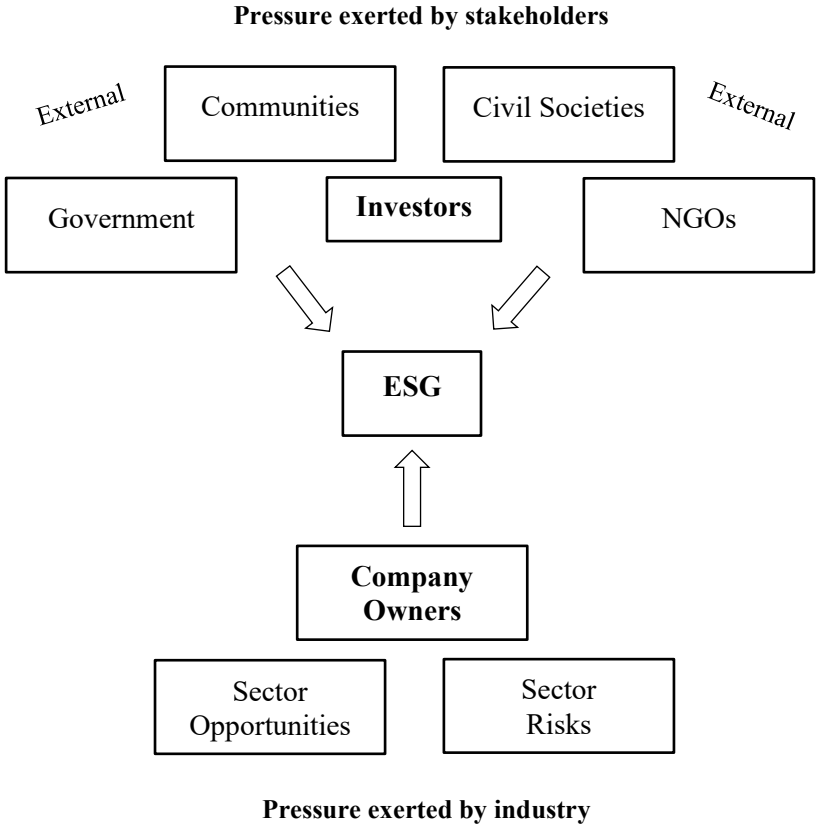

Figure 1. CSR – a Pull and Push phenomena (modified from Deutsche Bank 2012)

As illustrated in Figure 1, ESG is affected by both push and pull factors. External pressure to develop ESG practices comes from various stakeholders, such as investors and government, whose needs may differ significantly regarding access to ESG information and ESG information quality and quantity. Another driver of ESG is the companies themselves. Companies are actively seeking to gain a competitive advantage across various

industries by exploring ESG opportunities and sustaining business continuity by identifying the risks associated with ESG. (Deutsche Bank 2012.)

To provide ESG information and establish a dialogue across various stakeholders, firms need to report their ESG performance. Consequently, there is a growing practice of integrated reporting that demonstrates the linkage between a firm's financial performance concerning ESG practices. However, measuring and comparing such indicators is not straightforward. Moreover, despite the intensifying regulation, many ESG practices remain voluntary and go beyond legal requirements, so there is much heterogeneity concerning the ESG reporting practices. (Deutsche Bank 2012; GRI.)

Some general frameworks have been developed for standardization. GRI Sustainability Reporting Standards (GRI) is an international initiative that aims to provide consistent guidelines for sustainability reporting. GRI is an independent international organization, and its standards help companies harmonize public reporting on their different economic, environmental, and social impacts. Whereas Principles for Responsible Investment (PRI), they promote ESG for investors by providing six responsible investment principles. The PRI is an investor initiative in partnership with the UN Global Compact and UNEP Finance Initiative. It advocates for a better understanding of ESG factors and supports its international network of investor signatories in integrating ESG factors into their investment decision-making process. Since the principles were launched in 2006, the PRI has grown consistently, and it is now the world's leading independent proponent of responsible investment. Today, PRI has over 2,300 signatories, representing over $85 trillion assets under management. The six principles of responsible investment are illustrated in Table 1. (Deutsche Bank 2012; PRI 2020; GRI.)

Table 1. The Principles of Responsible Investment (modified from PRI 2019)

The Principles of Responsible Investment (PRI)	Examples of possible actions
1. *"We will incorporate ESG issues into investment analysis and decision-making processes."*	Address ESG issues in investment policy statements and support the development of ESG-related tools, metrics, and analyses.
2. *"We will be active owners and incorporate ESG issues into our ownership policies and practices."*	Engage with companies on ESG issues and ask investment managers to undertake and report on ESG-related engagement.
3. *"We will seek appropriate disclosure on ESG issues by the entities in which we invest."*	Ask for ESG issues to be integrated within annual financial reports and standardized reporting on ESG issues.
4. *"We will promote acceptance and implementation of the Principles within the investment industry."*	Revisit relationships with service providers that fail to meet ESG expectations and support the development of tools for benchmarking ESG integration.
5. *"We will work together to enhance our effectiveness in implementing the Principles."*	Collectively address relevant emerging issues and develop or support appropriate collaborative initiatives.
6. *"We will each report on our activities and progress towards implementing the Principles."*	Disclose how ESG issues are integrated within investment practices and active ownership activities.

As shown in Table 1, the six principles of responsible investment encourage investors to incorporate ESG factors into their investment decisions, become active owners, improve transparent and appropriate disclosure on ESG issues, and commit to promoting the implementation of the principles. To do so, the signatories of these principles can, for example, seek to collaborate with those companies that are committed to improving ESG issues or actively put pressure on those that fail to meet their ESG expectations. Moreover, investors may seek to promote ESG reporting through their activities. (PRI 2019.)

2.2 Terminology of sustainable investing

The heterogeneity of sustainable investing terminology also occurs in academic literature (Wallis & Klein 2015). One reason for this is that there is no unambiguous definition of sustainability or responsibility. Dorfleitner and Utz (2012) state that sustainability means something different for every individual investor, and Cowton (1999) argues that the use of different terms of responsibility and ethics are, to a certain extent, a matter of taste. Numerous terms are commonly used to refer to SRI and ESG investing but grouping these

terms under the same category is still misleading as, in fact, the definitions of these terms differ.

Commonfund Institute (2013) defines SRI as *"a portfolio construction process that attempts to avoid investments in certain stocks or industries through negative screening according to defined ethical guidelines,*" and ESG investing as "*integrating ESG factors into fundamental investment analysis to the extent that they are material to investment performance*." To shed some more light on the discrepancies between SRI and ESG investing, Table 2 illustrates the essential characteristics of these practices.

Table 2. Differences in SRI and ESG (modified from Commonfund Institute 2018)

	SRI	ESG
Focus	**Principles:** investments driven by ethical values.	**Returns:** investments driven by long-term sustainability factors and an attempt to identify companies with higher investment potential.
Screening	**Negative screens:** depending on the investor's criteria, individual companies or industries can be excluded from the investment portfolio.	**No negative screens:** rather than focusing on exclusion, ESG rankings are used as a part of the overall investment process. The low ranking does not necessarily exclude a company from a portfolio but leads the investor to evaluate the company further.
Definition	**Narrow:** more narrowly defined by the investor. For example, the investor could divest the portfolio of the top 5 tobacco companies.	**Broader:** investment decisions are based on a broad set of factors. For example, which natural resource companies are most likely to experience catastrophic event because of their poor environmental and safety practices?
Consistency of definition	**Different criteria**: different investors have different SRI priorities, so SRI criteria are not universal but investor-specific.	**Universal approach:** Certain ESG factors have broad applicability to all investment options. For example, good governance and transparency are positives for all investors.

As Table 2 depicts, differences between SRI and ESG investing can be divided into four aspects: focus, screens, definition, and consistency. In general, SRI is driven by investor's ethical values, whereas ESG investing is not about ethics but an attempt to improve investment performance, especially in the long-term. As a result, the implementation of SRI might vary considerably among investors, while ESG investing is universal. (Commonfound Institute 2018.)

One fundamental difference between SRI and ESG investing comes from screening. When applying SRI, negative screening is the predominant tool for a portfolio construction process. Negative screening means that controversial firms and industries, like those

involved with tobacco, gambling, and weapons, are excluded from an investment portfolio. For example, tobacco screening can be defined as the exclusion of companies involved in the production or retailing of tobacco products. However, ESG analysis takes a broader view and aims to improve the investment portfolio performance, especially considering the long-term performance. When applying ESG investing, the investor examines the environmental, social, and governance issues that are material to a firm's performance. Thus, as ESG issues are evaluated alongside the traditional indicators of risk and opportunities, ESG investing allows investors to assess the firm's risks and opportunities more profoundly. (Colle & York 2008; Commonfound Institute 2013; Scholtens 2014.)

Negative screening has been criticized for failing to influence the direction of the firms positively. Colle and York (2008) argue that if a company operating in a "sin" industry is excluded and does not enter the investor's assessment, SRI does not provide the company with an impetus to improve its operations. As a comparison, rather than excluding companies, an investor applying positive screening invests in those companies that meet specific criteria. For example, the investor only invests in companies that set certain socially responsible business practices. As this strategy is not based on excluding, it is seen as a more incentive way to make companies act responsibly. (Colle & York 2008; Wallis & Klein 2015; Robeco.)

While negative and positive screening focus on certain industries, the best-in-class approach aims to truly influence the direction of the companies across various industries. The best-in-class approach aims to invest in those companies which are considered the most responsible within their industry. Thus, no industry is excluded, and better companies are expected to act as models for less responsible ones. This approach relates to ESG investing as it is not driven by investors' ethical values but the desire to reduce investment risks and increase returns by identifying companies with higher investment potential. (Wallis & Klein 2015; Duuren et al. 2016; Robeco.)

2.3 ESG factors

2.3.1 Environment

Various factors should be assessed when applying ESG investing. However, there are no universal criteria for determining which different ESG factors should fall into the environmental, social, or governance categories. In addition, these categories tend to overlap.

In general, ESG factors include factors such as climate change, labor management, gender diversity, and corporate governance, but the related risks vary significantly across industries. For example, a financial company may be posed an utterly different ESG risk than a mining company, so applying ESG investing requires an investor to delve into the industry-specific key issues. (Pelosi & Adamson 2016; MSCI 2020a.)

Climate change poses existential risks not only for nature and biodiversity but also for companies. A firm may face supply shortages or operational problems caused by a natural disaster or be exposed to transition risks that arise from society's actions to fight against climate change. For instance, there might be enormous changes in regulation or technologies, directly affecting the markets in which a firm is operating. A recent example of changing legislation is the EU Taxonomy that has entered into force in 2020. The EU Taxonomy is a classification tool for companies, investors, and financial institutions to identify environmentally friendly activities. It thus helps companies and issuers to access green financing by setting the thresholds that must be met to be considered sustainable. (Deloitte 2019; TEG final report on the EU taxonomy 2020; European Commission.)

On the other hand, climate change provides business opportunities. Being a pioneer in environmental practices can provide a competitive advantage and improve resource productivity, while shifting towards renewable energy can foster a firm's competitiveness and unlock new market opportunities. (Deloitte 2019; MSCI 2020b.)

Table 3. Environmental factor of ESG (MSCI 2020b)

Environmental (E)			
Climate change	Natural resources	Pollution & Waste	Environmental opportunities
Carbon emissions	Water stress	Toxic emissions and waste	Opportunities in cleantech
Product carbon footprint	Biodiversity and land use	Electronic waste	Opportunities in green building
Financing environmental impact	Raw material sourcing	Packaging material and waste	Opportunities in renewable energy
Climate change vulnerability			

While there are both risks and opportunities in environmental practices, it leads to a question of how to assess them. As shown in Table 3, MSCI defines that the environmental

factor (E) of ESG includes the following sub-categories: climate change, natural resources, pollution and waste, and environmental opportunities. As illustrated, each subcategory contains different indicators, such as carbon emissions, water stress, electronic waste, and opportunities in renewable energy. An investor can assess a company's environmental risks and opportunities and compare companies by utilizing these indicators. (MSCI 2020b.)

The effect of environmental practices on a firm's performance and value has been discussed in the academic literature. For example, Matsumura et al. (2014) investigate whether a firm value is associated with carbon emissions. Using carbon emissions data from 2006 to 2008 for S&P 500 firms, they find that the markets penalize firms for their carbon emissions, especially those firms that do not report their emissions at all. They also find that an increase in a firm's carbon emissions decreases the firm value. Moreover, Del Guercio et al. (2008) state that shareholder actions can improve corporate performance as investors can support firms fighting against climate change. Mercereau et al. (2020) agree with them by adding that investors can do this without giving up returns or increasing their portfolio risk significantly. According to them, investors can choose to invest, for example, in cleaner sectors, such as renewable energy, or lobby firms to lower their climate footprint. Lee and Lounsbury (2011) also provide evidence that voting and engagement can improve firms' ESG factors. They investigate the US petroleum and chemical industries, and their findings indicate that shareholder resolution can improve the environmental performance of those companies operating in these industries.

2.3.2 Social

Compared to other parts of ESG, the social dimension is often considered the most challenging part to integrate into the investment decision-making process. The integrating is challenging as the social dimension includes practices that are difficult to quantify and are not so clearly linked to risk-return analysis. The social practices also often deal with culturally specific norms that vary from country to country, making the generalization, comparability, and measurement of the social related issues more challenging. Furthermore, the analysis of social issues might be seen more often to be qualitative rather than quantitative, and the relationship with long-term investment performance is less clear and difficult to assess. (Hebb et al. 2015.)

Although social issues might be challenging to assess, they still need to be understood to form a comprehensive and credible ESG analysis. Based on the classification of MSCI

(2020b), Table 4 shows one way to identify the indicators of the social dimension (S). MSCI classifies 13 indicators, such as human capital development and product safety and quality, which affect a firm's social practices. These indicators are further classified into four sub-categories: human capital, product liability, social opportunities, and stakeholder opposition.

Table 4. Social factor of ESG (MSCI 2020b)

Social (S)			
Human capital	Product liability	Social opportunities	Stakeholder opposition
Labor management	Product safety and quality	Access to communications	Controversial sourcing
Human capital development	Chemical safety	Access to finance	
Health and safety	Financial product safety	Access to healthcare	
Supply chain labor standards	Privacy and data security	Opportunities in health and nutrition	

As can be noticed, the indicators are related to different stakeholders of a firm, such as employees and customers. For example, employee satisfaction could be related to human capital development, while product safety and quality are essential to the end-users. According to Hebb et al. (2015), at least three stakeholder types are bound up in the social factor: the end-users of company products, employees, and those stakeholders that affect company decisions. They argue that an understanding of the needs of these different stakeholder groups is required to integrate the social dimension into ESG analysis. For example, there should be an understanding of how the company's products, employee satisfaction, or labor and stakeholder practices affect corporate performance. (Hebb et al. 2015.)

Prior research supports this argument. For instance, Jiao (2010) argues that responding to the needs of different stakeholders, such as customers and employees, is related to the value of the firm as she finds that an increase in the stakeholder welfare increases a firm's Tobin's Q. Whereas Edmans (2011), he finds a positive correlation between employee satisfaction and shareholder returns. In his study, companies with high employee satisfaction generate higher long-term returns, even when controlling for risk, industries, or a broad set of observable characteristics.

2.3.3 Governance

Governance practices cover a wide range of issues, and as history has shown, a failure in corporate governance can have far-reaching and devastating consequences (Balachandran & Faff 2015). The quality of corporate governance has especially come to the fore after scandals and crises, such as Enron in 2001 and the financial crisis in 2008. After these turning points, several reform activities have been initiated to increase corporate governance quality and avoid mismanagement. These cases have also sparked off a fierce debate on whether the purpose of a firm should only be maximizing the wealth of its shareholders. Table 5 shows the sub-categories and indicators of the governance dimension (G) of ESG. (Vasudev & Watson 2012; Velte 2016.)

Table 5. Governance factor of ESG (MSCI 2020b)

Governance (G)	
Corporate behavior	Corporate governance
Business ethics	Board diversity
Anti-competitive practices	Executive pay
Tax transparency	Ownership and control
Corruption and instability	Accounting
Financial system instability	

The governance dimension can be divided into two sub-categories: corporate behavior and corporate governance. In the academic literature, the effect of the indicators under the sub-categories, such as board diversity, and ownership and control, on a firm's ESG performance and firm value has been discussed. For example, board and ownership structure have been found to affect corporate disclosure (see, e.g., Jizi et al. 2013; Ortas et al. 2015), and empirical research shows evidence that good corporate governance contributes to better operating performance and firm value (see, e.g., Durnev & Kim 2005; Chhaochharia & Grinstein 2007). Balachandran and Faff (2015) argue that corporate governance is closely related to corporate risk, and thus it has a profound impact on firm value. Consequently, in line with the other ESG factors, analyzing governance practices aims to reveal corporate risks.

A credible ESG analysis requires transparent and reliable information on governance issues. In many countries, various corporate governance codes have been announced to support high-quality corporate governance practices. For example, in Finland, the key objective of the Corporate Governance Code is to promote openness, transparency, and good corporate governance in a way that supports the competitiveness and international comparability of Finnish listed companies. The Corporate Governance Code harmonizes the procedures of listed companies, increases the information provided to shareholders and other investors, and improves transparency about governing bodies, management fees, and remuneration systems. (Securities Market Association.)

One of the goals of the Finnish Corporate Governance Code is to involve companies in board diversity. The company should define and report its principles concerning diversity, and there should be both genders represented on the board of directors (Finnish Corporate Governance Code 2020). In the context of corporate governance, diversity in the board can be described as means the board structure is made up of different individuals in terms of opinions, backgrounds, and expertise, and that these qualities are utilized in board process and decision-making (Walt & Ingley 2003). The debate of whether this has a positive impact on firm performance has been examined in the academic literature. For example, Velte (2016) and Lückerath-Rovers (2013) investigate the impact of female members on the management boards. Velte (2016) finds that female members positively impact ESG performance, while Lückerath-Rovers (2013) finds that firms with women directors perform better than those without women on their boards.

2.4 ESG ratings and rating providers

2.4.1 What is an ESG rating?

As there is no universal verification of how firms' responsible actions should be measured, some organizations have developed proprietary measures of ESG. ESG rating (or ESG score) is an assessment of a firm's quality, standard, or performance on environmental, social, and governance issues, and it aims to measure a firm's financially relevant ESG risks. ESG ratings can measure a firm's overall ESG performance or one of its three dimensions, allowing investors to integrate ESG factors into their investment decisions, such as portfolio analysis or equity research. ESG ratings are often based on companies' information through their annual, CSR or sustainability reports and other public sources.

(Huber & Comstock 2017; Minutolo et al. 2019; Refinitiv 2019; SustainAbility 2019; MSCI 2020b.)

In general, ESG ratings form the basis of informal and shareholder proposal-related investor engagement. They are continually increasing in importance to the investors as they provide an opportunity to assess, measure, and compare a firm's ESG performance over time. Today, several third parties evaluate international and domestic public (and many private) companies based on their ESG performance. These rating agencies have become influential institutions, and some of the well-known third-party ESG rating providers are RobecoSAM, MSCI, Sustainalytics, Refinitiv, and Bloomberg. The rating agencies' ESG ratings affect a wide range of finance and business decisions, and it has been estimated that already $30 trillions of assets are invested relying in some way on ESG ratings. (Huber & Comstock 2017; GSIA 2018; SustainAbility 2019; García et al. 2019.)

An analysis of the various ESG rating process is beyond the scope of this paper. However, it is highlighted that although ESG ratings are widely used in finance research (see, e.g., Berg et al. 2019; Gibson et al. 2020), the definition of ESG ratings is not yet well-established. In the academic literature, ESG ratings are often taken to measure the firm's actual sustainability performance (see, e.g., Halbritter & Dorfleitner 2015; Velte 2017; Yoon et al. 2018), but other interpretations also exist. For example, Sharfman and Chitru (2008) do not use the environmental score as a proxy for environmental performance but rather as an additional environmental risk management indicator.

Minutolo et al. (2019) even argue that the ESG score is not a measure of sustainability performance but rather a measure of disclosure. They state that as a firm can voluntarily disclose ESG information, the managerial choice to disclose affects the final ESG rating. For example, they argue that a firm with high greenhouse gas emissions may perform poorly with respect to environmental performance, but by disclosing relevant information about other dimensions, it can still score highly concerning the overall ESG score. This argument highlights that the inconsistencies in previous studies examining the ESG-CFP relationship may be due not only to the difficulties of defining ESG factors but also to the inconsistencies in measuring them.

2.4.2 Differences between data providers

The lack of common standards leads to differences in ESG performance criteria and measurement methods between rating agencies (García et al. 2019). Considerable differences exist when comparing ESG ratings from different data providers, and low correlations between different ratings have been reported (see, e.g., Chatterji et al. 2016; Berg et al. 2019; Gibson et al. 2020). For example, in the data set of five different ESG raters, Berg et al. (2019) report correlations between different ratings on average 0.61, whereas Gibson et al. (2020) show that the average correlation between the overall ESG ratings of six rating providers is only 0.46. For comparison, the correlation between Moody's and Standard & Poor's credit ratings is 0.99 (Berg et al. 2019). Consequently, ESG information provided by rating agencies is relatively noisy.

Different sources of divergence have been examined. Liang and Renneboog (2017) state that a firm's ESG rating and its country's legal origin are strongly correlated. They find that firms from civil law countries (e.g., most European countries) have higher ESG performance than firms from common law countries (e.g., the US and the UK) and Scandinavian civil law firms have the highest ESG ratings. Against this background, Gibson et al. (2020) highlight that the reason for a wide divergence of ESG ratings is the link between legal origin and the ESG rating providers. They state that the rating agencies with a civil law origin are more inclined to identify material social ESG information, whereas the agencies with a common law origin are more apt to recognize governance-related issues. Their argument is based on the suggestion that corporate governance is more stakeholder-oriented in civil law countries and more shareholder-centric in common law countries, resulting in disagreement about social and governance ratings between civil and common law rating providers. Since environmental ratings are based on more objective and measurable factors, such as greenhouse gas emissions, Gibson et al. (2020) argue that as being more subjective, the disagreement is mainly about the social and governance scores.

Duuren et al. (2016) also investigate how beliefs and expectations regarding ESG vary across countries by examining portfolio managers' beliefs and expectations towards ESG investing. They find a significant difference in the US and the European (including the UK) portfolio managers. On average, they find that the European and the UK managers have a stronger belief in the existence of a positive relation between SRI and performance, whereas managers domiciled in the US expect a more positive impact on risk

reduction and long-term performance. In addition, the European portfolio managers attach a higher weight to environmental and social factors, whereas both the US and European portfolio managers give governance factors high weight. (Duuren et al. 2016.)

More specific reasons for a wide divergence of ESG ratings are also discussed in the previous literature. Berg et al. (2019) argue that there are three distinct reasons for the divergence: scope, weight, and measurement divergence. According to them, *scope divergence* appears when a rating agency includes different sets of attributes as a basis of the ESG rating than another rater. For example, one data provider might include employee turnover in the scope of rating while another may not, leading to differences in the overall ESG rating. *Weight divergence* means rating agencies might take different views on the relative importance of different attributes. For instance, greenhouse gas emissions may enter the final rating with greater weight than employee turnover. *Measurement divergence* appears when the data providers measure the same attribute by using different indicators. For instance, there are yet no generally applicable standards for measuring a firm's labor practices. (Berg et al. 2019.)

Berg et al. (2019) also highlight the presence of a *Rater Effect.* They argue that as evaluating firms' ESG attributes involves judgment, those judgments are correlated with each other. For example, a favorable judgment of one attribute tends to lead to another favorable judgment for another attribute as well. In other words, the *Rater Effect* means a firm will be seen through a positive or a negative lens, leading to a better or worse overall ESG rating than the individual attributes would have allowed for. (Berg et al. 2019.)

To sum up, significant disagreement of ESG ratings exists, and an improvement in one rating agency's ESG rating does not necessarily imply an improvement in the rating of another provider. Thus, it can be argued that ESG ratings currently do not encourage companies towards improvements, and companies should closely collaborate with the rating providers to establish open, transparent disclosure standards and ensure that the data is publicly accessible. The lack of comprehensiveness has essential implications for the generalization of academic research findings and creates challenges for asset managers to implement their ESG investment strategies. As trillions of assets are invested relying in some way on ESG ratings, the consequences of ignoring these differences could be far-reaching, resulting in not only contradictions in the academic research but also a significant number of incorrect investment allocations. (Berg et al. 2019; Gibson et al. 2020.)

2.4.3 Asset4 ESG rating process

The Asset4 database is one of the most comprehensive ESG databases provided by Refinitiv (Halbritter & Dorfleitner 2015, 26; Refinitiv 2019). The ESG score of the Asset4 database measures a firm's relative ESG performance, effectiveness, and commitment across ten main categories, such as emissions, workforce, and management. In addition, the Asset4 database provides an overall ESG Combined Score (ESGC), which is discounted for significant ESG controversies impacting the companies in coverage. Asset4 ESG scores are based on company-reported data and available on over 7,000 companies worldwide with time series data going back to 2002. Figure 2 illustrates the ESG rating process of Asset4. (Refinitiv 2019.)

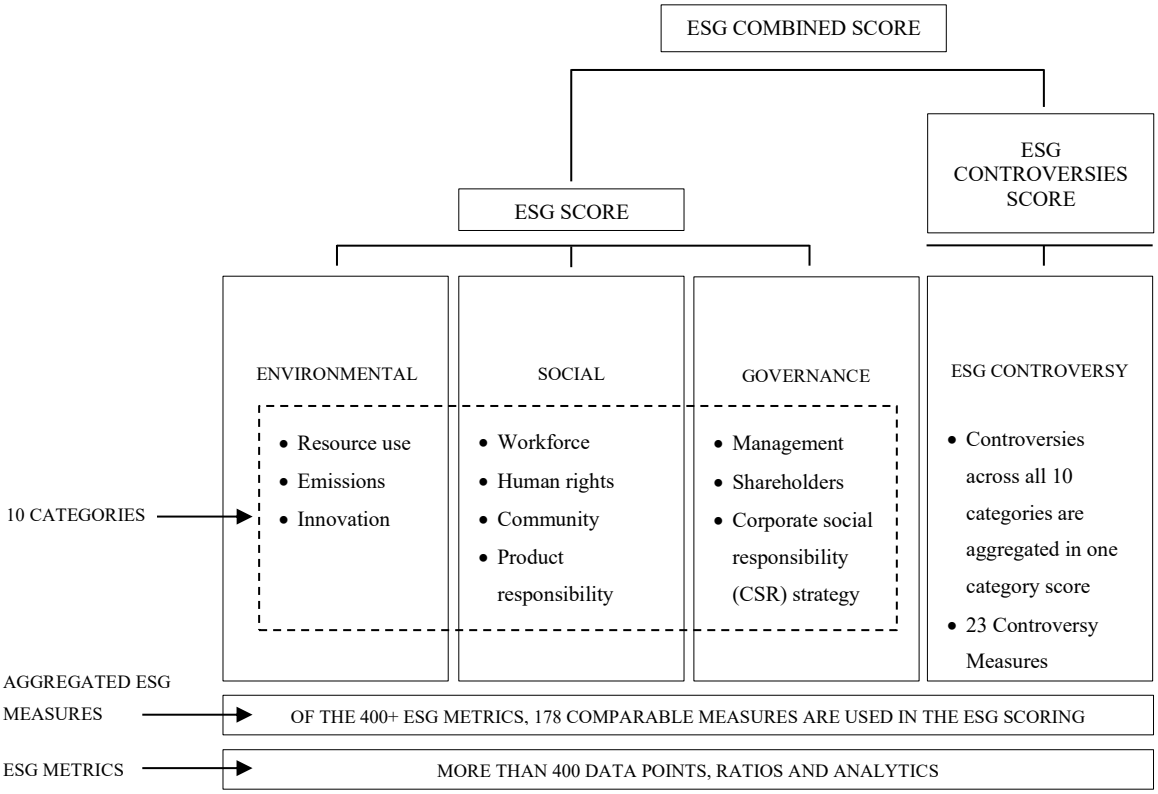

Figure 2. Asset4 ESG rating process (modified from Refinitiv 2019)

The ESG universe of companies, for which ESG scores are calculated and ESG data is maintained, consists of more than 7,000 companies globally, mainly covering the companies in North America (over 2,900 companies) and Europe (more than 1,200 companies). As illustrated in Figure 2, within the ESG universe, over 400 ESG measures are

first manually processed for each company. According to the comparability, industry relevance, and data availability, a subset of 178 of the most relevant and comparable fields is carefully selected to power the overall scoring process. (Refinitiv 2019.)

To calculate the ESG Controversies (ESGC) score and the environmental and social category scores, Thomson Reuters Business Classification (TRBC) industry group is used as a benchmark as these measures are more similar and relevant to companies within the same industries. For all governance categories, scores are benchmarked against the country of headquarters, as best governance practices are more consistent within countries. As shown in Figure 2, the ESGC score is formulated based on 23 ESG controversial topics. If a company is damaged by a scandal during the year, the company involved is penalized, affecting its overall ESGC score and grading. (Refinitiv 2019.)

To provide up-to-date, comprehensive, and objective information, Asset4 ESG scores rely on various publicly available information sources. The database, ESG news, and controversies are continuously updated, and data is weekly refreshed on products, including the recalculation of the ESG scores. In line with firms' ESG disclosure, ESG reported data is typically updated once a year. However, data can be refreshed more frequently if there is a substantial change in the corporate structure or reporting during the year. (Refinitiv 2019.)

Table 6. Asset4 ESG rating methodology (modified from Refinitiv 2019)

Pillar	Category	Indicators in Rating	Weights	Pillar Weights
Environment	Resource use	19	11%	(11%+12%+11%)
	Emissions	22	12%	
	Innovations	20	11%	
Social	Workforce	29	16%	(16%+4.5%+8%+7%)
	Human rights	8	4.50%	
	Community	14	8%	
	Product responsibility	12	7%	
Governance	Management	34	19%	(19%+7%+4.5%)
	Shareholders	12	7%	
	CSR strategy	8	4.50%	
TOTAL		178	100%	

Table 6 illustrates more detail on how aggregated ESG measures are further grouped into ten categories. Ten categories, such as resource use, workforce, and management, are weighted proportionately to the count of indicators within each category. The three pillar scores (environmental, social, and governance), and the final ESG score, are formulated from these combinations.

Table 7. Asset4 ESG score range (modified from Refinitiv 2019)

Score range	Grade	Score range	Grade
0.00 <= score <= 0.083	D -	0.500 < score <= 0.583	B -
0.083 < score <= 0.167	D	0.583 < score <= 0.667	B
0.167 < score <= 0.250	D +	0.667 < score <= 0.750	B +
0.250 < score <= 0.333	C -	0.750 < score <= 0.833	A -
0.333 < score <= 0.417	C	0.833 < score <= 0.917	A
0.417 < score <= 0.500	C +	0.917 < score <= 1.000	A +

Finally, the conversion from a score to a letter grade is shown in Table 7. Asset4 ESG scores are percentile rank scores available in percentages and letter grades from D- to A+. (Refinitiv 2019.)

3 THEORETICAL VIEW OF ESG AND FINANCIAL PERFORMANCE

3.1 Theories explaining the ESG-CFP relationship

3.1.1 Principal-Agent theory

Maximizing shareholder wealth is often seen as a superior goal of the firm. From this perspective, company managers should only make decisions that increase the firm's market value, which in turn means they should act in the best interests of the company's owners. However, as the interests of the manager and the owner might not be aligned, the manager does not necessarily act in favor of the owner but instead tries to increase her/his utility. Based on the principal-agent theory, this contradiction creates the agency problem, meaning that a principal (owner) who authorizes another person to perform services on her/his behalf cannot be sure the agent (manager) will ultimately act in her/his best interests. (see, e.g., Jensen & Meckling 1976.)

In the previous literature, ESG practices are sometimes interpreted as consequences of managerial agency problems. This interpretation refers to the managerial opportunism theory, implying that managers predominantly pursue personal goals and are tempted by short-term profits. For example, Bénabou and Tirole (2010) and Brown et al. (2006) argue that managers may carry out ESG activities for their interests at a cost to shareholders. In accordance with this statement, Barnea and Rubin (2010) criticize that managers may seek to overinvest in ESG activities to build their reputation as good citizens. Consequently, the implementation of ESG practices might be a waste of firm resources and further destroy the firm value (Miralles-Quirós et al. 2018).

Moreover, Schuler and Cording (2006) point out that while a firm's investments in ESG activities might benefit some groups in society, the private returns can still be negative. For example, they state that when a firm makes an environmentally friendly investment to reduce its pollution and improve air quality, the costs of this capital investment may outweigh the private benefit for the firm's shareholders. In the light of these arguments, ESG activities contradict the fundamental principle that the purpose of a firm is to maximize its shareholders' wealth and thus can be interpreted to violate firm performance.

Interestingly, the principal-agent theory also provides a contrary interpretation of the ESG-CFP relation. ESG activities might mitigate asymmetric information and further the

agency costs as a firm with better ESG performance is more likely to disclose more information regarding its ESG activities to the market. The enhanced ESG disclosure increases the transparency of the firm's operations in terms of environment, social, and governance, and may also enhance its internal control systems. Thus, although the ESG rating itself may not be that important, it might indicate a firm is willing to provide additional information and act as a signal of openness. Consequently, the increased transparency, reliability, data availability, and quality reduce the informational asymmetry between the firm and, for example, investors, and lead to lower capital constraints and further better firm performance. Moreover, one could argue that ESG scores reduce information asymmetry by providing investors a channel to gain ESG information in a timely fashion way. As such, some previous studies argue that ESG scores are not a measure of sustainability performance but rather a measure of disclosure and transparency. (Jensen & Meckling 1976; Cheng et al. 2014; Aouadi & Marsat 2018; Minutolo et al. 2019.)

3.1.2 Stakeholder theory

As mentioned previously, the quality of corporate responsibility has historically come to the fore especially after scandals and crises. Moreover, the incidents have also often sparked off a fierce debate on whether the purpose of a firm should only be seeking to maximize the wealth of its shareholders. In 1984, Edward Freeman initially detailed the stakeholder theory that addresses a company should create value not only for shareholders but also for all its stakeholders. This approach stresses the interconnected relationships between a company and its customers, employees, investors, suppliers, communities, and all those other parties involved in the organization. Today, the stakeholder theory is an established part of business ethics research, serving as a platform for further research and development in the financial sector. (see, e.g., Bettis 1983; Vasudev & Watson 2012; Velte 2017; Stakeholder Theory 2018; Shodiya et al. 2019.)

To put it simply, the stakeholder theory asserts that a firm's ability to generate sustainable wealth is determined by its relationships with its stakeholders (Garcia et al. 2017). Many researchers agree that the better a firm manages relationships with all its stakeholders, the better the firm performs (see, e.g., Minutolo et al. 2019). Thus, the stakeholder theory aligns with the value enhancing theory, providing a channel through which ESG may be connected to firm value (Miralles-Quirós et al. 2018).

As ESG practices aim to improve environmental, social, and governance issues – factors that are likely to have a significant impact on various stakeholders – ESG activities

can promote the company management to meet different stakeholders' demands. The influences can be both direct and indirect. For example, high ESG performance may increase a firm's brand value and improve the image of its products among customers. Moreover, outstanding ESG performance may be interpreted as a signal for superior management skills and enhance a firm's reputation as an employer, attracting and retaining high-quality employees. Furthermore, a high ESG performance can foster more stable relations with the government and the financial community, whereas a low ESG performance is likely to entail higher probabilities of lawsuits and legal fines. From this perspective, the ESG score can be interpreted as a proxy for stakeholder communication. (Sassen et al. 2016; Miralles-Quirós et al. 2018; Yoon et al. 2018; Minutolo et al. 2019.)

Following the reasoning of the stakeholder theory, a firm should disclose financial and non-financial information to meet stakeholders' requirements. In other words, a firm should strive to be as transparent as possible. As suggested by the principal-agent theory, increased transparency arguably reduces informational asymmetry with the general public, creates trust among stakeholders, and mitigates the risk perceived by investors (Garcia et al. 2017). However, the difficulty here is that stakeholders' needs are diverse, and stakeholders may have different reasons to assess ESG information. For instance, consumers may be interested in sourcing and labor policies, whereas investors may be more interested in residual risk. (Sassen et al. 2016; Miralles-Quirós et al. 2018; Yoon et al. 2018; Minutolo et al. 2019.)

In addition to showing that both better stakeholder engagement and transparency around ESG performance leads to reduced capital constraints, Cheng et al. (2014) also provide evidence that this relation is driven by environmental and social dimensions. Sharfman and Chitru (2008) agree with them by arguing that improved environmental risk management equates with improved strategic risk management. Their argument could be interpreted as meaning that if a company transparently provides information about its environmental activities and receives a high environmental score, it can signal investors that the company is engaged in good risk management. This, in turn, reduces the company's risk from an investor's perspective and further leads to a lower cost of capital and better firm performance.

3.1.3 Risk management theory

Sometimes business practices negatively affect stakeholders even under the best of circumstances. As a result of the adverse event, stakeholders may punish the firm with various sanctions. The sanctions may range from mild (badmouthing or boycotts) to severe (revoking the right to do business), depending on both the intentions of the offender and the harmful effects of the act, meaning that penalties will be more severe when bad actors do bad deeds. (Godfrey et al. 2009.)

To avoid such punishments and build trustworthiness among stakeholders, firms may enhance their social capital. Like ESG, social capital is somewhat abstract and hard to define due to its multidimensional nature (Lins et al. 2017). La Porta et al. (1997, 333) summarize that social capital is *"a propensity of people in a society to cooperate to produce socially efficient outcomes*" and highlight the trustworthiness that arises from connections among individuals. Interestingly, in line with many previous studies (see, e.g., Godfrey et al. 2009; Lins et al. 2017; Petitjean 2019), ESG ratings can be determined according to the intensity of activities by which firms build their social capital. In other words, stakeholders interpret high ESG performance as a sign of trustworthiness, which further protects the company from the worst consequences of a negative event.

Instead of a single firm, a negative shock often affects the entire market, as it did during the 2008–2009 financial crisis. Align with the risk management theory, ESG can generate social capital even in times of crisis. A positive assessment of a firm's ESG practices impacts the attitude and loyalty of stakeholders toward a firm, and thus high ESG performance may alleviate stakeholders' sanctions against a firm in the event of a crisis. That is, a high social capital may indicate that a firm is willing to cooperate with the stakeholders, so the stakeholders are more willing to help such firms also in crisis times. (Sassen et al. 2016; Lins et al. 2017; Petitjean 2019.)

Moreover, if ESG generated insurance benefits through the improved social capital, investors would place a valuation premium on those firms with improved ESG practices when overall trust is low in the market. Consequently, building firm-specific social capital can be thought of as an insurance policy that pays off when investors and the economy face a crisis of confidence. Indeed, Lins et al. (2017) show that this "insurance-like" protection pays off especially when the overall level of trust in corporations and markets suffers a negative shock, as during the 2008–2009 financial crisis. (Sassen et al. 2016; Lins et al. 2017; Petitjean 2019.)

3.1.4 Legitimacy theory

As in line with risk management theory and social capital, it can be argued that organizations strive to operate within the bounds and norms of their societies. Supported by the legitimacy theory, this approach states there is a social contract between the organization and society and that the organization is expected to undertake the terms of this contract. If not operating in a way consistent with the community expectations, the organization will be penalized. The punishment may occur, for example, through consumers reducing the demand for the products of the business or investors eliminating the supply of financial capital. However, the norms defining the contract are not permanent but change over time. As the firm's right to exists must be renewed, the organization must continuously meet the test of legitimacy by assuring its services and products are required by society, and the groups benefiting from these services and rewards have society's approval. (Shocker & Sethi 1973; Brown & Deegan 1998.)

Under the legitimacy theory, ESG activities can be viewed as an intent of a firm to pursue moral legitimacy concerning the social contract, and many studies summarize that a company can improve its financial performance by increasing its legitimacy. In this regard, two types of ESG strategies are identified in the academic literature. In the first option, the company takes serious actions to incorporate ESG into its operations and strategy. In other words, the organization embraces a genuine desire to meet the demands set for it by society. This might take significant investments and require lots of resources, but costs are incurred to achieve significant ESG results. By having real ESG outcomes, these firms can achieve sustainable business development, provide legitimacy for their operations, and meet their social contract obligations. (Wang & Sarkis 2017; Seele & Gatti 2017.)

Unlike the first strategy, the other one is more symbolic and often referred to as "greenwashing" or "window dressing". It means the company is engaged in ESG only to improve its reputation or corporate image, and it does not include the real allocation of resources needed to implement ESG in the organization. Thus, the company does not generate the promised outcomes and is in breach of the social contract. This discrepancy between an organization's actions and society's expectations causes a legitimacy gap that can lead to poor financial performance or even jeopardize the entire organization's existence in the long-term. (Wang & Sarkis 2017; Seele & Gatti 2017; Lee & Isa 2020.)

3.2 Previous empirical evidence

3.2.1 Inconclusive results

Since the beginning of the 1970s, researchers have been interested in the relationship between ESG factors and corporate financial performance (CFP). Although more than 2000 empirical ESG related studies have been published, the ESG-CFP relation has remained a central debate for more than 40 years, and the findings have remained inconclusive. The dissimilarity of the results is widely emphasized in previous studies (see, e.g., Wallis & Klein 2015; García et al. 2019). Garcia-Castro et al. (2010) find three possible reasons for the contradiction. First, they highlight difficulties in assessing and measuring corporate social performance. Second, they state there might be circumstances not yet understood well enough that affect the CSP-CFP relationship, leading to missing control variables. Finally, they argue that the relationship between short- and long-run performances should be better understood. (Garcia-Castro et al. 2010; Friede et al. 2015.)

Although many researchers state that empirical findings of the ESG-CFP relation remain inconclusive, Friede et al. (2015) argue that the business case for ESG investing is empirically well-founded. They base their argument on their exhaustive overview of previous academic research, where they combine the findings of about 2200 individual studies. They find that roughly 90% of these studies find a nonnegative ESG-CFP relation, and the large majority reports positive findings. They state that in line with the theory of learning effects in capital markets, it would be justified to presume that the increasing ESG awareness, such as the increasing number of PRI signatories, would lead to a decreasing ESG alpha. However, their findings show that the positive ESG-CFP relation appears stable over time.

Overall, the impact of ESG on the company has been examined from various perspectives, including the impact of ESG on the company's cost of capital, financial performance, value, and portfolio performance. Table 8 summarizes some previous empirical studies examining the relationship between ESG and these subjects.

Table 8. Previous studies on the impact of ESG on firm performance

Factor	Relationship with	Impact	Period	Study
ESG	Firm risk	Decreases	2002–2014	Sassen et al. 2016
ESG	Cost of capital	Increases	2010–2013	Atan et al. 2018
ESG E, S, G	Cost of capital	None/Mixed	2004–2007 2003–2010 2010–2013	Menz 2010 Cajias et al. 2014 Atan et al. 2018
ESG	Cost of equity	Decreases	2003–2015 1992–2007	Albuquerque et al. 2019 El Ghoul et al. 2011
ESG E	Cost of debt	Decreases	1995–2007 1995–2006	Jiraporn et al. 2014 Bauer & Hann 2010
ESG E, S, G	Financial performance	Increases	1991–2002 2003 1997–2004 2003–2013 2009–2013 2006–2015 2009–2015	Benson & Davidson 2010 Brown & Caylor 2006 Guenster et al. 2011 Cornett et al. 2016 Wang & Sarkis 2017 Yang & Baasandorj 2017 Minutolo et al. 2019
ESG E, S, G	Financial performance	None/Mixed	1991–2005 2010–2013 2010–2014 2005–2017	Garcia-Castro et al. 2010 Atan et al. 2018 Velte 2017 Petitjean 2019
ESG E, S, G	Financial performance	Decreases/ Mixed	1996–2004 2010–2015	Baron et al. 2011 Yoon et al. 2018
ESG	Portfolio performance	Increases	1992–2004	Kempf & Osthoff 2007
ESG	Portfolio performance	None/Mixed	1991–2012	Halbritter & Dorfleitner 2015

As depicted, some of the studies show the positive effects of ESG on CFP (e.g., Sassen et al. 2016; Albuquerque et al. 2019; Minutolo et al. 2019), whereas some negative or mixed effects (e.g., Baron et al. 2011; Halbritter & Dorfleitner 2015; Petitjean 2019). Both the overall ESG and the effect of each three dimensions have been widely examined. Next, these studies and their findings are discussed.

3.2.2 ESG and cost of capital

As ESG investing aims to enhance the risk-return relationship, it is justified to ask whether corporate responsibility impacts firm risk. Sassen et al. (2016) investigate how ESG factors affect market-based firm risk in Europe. They use three risk measures: systematic, idiosyncratic, and total risk. Covering the period 2002–2014, they find that a

higher corporate responsibility decreases total and idiosyncratic risk. More interestingly, their findings suggest that the higher performance regarding the social dimension can increase firm value through lower firm risk. This finding corresponds to the previously presented arguments of Liang and Renneboog (2017) and Gibson et al. (2020), supporting the view that the social dimension of ESG is particularly valued in Europe and further in civil law countries. Moreover, as the cost of capital is directly linked to company risk, the results of Sassen et al. (2016) give evidence that good ESG performance reduces a firm's cost of capital. Hence, the cost of capital theory provides another framework in which the effect of ESG on firm performance can be examined (Sassen et al. 2016).

Previous empirical research has concluded that firms with acceptable sustainability standards enjoy lower capital costs (see, e.g., Clark et al. 2015). For example, Albuquerque et al. (2019) argue that firms with high-ESG have a lower cost of equity. Their study finds that ESG decreases systematic risk and increases the firm value and that these effects are more substantial for firms with high product differentiation. El Ghoul et al. (2011) also find that firms with better ESG scores exhibit cheaper equity financing. Their findings suggest that investment in responsible employee relations, environmental policies, and product strategies substantially reduces firms' cost of equity. In addition, their results show that participation in two "sin" industries, tobacco, and nuclear power, increases firms' cost of equity.

As discussed, poor ESG performance may pose reputational, financial, and litigation risks for companies. This may have a direct impact, particularly on a firm's debt financing. By implementing reasonable ESG practices to mitigate such risks, companies can benefit from the lower cost of debt, such as credit spreads. Using environmental information on 582 US companies between the years 1995–2006, Bauer and Hann (2010) conclude that environmental concerns are associated with lower credit ratings and a higher cost of debt, whereas proactive environmental practices result in a lower cost of debt. Jiraporn et al. (2014) agree with this statement as they find that more socially responsible firms enjoy more favorable credit ratings. (Bauer & Hann 2010; Jiraporn et al. 2014; Clark et al. 2015.)

However, as shown in Table 8, not all researchers find similar relation between ESG and the cost of capital. Menz (2010) examines the relationship between CSR and firm value from the corporate bond market perspective. He argues that as socially responsible firms are often regarded as less risky, they should have lower risk premiums. Nevertheless, his results show that the risk premium for socially responsible corporations is ceteris

paribus higher than for non-socially responsible firms. For this reason, he suggests that the assumed relationship between CSR and credit spreads must be rejected. He highlights that one main reason is that, for bond investors, credit ratings matter more than ESG ratings. Hence, an extra ESG rating does not add informational value to bondholders because credit ratings already, to some extent, include governance, environmental, and social issues. (Menz 2010.)

Atan et al. (2018) also present a contradictory result. By examining the performance of Malaysian public-limited companies in terms of profitability, firm value, and cost of capital during 2010–2013, they find that the individual ESG pillars are not influencing the cost of capital (WACC). In contrast, the overall ESG score is positively and significantly influencing the WACC. However, their results may be attributed to the fact that the stakeholders in an emerging market may not yet be as confident with the firms' ESG initiatives as in more developed countries. In addition, they highlight that their study only covers a short period that may not yield significant statistical results. Corresponding to Atan et al. (2018), Cajias et al. (2014) also find evidence that firms with a high number of ESG concerns diminished their capital cost in the short run. These observations underline the previous assumption that ESG investing is first and foremost a long-term approach.

3.2.3 ESG and portfolio performance

The ESG-CFP relation has also been studied within the framework of portfolio construction. In their study, Kempf and Osthoff (2007) implement a trading strategy of buying stocks with high socially responsible ratings (SRI ratings) and selling stocks with low SRI ratings. Their data consists of stocks included in the S&P 500 and the DS 400 for 1992–2004, and SRI ratings are collected from the KLD Research & Analytics. They find that the simple long-short strategy leads to high abnormal returns even when considering reasonable transaction costs. More interestingly, the highest abnormal returns are achieved when the best-in-class approach is implemented, whereas negative screening does not lead to abnormal returns. As discussed earlier, the best-in-class approach is one way to implement ESG investing, while often criticized negative screening is traditionally part of SRI investing. Thus, the results of Kempf and Osthoff (2007) provides support for applying the ESG approach instead of the traditional SRI approach.

Halbritter and Dorfleitner (2015) also investigate the link between ESG ratings and financial performance within the framework of portfolio construction. Their sample includes ESG data for the US market from 1991 to 2012. As against many other studies, they find nonsignificant return differences between the firms with high and low ESG ratings, and even the best-in-class approach does not generate abnormal returns. However, unlike Kempf and Osthoff (2007), they collect their data from not only one but three different ESG rating providers: Asset4, Bloomberg, and KLD. As stressed earlier, ESG ratings significantly depend on the underlying rating approach, and each rating provider has its own rating methodology. Consequently, the results of Halbritter and Dorfleitner (2015) underline the differences in ESG rating concepts and highlight the importance of taking this variation into account when comparing the results of different studies.

3.2.4 ESG and firm performance

There has indisputably been intense debate on whether ESG affects firm performance. There are differences in the results and how researchers have studied and measured firm performance. Instead of portfolio construction or using risk or the cost of capital as a measure for firm performance, many studies use panel data sets (see, e.g., Yoon et al. 2018; Petitjean 2019) and return on assets (ROA) or Tobin's Q as a measure of firm performance (see, e.g., Wang & Sarkis 2017; Minutolo et al. 2019). Within this framework, many researchers find a positive ESG-CFP relationship (see, e.g., Wang & Sarkis 2017; Yang & Baasandorj 2017; Minutolo et al. 2019), whereas some suggest there is no correlation or the correlation is unclear (see, e.g., Garcia-Castro et al. 2010, Velte 2017; Atan et al. 2018; Petitjean 2019), and a few argue there is a negative correlation between ESG and firm performance (see, e.g., Baron et al. 2011).

In addition to different research methods and proxies, a great deal of different data has also been used in the previous studies, for example regarding the market, data providers, and the length of the period. For example, Minutolo et al. (2019) analyze firms in the S&P 500 from the period 2009–2015 by using the Bloomberg ESG database, Velte (2017) investigates firms listed on the German Prime Standard (DAX30, TecDAX, MDAX) for the years 2010–2014 by using Asset4 database, Yoon et al. (2018) study firms in Korean market during 2010–2015 and using the Korea Corporate Governance Service, whereas the study of Yang and Baasandorj (2017) includes several different countries for the years 2006–2015 and collects ESG scores from Asset4 database. All these four studies find at least some evidence of the positive ESG-CFP relationship.

Many prior studies that examine the ESG-CFP relationship not only consider the overall ESG performance but also separately look at the individual ESG dimensions impact on firm performance (see, e.g., Yang & Baasandorj 2017; Atan et al. 2018). Accordingly, although the overall ESG performance may not lead to a significant association, some of the dimensions might still impact CFP. Many researchers argue that especially an environmentally friendly corporate policy leads to better firm performance. For example, Darnall et al. (2008) examine manufacturing facilities operating in Canada, Germany, Hungary, and the US and find that companies that adopt comprehensive environmental management practices are more likely to obtain positive business performance. Whereas Guenster et al. (2011), they investigate the US listed companies from 1997–2004 and analyze the relation between eco-efficiency and financial performance. They use ROA as a proxy for operating performance and profitability and Tobin's Q for a firm valuation, concluding that eco-efficiency positively affects firm performance and market value.

In addition to environmental performance, there is evidence that social and governance factors separately impact CFP. For instance, Benson and Davidson (2010) investigate S&P 500, Domini 400 Social, and Russell 1000 companies from 1991 to 2002, finding that firms with better stakeholder management also have higher firm value, whereas Brown and Caylor (2006) examine the governance performance of 1,868 firms and find that the corporate governance is positively and significantly associated with Tobin's Q.

3.2.5 Sensitive industries and market crises

As stated previously, ESG factors and further ESG related risks significantly vary across industries, implying that firms operating in different industries have different ESG risk profiles. Therefore, it is not surprising that when debating whether there is a positive ESG-CFP relation or not, some previous studies find that the value-creating effect of ESG is industry-specific. From the stakeholder theory perspective, this may be due to the pressure from different interest groups or the regulations imposed on specific industries. For example, environmentally sensitive industries, such as oil, gas, paper, mining, and chemical, are often seen as polluting sectors and perceived as having high environmental risk (see, e.g., Amor-Esteban et al. 2018). Due to this, they need to be leaders in sustainable development as they need to put more effort into environmental issues than their non-sensitive counterparts to convince stakeholders that their actions are responsible. Whereas firms from less polluting sectors, such as financial services or media, they do not have

the same pressure regarding environmental issues. On the other hand, giving higher priority to employees' rights and business ethics, firms from less polluting sectors may present higher values in social and governance issues. (Richardson & Welker 2001; Andersen & Dejoy 2011; Amor-Esteban et al. 2018.)

There is empirical evidence that the value-creating effect of ESG is different for firms in environmentally sensitive industries. For example, by running a panel regression model, Yoon et al. (2018) find that the impact of ESG on firm valuation is lesser for firms in environmentally sensitive industries than for firms not belonging to sensitive industries. They investigate this difference by including an interaction term of the ESG variables and a dummy variable for environmentally sensitive industries into their regression model, finding the coefficients on the interaction terms to be negative. By utilizing similar regression models and interaction terms, Miralles-Quirós et al. (2018) also find that the market positively values the environmental practices for firms not related to environmentally sensitive industries. However, in contrast to Yoon et al. (2018), they find that the market positively values social and corporate governance practices for the firms belonging to the sensitive industries. Consequently, no clear evidence on how sensitive industries affect the ESG-CFP relation exists, but there is still evidence of potential differences between industries, leaving an interesting research gap for further investigation.

Although some researchers have paid attention to the industry-specific characteristics, less research emphasizes that the ESG activities may especially pay off during market crises. However, consistent with the risk management theory and social capital, there is some gleaned evidence that ESG performance mitigates financial risk when there is a period of low trust in the market. Align with the studies examining the industry-specific characteristics, the papers typically use interaction terms to examine whether the value-creating effect of ESG performance is positively specific to periods of low trust.

For example, Lins et al. (2017) find that the non-financial US firms with high-ESG performed better than others during the financial crisis in 2008–2009. Their findings support that high-ESG firms experienced higher profitability and growth during the market crisis than low-ESG firms. Cornett et al. (2016) agree with Lins et al. (2017) by showing that the financial performance of the US banks is positively related to their ESG score during the financial crisis. More interestingly, Broadstock et al. (2020) provide similar results on the recent crisis triggered by COVID-19. Their study covers the ESG dataset for China's CSI300 members and shows that ESG performance is positively related to the short-term cumulative returns of CSI300 stocks around the COVID-19 crisis. They

illustrate that ESG performance lowers financial risk during a crisis and conclude that investors may interpret high-ESG as a signal of risk mitigation in crisis times.

Not surprisingly, some studies provide contradictory conclusions. For example, Simionescu and Gherghina (2014) examine the ESG-CFP relation using the various account and market-based proxies for financial performance during 2008–2011. For most of the performance measures, they do not find a positive relationship. Petitjean (2019) also examines the panel data set of large US companies included in the S&P 500 between the years 2005–2017 and does not observe any clear-cut changes over time whether the analysis is conditioned on the occurrence of financial crisis 2008–2009. He also examines the ESG-CFP relationship before, during, and after the financial crisis by separately investigating each of the three ESG dimensions. Paying special attention to the effect of environmental performance and eco-friendly policies and using a wide range of the interaction terms in the regression, he finds no substantial evidence that the relationship would be special at the period of low trust. Nevertheless, he finds some weak evidence that through efficient energy use, financial performance seems to be more sensitive to environmental performance during the crisis than before it. Overall, these conclusions may indicate that firms are expected to focus more on short-term economic survival rather than invest their ESG practices in the middle of a crisis. (Petitjean 2019.)

3.3 Research hypotheses development

As mentioned in the beginning, the main objective of this study is to investigate whether there is a relationship between a firm's ESG and corporate financial performance (CFP). Based on previously discussed financial theories and empirical evidence, research hypotheses are next formulated. As discussed, most of the theories, such as the stakeholder and legitimacy theory, support a positive ESG-CFP relation. In addition, numerous empirical studies bolster that the relationship is statistically significant (see, e.g., Friede et al. 2015; Yang & Baasandorj 2017; Minutolo et al. 2019). Hence, the following hypothesis is formulated

> *H_1: There is a positive and significant relationship between a firm's ESG and financial performance.*

Assuming the disaggregation of ESG performance, there is evidence that the relationship is similar when measuring ESG performance in its three different dimensions (see, e.g., Velte 2017; Atan et al. 2018). As a result, as constituents of hypothesis H_1, the following three hypotheses are proposed

H_{1a}: There is a positive and significant relationship between a firm's environmental and financial performance.
H_{1b}: There is a positive and significant relationship between a firm's social and financial performance.
H_{1c}: There is a positive and significant relationship between a firm's governance and financial performance.

As emphasized, ESG risk profiles vary across industries. Under the stakeholder theory, the value-creating effect of ESG may be different for firms in environmentally sensitive industries than for their non-sensitive counterparts. Based on this view and the results of Yoon et al. (2018), it is hypothesized that the impact of ESG on firm performance is more significant for firms in non-sensitive industries than for firms that do belong to environmentally sensitive industries, leading to the following hypothesis

H_2: Firms belonging to non-sensitive industries face a greater valuation effect of overall ESG performance compared to firms belonging to environmentally sensitive industries.

Furthermore, many researchers argue that especially an environmentally friendly corporate policy leads to better firm performance (see, e.g., Darnall et al. 2008; Sharfman & Chitru 2008; Bauer & Hann 2010; Guenster et al. 2011). In addition, as Yoon et al. (2018) and Miralles-Quirós et al. (2018) especially find that the market positively values the environmental practices for firms not related to environmentally sensitive industries, the following sub-hypothesis is formulated

H_{2a}: Firms belonging to non-sensitive industries face a greater valuation effect of environmental performance compared to firms belonging to environmentally sensitive industries.

As discussed, some researchers emphasize that the ESG activities may especially pay off during market crises (Cornett et al. 2016; Lins et al. 2017; Broadstock et al. 2020). The rationale behind this conclusion relies on the risk management theory and social capital as high ESG performance can be thought of as an insurance policy that pays off when investors and the economy as a whole face a crisis of confidence. However, no consistent empirical evidence is gained, and previous studies have mainly concentrated on the US markets and only the effect of the financial crisis 2008–2009. Motivated by this research gap, this study extends the literature by examining the possible effect of periods of low trust on the European market and taking the Eurozone crisis under consideration. Consequently, the following hypothesis is developed

> *H_3: The value-creating effect of ESG performance is positively specific to periods of low trust.*

Again, based on the assumption that especially an environmentally friendly corporate policy leads to better firm performance, the following sub-hypothesis is developed

> *H_{3a}: The value-creating effect of environmental performance is positively specific to periods of low trust.*

4 DATA AND RESEARCH METHOD

4.1 Data

This empirical study examines whether there is a relationship between ESG and corporate financial performance (CFP) in the European market during the period 2002–2019. ESG scores are obtained from the Asset4 database, one of the most comprehensive ESG databases provided by Refinitiv (see, e.g., Halbritter & Dorfleitner 2015, 26; Refinitiv 2019), and all financial data is obtained from the Refinitiv Eikon Datastream. Both ESG and financial data are collected for the period 2002–2019.[1] The sample period is relatively long for two reasons. First, ESG investing is proved to be first and foremost a long-term approach (see, e.g., Cajias et al. 2014; Atan et al. 2018). Second, a long sample period is required to examine the effects of the financial and the Eurozone crises (2008–2009 and 2011–2012) since there must be sufficient data before and after the crises.[2] The sample spans from 2002 as the Asset4 database provides ESG data going back to 2002.

The sample construction procedure can be described as follows. First, every firm of the Asset4 database Europe list was initially included in the sample. [3] Asset4 Europe list consists of 1159 capitalized European firms. It broadly covers firms listed in the STOXX Europe 600 index that is often considered a benchmark for the European stock markets (Horvath & Petrovski 2013; Sassen et al. 2016). Classified by Industry Classification Benchmark (ICB), Asset4 Europe includes 11 industries: technology, telecommunications, health care, financials, real estate, consumer discretionary, consumer staples, industrials, basic materials, energy, and utilities.[4] In line with previous literature, firms in the financial sector are excluded from the final sample due to their significant off-balance sheet operations and specific regulations compared to other sectors (see, e.g., Velte 2017; Yoon et al. 2018; Petitjean 2019). The remaining sample thus comprised ESG and financial data of 925 non-financial firms for the period between 2002 and 2019, including the following 20 countries: United Kingdom, Germany, France, Sweden, Switzerland, Italy, Spain, Netherlands, Norway, Belgium, Finland, Denmark, Poland, Turkey, Austria,

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1 All the data is annual data with values measured at the end of each year.

2 OECD based Recession Indicator for OECD Europe also points to a recession between January 2008 and June 2009 and between May 2011 and February 2013.

3 The full code of the Asset4 Europe list is LA4RGNEU in Asset4.

4 Industry Classification Benchmark (ICB) is a globally utilized standard for classifying companies by industry and sector. More information: https://www.ftserussell.com/data/industry-classification-benchmark-icb, retrieved 1.12.2020.

Greece, Ireland, Portugal, Czech Republic, and Hungary. The distribution of countries and industries in the final sample is illustrated in Table 9.

Table 9. The distribution of countries and industries in the final sample

Country	Firms (N)	Firms (%)	Industry	Firms (N)	Firms (%)
United Kingdom	289	31.2 %	**Sensitive industries**		
Germany	110	11.9 %	Basic Material	82	8.9 %
France	102	11.0 %	Energy	67	7.2 %
Sweden	61	6.6 %	Utilities	40	4.3 %
Switzerland	47	5.1 %		189	20.0%
Italy	44	4.8 %			
Spain	41	4.4 %	**Non-sensitive industries**		
Netherlands	37	4.0 %	Industrials	222	24.0 %
Norway	29	3.1 %	Consumer Discretionary	189	20.4 %
Belgium	25	2.7 %	Health Care	78	8.4 %
Finland	24	2.6 %	Consumer Staples	74	8.0 %
Denmark	23	2.5 %	Real Estate	67	7.2 %
Poland	23	2.5 %	Technology	59	6.4 %
Turkey	23	2.5 %	Telecommunications	47	5.1 %
Austria	12	1.3 %		736	80.0%
Greece	12	1.3 %			
Ireland	9	1.0 %			
Portugal	8	0.9 %			
Czech Republic	3	0.3 %			
Hungary	3	0.3 %			
TOTAL	925	100 %	TOTAL	925	100 %

In line with the previous literature, sectors related to energy (including oil and gas), steel making, chemicals, mining, paper, and pulp, are defined as environmentally sensitive industries (see, e.g., Richardson and Welker 2001; Garcia et al. 2017; Yoon et al. 2018). In accordance with the ICB classification, the following industries are identified as environ-

mentally sensitive: basic materials, energy, and utilities. Basic materials refer to sub-sectors such as paper, metals, mining, and chemicals; the energy includes oil, gas, and coal; and the utilities include sub-sectors such as electricity, gas, and water.[5] In line with this classification, 189 firms belong to the environmentally sensitive industries in the final sample.

It is noted that some countries and industries are better represented than others in the final sample. For example, most of the firms (over 54%) are located either in the United Kingdom, Germany, or France, while only a few companies (under 2%) are in Portugal, the Czech Republic, or Hungary. Similarly, most firms (over 44%) operate either in industrials or consumer discretionary industries, whereas fewer firms (under 10%) operate in telecommunications or utilities.

Although the final sample consists only of the European firms, the uneven distribution of countries and industries is highlighted since the ESG-CFP relation may be industry and country-specific. Firms operating in non-sensitive industries may face a greater valuation effect of ESG performance compared to firms belonging to environmentally sensitive industries, and civil and common law countries may be more apt to recognize different ESG information, meaning that the social (governance) performance may be more valued in civil (common) law countries (see, e.g., Duuren et al. 2016; Gibson et al. 2020). Consequently, it is highlighted that the firms in environmentally sensitive industries account for about 20% of the firms, and the firms from the UK and Ireland, which are the only common law countries in the final sample, represent about 30% of the firms.[6]

Since ESG has been entering the mainstream in recent years, the amount of ESG data has increased during the last decade. Consequently, the amount of ESG scores also annually increases during the panel period, except between 2018 and 2019. For example, out of 925 firms, only 244 firms have ESG data in 2002, but already 854 firms have ESG data in 2018. The arguable reason why there are fewer firms with ESG data in 2019 (719 firms) than in 2018 (854 firms) is that the Asset4 database has not yet received the scores for all the companies by the time the data was collected for this study.[7] More information about

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5 More information about the sub-sectors is provided in Appendix 1.

6 More information about the different legal systems: https://www.lawlibrary.ie/Legal-Services/The-Courts-System.aspx, retrieved 2.1.2021.

7 The data of this study was collected in August 2020. Asset4 ESG scores are based on company-reported data and various other publicly available information. As not all the companies publish their ESG reports at the same time, and no specific timeframe for ESG reporting exists, the ratings of different companies are not updated in the Asset4 database at the same time. Thus, not all the ESG scores for the year 2019 were yet available in August 2020.

how the amount of ESG scores develops in the final sample is illustrated in Appendix 2 and 3.

The data used in this study is panel data as there are multiple firms that are observed in several years. Panel data set is widely used in prior research examining the ESG-CFP relationship (see, e.g., Velte 2017; Petitjean 2019). As the same firms are observed for each period, the panel data set is a fixed panel. Furthermore, the panel is unbalanced since the amount of the ESG scores and financial data across firms varies during the sample period. However, no problems are expected with the use of an unbalanced panel that is also used in prior studies (see, e.g., Garcia-Castro et al. 2010). Many empirical methods are suitable for unbalanced panel data, and most software programs, also those used in this study, can handle the unbalanced data.[8]

4.2 Research method

4.2.1 Pooled OLS and Fixed Effects regression

Given the objective of this study, panel regression analysis is computed. In line with many previous studies that use a panel data set to examine the ESG-CFP relationship, Pooled OLS (POLS) regression model is used as a simple model (see, e.g., Garcia et al. 2017; Atan et al. 2018). However, despite its prevalence, POLS is a highly restrictive model as it disregards individual heterogeneity by imposing a common intercept and slope coefficients for all cross-sections. It rules out the existence of firm-specific unobserved effect, α_i, which is not directly observable and represents a firm's unique characteristics that distinguish it from the rest. Therefore, if there is an unobserved effect that is correlated with the included independent variable while being a determinant of the dependent variable, POLS becomes inconsistent and suffers from the omitted variable bias. The omitted variable bias is a common problem in empirical research and particularly relevant to elusive variables such as proxies for sustainability that is hard to measure by its nature. (Garcia-Castro et al. 2010; Atan et al. 2018.)

One solution for omitted variable bias is to specify a fixed effects model (FE) that allows α_i to be correlated with the regressors. To demonstrate, an unobserved variable is included in a simple regression model with one independent variable

[8] The regression analysis is conducted using the EViews 11 Student Version.

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Z_i + \varepsilon_{it}, \quad (1)$$

where i is the subscript for each individual, t is the subscript for time, Y_{it} is the dependent variable, β_0 is the intercept, β_k is the regression coefficient, X_{it} is the independent variable, Z_i is the unobserved variable that varies from one entity to the next but is constant over time, and ε_{it} is the error term. As Z_i varies from one entity to the next, the model allows having N intercepts, one for each entity. Especially, when letting $\alpha_i = \beta_0 + \beta_2 Z_i$, the Equation 1 becomes

$$Y_{it} = \beta_1 X_{it} + a_i + \varepsilon_{it},$$

where $\alpha_i, \ldots, \alpha_n$ are entity fixed effects, the unknown intercepts to be estimated. As the FE model allows attrition, which is the reason an entity leaves the sample, to be correlated with a_i, the FE model also applies to unbalanced panel data set. The rationale is that if some entities are more likely to drop out of the survey, it is captured by α_i. (Wooldridge 2013, 484–492; Stock & Watson 2020, 361–381.)

However, the entity fixed effects model only absorbs the influences of those omitted variables that differ from one entity to the next but are constant over time. As there might also exist omitted variables that are constant across entities but change over time, the unobserved variable varying over time is included in the model, and the two-way fixed effect model with multiple regressors is defined as

$$Y_{it} = \beta_1 X_{1,it} + \ldots + \beta_k X_{k,it} + \alpha_i + \lambda_t + \varepsilon_{it},$$

where $\lambda_t, \ldots, \lambda_n$ are time fixed effects, another unknown intercept to be estimated. (Stock & Watson 2020, 367–375.)

To justify the suitable model for the panel data, the following tests are conducted. First, by running the F-test for the fixed effects, all the associated p-values strongly reject the null hypothesis that the cross-section and time effects are redundant.[9] Thus, the F-test suggests that the coefficient generated by the POLS is not consistent, and the FE should be used over the POLS. Breusch-Pagan LM test also rejects the adjustment of the POLS,

[9] F-test is run for all the models used in this study, and the null hypothesis is rejected at a 1% significance level in all cases.

suggesting the random effects model (RE) over the POLS.[10] Although some previous studies also run the RE model when examining the ESG-CFP relation (see, e.g., Garcia et al. 2017; Atan et al. 2018), the RE model is not conducted in this study. The rationale is that the RE model's key assumption is an opposite to that made in the FE model: the RE model assumes that the unobserved effect is uncorrelated with the regressors, also known as strict exogeneity. In addition, the Hausman test contradicts the assumption of the RE model by suggesting a correlation between the unobserved fixed effects and the regressors in the sample.[11] Consequently, the RE model would be inconsistent, whereas the FE model seems to be the most appropriate for the data. (Sassen et al. 2016; Garcia et al. 2017; Atan et al. 2018.)

4.2.2 Dependent and independent variables

In line with previous literature, to capture both the historical and potential future performance of a firm, both accounting and market-based measures are used as proxies of a firm's financial performance (Atan et al. 2018). Thus, the dependent variable is assessed using two criteria: profitability and firm value. As an account-based proxy for profitability, return on assets (ROA) is widely accepted in the previous literature (see, e.g., Guenster et al. 2011; Velte 2017; Yang & Baasandorj 2017; Minutolo et al. 2019). Following Yang and Baasandorj (2017) and Minutolo et al. (2019), ROA is measured at the end of each year and defined as follows

$$ROA_{i,t} = \frac{Net\ profit_{i,t}}{Total\ Assets_{i,t}},$$

where $Net\ profit_{i,t}$ is the net income of firm i in year t, and $Total\ Assets_{i,t}$ is the book value of the total assets of firm i in year t.

As account-based variables are typically more short-term-oriented measures and they may depend on the timing of cash flows in the company or be subject to manipulation by the management, some weaknesses in measuring a firm's performance with an account-based variable may occur (Garcia-Castro et al. 2010; Aouadi & Marsat 2018). Hence,

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[10] Breusch-Pagan LM test is run for all the models used in this study, and the null hypothesis is rejected at a 1% significance level in all cases.

[11] Hausman test is employed for all the models used in this study. All the p-values are statistically significant at a 1% significance level, indicating that the FE model is favored over the RE model.

firm performance is also measured with Tobin's Q, a market-based variable and a widely accepted measure for firm value (see, e.g., Guenster et al. 2011; Velte 2017; Yang & Baasandorj 2017; Minutolo et al. 2019). Unlike ROA, it is a forward-looking measure of firm's performance and overcomes the weaknesses of traditional accounting measures. Tobin's Q below one indicates poor use of resources, meaning that the firm creates less value on the stock market than its assets are worth. Conversely, if the value is greater than one, a firm's market value is higher than the current value of its assets. (Aouadi & Marsat 2018.)

The definition of Tobin's Q varies in the literature. In line with Yang and Baasandorj (2017) and Minutolo et al. (2019), Tobin's Q is measured at the end of each year and the following approximation is used

$$Tobin's\ Q_{i,t} = \frac{Market\ Cap_{i,t} + Pref\ Stock_{i,t} + Debt_{i,t}}{Total\ Assets_{i,t}},$$

where $Market\ Cap_{i,t}$ is the market capitalization of all outstanding stock of firm i in year t, $Pref\ Stock_{i,t}$ is the value of the outstanding preferred stock of firm i in year t, and $Debt_{i,t}$ represents short-term debt and current portion of long-term debt of firm i in year t.

In line with many prior studies, ESG is measured by the ESG score obtained from the Asset4 database (see, e.g., Sassen et al. 2016; Velte 2017; Aouadi & Marsat 2018). As previously discussed, the Asset4 ESG score is an overall company score based on the self-reported information in the environmental, social, and corporate governance pillars, and it is used as a proxy for a firm's overall ESG performance.[12] As the effect of the three ESG dimensions is also separately analyzed, the environmental, social, and governance pillar scores of Asset4 are used as proxies for a firm's environmental, social, and governance performance, respectively. (Refinitiv 2019.)

[12] Asset4 ESG score is used instead of the Asset4 ESG Combined Score to measure the pure impact of ESG on firm performance and make the results more comparable to previous studies that have commonly used ESG score instead of ESG Combined Score (see, e.g., Sassen et al. 2016).

Table 10. Dependent and independent variables

The data is collected for the period 2002–2019. All the variables are measured at the end of each year.

Variable	Proxy for	Definition	Theoretical foundation
Dependent variables			
Return on assets (ROA)	Corporate financial performance (CFP)	Net profit / Total Assets	Yang & Baasandorj 2017 Minutolo et al. 2019 Petitjean 2019
Tobin's Q (TQ)	Corporate financial performance (CFP)	(Market Capitalization + Preferred Stock + Debt) / Total Assets	Yang & Baasandorj 2017 Minutolo et al. 2019
Independent variables			
ESG score (ESGS)	Firm's overall ESG performance	Asset4 ESG Score	Sassen et al. 2016 Aouadi & Marsat 2018 Velte 2017
Environmental score (ENVS)	Firm's environmental performance	Asset4 Environmental Pillar Score	Sassen et al. 2016 Aouadi & Marsat 2018 Velte 2017
Social score (SOCS)	Firm's social performance	Asset4 Social Pillar Score	Sassen et al. 2016 Aouadi & Marsat 2018 Velte 2017
Governance score (GOVS)	Firm's governance performance	Asset4 Governance Pillar Score	Sassen et al. 2016 Aouadi & Marsat 2018 Velte 2017

Table 10 summarizes the dependent and independent variables used in this study. As illustrated, the dependent variables are return on assets (ROA) and Tobin's Q (TQ), and four independent variables are the overall ESG score (ESGS), environmental score (ENVS), social score (SOCS), and governance score (GOVS). All the variables are commonly used proxies in previous literature and measured at the end of each year.

4.2.3 Control variables and interaction terms

Despite its virtue, the FE model can only control omitted variables that vary across entities but do not evolve over time or variables that change over time but do not vary across entities. As there might be omitted variables that vary both across firms and over time, the set of control variables is adopted into the panel regression model. Control variables are not of primary interest in the study but rather regressors that, if neglected, could lead the estimated causal effect of interest to suffer from omitted variable bias. (see, e.g., Garcia-Castro et al. 2010; Lu et al. 2014; Aouadi & Marsat 2018.)

Andersen and Dejoy (2011) argue that the best model examining the ESG-CFP relationship controls the size, industry, risk, and research and development expenditures (R&D). Consistently, these variables, or some mix of them, are the control variables widely used in many previous studies (see, e.g., Velte 2017; Aouadi & Marsat 2018; Atan et al. 2018). However, in their comprehensive research in which 84 empirical studies on the nexus between CSR and CFP are reviewed during 2002–2011, Lu et al. (2014) state that the five most frequently used control variables in explaining the ESG-CFP relationship are firm size, industry, capital structure, financial return (e.g., ROA or ROE), and risk. As a combination of the arguments of Lu et al. (2014) and Andersen and Dejoy (2011), the following control variables are used in this study: financial return (ROA), size, risk, and industry. R&D expenditures are excluded since the R&D variable is owing to limited data availability in the European sample. If R&D were included, the number of firm-year observations would dramatically drop.[13]

As mentioned, firm size has been widely recognized as being a necessary control variable. However, the effect of firm size on firm performance is ambiguous. Firm size may enhance a firm performance as a larger size may help a firm to sustain its competitive advantage when, for example, learning effects or economies of scale are present (Roberts & Dowling 2002). In addition, several studies show that market value is directly linked to firm size (Aouadi & Marsat 2018). On the other hand, some studies argue that firm value decreases when a firm becomes larger and more diversified due to the complexity of organizational structure (see, e.g., Lang & Stulz 1994; Seo et al. 2015). Nevertheless, as many prior studies have found that firm size affects ESG performance (see, e.g., Prior et al. 2008; Kim et al. 2014; Minutolo et al. 2019), it is reasonable to control for size in the regression model. For example, under the legitimacy theory, one might argue that when firms get larger, private information acquisition increases and larger firms need to maintain their social contract more actively and disclose more ESG related information to signal to the market their intent to be responsible (Lang & Lundholm 1993; Minutolo et al. 2019). In line with prior studies, the natural logarithm of total assets is adopted as a proxy for firm size (see, e.g., Sassen et al. 2016; Aouadi & Marsat 2018; Brogi & Lagasio 2018).

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[13] For example, over 15,000 observations are available for ROA, size, and leverage, whereas R&D expenditures would only have approximately 7,000 observations for the panel period. Hence, taking R&D expenditures as a control variable would significantly decrease the number of total observations in the regression model. Excluding R&D expenditures is in line with Sassen et al. (2016), who also excluded a control variable based on a similar reason.

As argued, the cost of capital theory provides a framework in which the effect of ESG on firm performance can be examined. According to Lu et al. (2014), capital structure is one of the five most frequently used control variables explaining the ESG-CFP relationship. As capital structure and debt capacity are closely related to risk, leverage has often been used as a proxy for firm risk (Prior et al. 2008; Lu et al. 2014; Garcia et al. 2017). In line with the previous research, leverage is defined as total debt divided by total assets and used as a proxy for controlling firm risk in this study (see, e.g., Guenster et al. 2011; Yang & Baasandorj 2017).

In the previous research, profitability is often controlled in those regression models in which Tobin's Q is used as a dependent variable. This approach is feasible when Tobin's Q is a proxy for firm performance and profitability is expected to affect both ESG and Tobin's Q. Many studies support these relations. For example, Aouadi & Marsat (2018) argue that previous research has established a direct link between firm performance and profitability, Li et al. (2018) find that there is an association between ROA and ESG disclosure, and Garcia et al. (2017) state that the profitability is associated with the environmental performance. In line with these statements, profitability, measured as ROA, is controlled in those regression models where Tobin's Q is the dependent variable.

The industry is also identified to be controlled. In line with the previous research, this paper pays special attention to the environmentally sensitive industries as there is prior evidence that sensitive industries may have a significant effect on the ESG-CFP relation (see, e.g., Amor-Esteban et al. 2018). As stated, based on the ICB classification, a firm is identified as being environmentally sensitive if it operates in one of the following sectors: basic materials, energy, or utilities. The industry is controlled using a dummy variable that takes the value 1 if a firm *i* belongs to a sensitive industry and 0 otherwise. In line with Garcia-Castro et al. (2010), firms are expected to operate in the same industry through the panel period, making the industry a time-invariant variable. Consequently, the industry dummy variable does not apply to FE models that only can estimate time-varying variables, and the industry dummy variable is thus only included in POLS models.

All the control variables are illustrated in Table 11. The set of control variables includes four control variables that are based on the previous literature and measured at the end of each year: return on assets (ROA), size (SIZE), leverage (LEV), and industry (IND). Moreover, Table 11 summarizes the definitions of the interaction terms that are adopted based on prior studies (see, e.g., Yoon et al. 2018; Miralles-Quirós et al. 2018;

Petitjean 2019). The interaction variables are included in the regression to investigate whether the ESG-CFP relationship is specific to industry or economic specific characteristics.

Table 11. Control variables and interaction terms

The data is collected for the period 2002–2019. All the variables are measured at the end of each year.

Variable	Proxy for	Definition	Theoretical foundation
Control variables			
Return on assets (ROA)	Profitability	Net profit / Total assets	Yang & Baasandorj 2017 Minutolo et al. 2019
Size (SIZE)	Firm size	Natural logarithm of total assets	Guenster et al. 2011 Velte 2017 Aouadi & Marsat 2018
Leverage (LEV)	Firm risk	Total debt / Total assets	Guenster et al. 2011 Garcia et al. 2017 Velte 2017
Sensitive industry (IND)	Industry in which a firm operates (branch of industry)	A dummy variable that takes the value 1 if firm belongs to an environmentally sensitive industry and 0 otherwise	Velte 2017
Interaction terms			
ESGS×IND	The interaction between a firm's overall ESG performance and industry	Interaction of ESG score with a dummy variable that takes the value 1 if a firm belongs to an environmentally sensitive industry and 0 otherwise	Yoon et al. 2018 Miralles-Quirós et al. 2018
ESGS×CRISIS	The interaction between a firm's overall ESG performance and market crisis	Interaction of ESG score with a dummy variable set to one in 2008–2009 (the financial crisis) and 2011–2012 (the Eurozone crisis) and 0 otherwise	Lins et al. 2017 Petitjean 2019
ENVS×IND	The interaction between a firm's environmental performance and industry	Interaction of environmental score with a dummy variable that takes the value 1 if a firm belongs to an environmentally sensitive industry and 0 otherwise	Yoon et al. 2018 Miralles-Quirós et al. 2018
ENVS×CRISIS	The interaction between a firm's environmental performance and market crisis	Interaction of environmental score with a dummy variable set to one in 2008–2009 (the financial crisis) and 2011–2012 (the Eurozone crisis) and 0 otherwise	Lins et al. 2017 Petitjean 2019

Consistent with H_2, the interaction term of ESG performance and the environmentally sensitive industry (ESGS × IND) is included by adding an interaction of ESG score with

a dummy variable that takes the value 1 if a firm belongs to a sensitive industry and 0 otherwise. Also, consistent with H_{2a}, the interaction term of environmental performance and the environmentally sensitive industry (ENVS × IND) is included by adding an interaction of environmental score with a dummy variable that takes the value 1 if a firm belongs to a sensitive industry and 0 otherwise. Following Yoon et al. (2018) and Miralles-Quirós et al. (2018), the coefficients on these interaction terms are expected to capture the valuation effect of ESG and environmental practices for environmentally sensitive industries.

Following Lins et al. (2017) and Petitjean (2019), the interaction term is also included to investigate H_3 and H_{3a}. Consistent with H_3, the interaction between a firm's ESG performance and market crisis (ESGS × CRISIS) is captured by adding an interaction term that is the interaction of ESG performance with a dummy variable set to 1 in 2008–2009 and 2011–2012, implicating the financial and the Eurozone crisis, respectively, and 0 otherwise. Likewise, consistent with H_{3a}, the interaction between a firm's environmental performance and market crisis is included (ENVS × CRISIS).

5 EMPIRICAL RESEARCH

5.1 Descriptive statistics

Before performing a panel regression analysis to test the research hypotheses, the descriptive statistics are reported in Table 12. Amongst others, the mean, minimum and maximum values, and standard deviation are presented for dependent, independent, and control variables. Since the data is unbalanced, the number of observations for each variable varies. For example, over 15,000 firm-year observations are found for ROA, size, and leverage, whereas over 10,000 firm-year observations are found for the overall ESG score and individual ESG pillar scores. As winsorizing extreme values of variables of interest is a common practice in financial research to deal with outlier observations in a regression model, this study follows Aouadi and Marsat (2018) by winsorizing all variables at the 1 and 99% level.

Table 12. Descriptive statistics

Table reports the descriptive statistics of the dependent, independent, and control variables. TQ is Tobin's Q, ROA is the return on assets, SIZE is the natural logarithm of total assets, and LEV is the leverage. ESGS is the overall ESG score, ENVS is the environmental pillar score, SOCS is the social pillar score, and GOVS is the governance pillar score. All variables are winsorized at the 1 and 99 % level to deal with outliers.

	N	Mean	Median	Max.	Min.	SD	Skew.	Kurt.
TQ	13,973	1.108	0.786	6.084	0.123	1.020	2.538	10.748
ROA	15,193	0.046	0.046	0.305	-0.383	0.090	-1.328	9.853
SIZE	15,200	14.676	14.684	18.829	9.914	1.762	-0.107	3.059
LEV	15,195	0.263	0.252	0.819	0.000	0.180	0.580	3.130
ESGS	10,805	49.950	50.470	89.470	8.310	20.705	-0.062	2.081
ENVS	10,799	45.549	46.370	95.210	0.000	28.066	-0.072	1.863
SOCS	10,799	51.977	52.320	95.230	4.830	24.305	-0.049	1.933
GOVS	10,805	50.720	51.170	93.080	6.580	22.188	-0.055	2.046

The mean (median) Tobin's Q is 1.108 (0.786), whereas the mean (median) ROA is 0.046 (0.046). The mean 1.108 for Tobin's Q implies that, on average, the sample firms have a market value equal to 1.108 times the replacement cost of assets (Minutolo et al. 2019). In general, ROA for firms operating in industries such as retail or capital goods is approx-

imately 4–5% (CSIMarket 2020). Since these sectors are broadly covered by the industrials and consumer discretionary that are the most represented industries in the sample, the mean of 4.6% for ROA seems reasonable. Mean and median values of ROA and Tobin's Q are comparable to prior research on financial performance (see, e.g., Yang & Baasandorj 2017; Velte 2017; Minutolo et al. 2019).

As Table 12 depicts, the average ESG scores of the firms are 49.95 for overall ESG performance, 45.55 for environmental performance, 51.98 for social performance, and 50.72 for governance performance. Recalling the previously introduced corresponding letter grades of Asset4 that range from D- to A+, the average overall ESG score approximately corresponds to the letter grades C+ and B-. On average, the sample firms have the best score in social performance, which supports the previous assumption that social performance is especially valued in Europe and further in civil law countries (Liang & Renneboog 2017; Gibson et al. 2020). This observation is further supported when comparing the results to Yoon et al. (2018) and Velte (2017). Yoon et al. (2018) examine ESG-CFP relation in the Korean market, finding that the Korean firms on average have the best score in environmental performance and the lowest in social performance, whereas Velte (2017), who examines German public companies, finds that the German firms particularly have the best score in social performance.

It is noted that the standard deviations of the ESG scores are high, particularly for the environmental score (28.07). The high standard deviation of ESG scores is in line with previous findings, underlining a substantial variation in ESG practices (see, e.g., Garcia et al. 2017; Yoon et al. 2018). Following Garcia et al. (2017), Table 13 clarifies the reasons for the high standard deviation. Based on the mean values of the overall and individual ESG scores of the sample firms at a country level, Table 13 illustrates the development of the ESG scores.[14] As shown, there has been a significant increase in average ESG scores from 2002–2004 to 2017–2019. The most remarkable change is in the environmental score, which has changed by an average of 30.78 points during the panel period. This development explains the high standard variation and further reflects the increased debate on climate change in recent years and the extent to which climate change has affected business practices. A similar eco-friendly trend is underlined in previous research (see, e.g., Petitjean 2019).

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[14] There is no ESG data available for Poland, Turkey, the Czech Republic, and Hungary for the years 2002–2004.

Table 13. Development of average ESG score and individual ESG pillar scores

	ESG		ENVS		SOCS		GOVS	
	2002–2004	2017–2019	2002–2004	2017–2019	2002–2004	2017–2019	2002–2004	2017–2019
United Kingdom	36.60	52.41	25.15	43.63	39.91	55.16	47.92	56.93
Germany	35.21	59.63	27.50	54.36	32.36	66.08	45.71	54.34
France	40.86	68.51	30.59	70.30	41.53	76.22	48.67	55.55
Sweden	34.75	58.85	20.69	53.97	34.90	64.58	47.76	55.53
Switzerland	33.66	54.01	26.68	46.68	32.57	59.87	41.17	53.45
Italy	38.43	62.68	22.98	58.24	39.12	67.89	48.91	56.56
Spain	35.52	66.08	21.31	65.47	36.91	75.37	43.48	52.46
Netherlands	43.16	65.64	30.63	63.48	46.47	73.11	51.93	57.88
Norway	35.00	52.28	21.15	49.04	34.74	55.48	48.35	50.96
Belgium	27.62	57.23	16.45	49.72	26.58	63.53	42.73	55.86
Finland	39.12	67.50	32.87	70.47	37.53	72.53	46.54	55.45
Denmark	32.41	58.91	18.31	50.36	28.61	66.65	50.78	54.75
Poland	-	42.30	-	36.17	-	43.01	-	44.89
Turkey	-	55.09	-	51.39	-	56.70	-	57.04
Austria	34.11	58.47	17.95	59.40	42.14	59.85	43.18	53.80
Greece	27.75	52.18	9.26	45.44	27.78	55.10	47.81	51.61
Ireland	20.27	53.80	14.75	44.16	13.91	56.95	38.41	58.66
Portugal	18.00	58.95	13.70	58.16	9.39	62.64	35.19	51.90
Czech Republic	-	50.80	-	42.40	-	48.80	-	51.80
Hungary	-	62.04	-	56.87	-	70.46	-	49.06
TOTAL MEAN	33.28	57.87	22.71	53.49	34.34	62.50	45.53	53.92

When comparing the average values of ESG scores during 2002–2004 and 2017–2019, it is noted that the average environmental and social score have increased more (30.78 and 28.16, respectively) than the governance score (8.39). One possible explanation for this may be that as there is a long tradition of corporate governance reporting, practices and reporting standards for environmental and social activities may have evolved more over the last decade, which is further reflected in the development of the ESG ratings. For example, *The financial aspects of corporate governance*, which is usually known as *the Cadbury Report*, were already published in 1997. The report sets out recommendations to mitigate corporate governance risks and failures, and many of its recommendations have since been incorporated into other similar codes, such as the OECD Principles of Corporate Governance. (Jones & Pollitt 2004; Velte 2017.)

As illustrated in Table 13, there are significant differences in the ESG scores at the country level. For example, through the panel period, firms from France, Spain, Netherlands, and Finland stand out, being among the most sustainable firms in terms of overall ESG score and the three ESG pillar scores. The observation is in line with Amor-Esteban et al. (2018), who find that France and Spain present strong ESG practices in the oil, gas, utilities, and industrial industries, the Netherlands in basic materials, and Finland in the utilities and technology industries. The result also corresponds to Liang and Renneboog (2017), who find that firms' ESG ratings significantly vary across countries and firms from civil law countries have high-ESG performance.

The result also aligns with the stakeholder theory, highlighting that concerning ESG performance, the stakeholders' demands are specific to each sector and country. For example, Finland, considered a state of wellbeing where pure nature is valued, has the strongest commitment to environmental performance through the panel period (Amor-Esteban et al. 2018). In addition, firms from the UK and Ireland have the highest average value for governance score compared to their average values in other individual pillar scores. Being the only common law countries in the final sample, this result further supports the assumption that social (governance) performance is especially valued in Europe and further in civil (common) law countries (Liang & Renneboog 2017; Gibson et al. 2020).

Table 14. Mean values of the variables by industry

	Sensitive industries							
	TQ	ROA	SIZE	LEV	ESGS	ENVS	SOCS	GOVS
Basic Materials	0.948	0.043	14.982	0.229	53.511	52.541	53.593	55.069
Energy	0.775	0.025	15.066	0.274	51.642	47.788	53.790	53.673
Utilities	0.501	0.027	16.450	0.339	56.563	57.505	56.995	54.326
TOTAL MEAN	0.795	0.033	15.325	0.268	53.574	52.068	54.427	54.433
	Non-sensitive industries							
	TQ	ROA	SIZE	LEV	ESGS	ENVS	SOCS	GOVS
Technology	1.578	0.056	13.251	0.164	44.299	32.936	47.532	47.812
Telecommunications	1.125	0.049	15.401	0.335	53.038	46.255	53.809	56.522
Health Care	1.912	0.025	13.901	0.214	50.316	40.651	54.615	50.569
Real Estate	0.533	0.036	14.730	0.385	46.244	46.417	48.580	42.886
Consumer Discretionary	1.231	0.058	14.632	0.265	48.732	42.795	51.455	48.703
Consumer Staples	1.162	0.058	14.785	0.259	52.705	49.994	54.142	53.104
Industrials	1.015	0.048	14.604	0.250	48.312	44.294	50.235	49.996
TOTAL MEAN	1.188	0.049	14.507	0.261	49.945	43.740	51.297	49.690

Table 15. Mean equality tests, sensitive and non-sensitive industries

The table reports the value of the test statistics of Brown-Forsythe test, two-sample t-test, Welch's F-test, and Wilcoxon-Mann-Whitney test (WMW). The symbols ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. All variables are winsorized at 1 and 99% level to mitigate the effect of outliers.

Variable	Industry	N	Mean	SD	Skew.	Kurt.	Brown-Forsythe	t-test	Welch F-test	WMW
TQ	Sensitive	2,850	0.795	0.672	3.790	24.154	271.269***	18.562***	586.440***	20.071***
	Non-sensitive	11,123	1.188	1.077	2.342	9.418				
ROA	Sensitive	3,130	0.033	0.089	-1.366	9.881	0.617	8.613***	74.165***	11.663***
	Non-sensitive	12,063	0.049	0.089	-1.330	9.925				
SIZE	Sensitive	3,130	15.325	1.711	-0.125	3.147	1.421	-23.565***	564.629***	23.143***
	Non-sensitive	12,070	14.507	1.736	-0.114	3.049				
LEV	Sensitive	3,130	0.268	0.168	0.542	3.177	45.437***	-1.788*	3.534*	2.576**
	Non-sensitive	12,065	0.261	0.183	0.590	3.110				
ESGS	Sensitive	2,346	53.574	20.558	-0.280	2.162	0.751	-9.622***	92.980***	9.780***
	Non-sensitive	8,459	48.945	20.634	-0.004	2.093				
ENVS	Sensitive	2,346	52.068	26.366	-0.349	2.087	36.635***	-12.812***	177.495***	12.691***
	Non-sensitive	8,453	43.740	28.256	0.010	1.850				
SOCS	Sensitive	2,346	54.427	24.407	-0.188	1.910	1.168	-5.526***	30.295***	5.583***
	Non-sensitive	8,453	51.297	24.235	-0.012	1.952				
GOVS	Sensitive	2,346	54.433	22.117	-0.186	2.057	0.011	-9.196***	84.489***	9.056***
	Non-sensitive	8,459	49.690	22.100	-0.021	2.055				

Next, following Garcia et al. (2017) and Richardson and Welker (2001), differences in descriptive information with respect to different industries are more specifically considered. Regarding the mean values of the variables, Table 14 illustrates the existence of differences between the firms belonging to the industries judged to be sensitive relative to those firms belonging to non-sensitive industries. As supplied, firms operating in sensitive industries perform better in overall ESG performance and individual dimensions of ESG performance. On average, for sensitive (non-sensitive) firms, the overall ESG score is 53.57 (49.95), the environmental score is 52.07 (43.74), the social score is 54.43 (51.30), and the governance score is 54.43 (49.69).

As illustrated in Table 14, firms operating in basic materials or utilities are leaders in ESG performance, especially in terms of the environmental score. This result corresponds to the stakeholder theory and previously introduced research: firms from more polluting industries are perceived as having high environmental risk, so to convince their actions are responsible, firms in sensitive industries need to put more effort into ESG practices than their non-sensitive counterparts and strive to be leaders in sustainable development. Whereas firms from non-sensitive industries, such as telecommunications or consumer staples, they have lower environmental performance but present high values in social and governance practices. (Richardson & Welker 2001; Andersen & Dejoy 2011; Amor-Esteban et al. 2018.)

In terms of financial variables, differences between the sensitive and non-sensitive industries are also consistent with the prior literature (Richardson & Welker 2001; Garcia et al. 2017). On average, firms in environmentally sensitive industries have a smaller ROA (3.3%) and Tobin's Q (0.80) than their non-sensitive counterparts (4.9% and 1.19, respectively). Also, firms in sensitive industries appear to be bigger than non-sensitive firms (with averages of 15.33 in sensitive and 14.51 in non-sensitive industries), whereas with respect to leverage, they appear to be similar (with averages of 0.27 in sensitive and 0.26 in non-sensitive industries).

The mean equality tests are conducted to determine whether the differences between the means of sensitive and non-sensitive industries are statistically significant. The choice of the appropriate two-sample test depends on the sample sizes, and the assumptions of normality and homogeneity of variance. However, these characteristics vary among the samples, as shown in Table 15. For example, for sensitive and non-sensitive firms, the sample variances are equal for ROA, size, overall ESG score, social pillar score, and governance pillar score (p-values > 0.05, Brown-Forsythe test), whereas the variances are

unequal for Tobin's Q, leverage, and environmental pillar score (p-values < 0.05, Brown-Forsythe test).[15] In addition, Tobin's Q, ROA, size, and leverage are heavy tailed as they have kurtosis higher than 3.0. Moreover, Tobin's Q and ROA are also highly skewed as they have skewness higher than 1.0 and less than -1.0, respectively. As selecting only one appropriate test is thus not straightforward, the use of several tests might be more plausible and informative (Zimmerman 1998). Consequently, three different tests are performed: the t-test, the Welch F-test, and the nonparametric Wilcoxon-Mann-Whitney (WMW) test. (Liesenfeld & Jung 2000, Skovlunda & Fenstad 2001; Joh & Malaiya 2014.)

The two-sample t-test is suitable when the samples have equal variances, whereas the Welch F-test is applicable for situations with unequal variances and particularly with unequal sample sizes. Both tests are optimal for normally distributed observations. Although none of the samples are normally distributed, one could argue that since the sample sizes are large (N > 30), the central limit theorem ensures that the t-test is robust to deviations from normality.[16] However, it is argued that when the samples have equal variances, the WMW test is the most appropriate when the distribution is heavy tailed or highly skewed (see, e.g., Skovlunda & Fenstad 2001). As some of the samples with equal variances are heavy tailed and/or highly skewed, the nonparametric WMW test is also conducted to avoid problems of violation of normality.[17] (Skovlunda & Fenstad 2001; Ghasemi & Zahediasl 2012.)

The results of the mean equality tests are shown in Table 15. The results support the previous discussion about the differences in means between the sensitive and non-sensitive firms by strongly implying that the differences are statistically significant. That is, except for leverage, all the test results are statistically significant at a 1% significance level, indicating the null hypotheses of equal means can be rejected.

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15 Brown-Forsythe (B-F) test is a modification of the Levene test that is a commonly used tool for checking the homogeneity of variances (Gastwirth et al. 2009). Many studies argue that B-F is superior in terms of robustness and power to Levene as the absolute mean difference is replaced by the absolute median difference in the B-F test (see, e.g., Brown & Forsythe 1974; Conover et al. 1981). B-F tests the null hypothesis that the variances in subgroups are equal, and it is robust to nonnormality and large and unequal sample sizes (see, e.g., Sharma & Kibria 2013).

16 Jarque-Bera test shows that p-value < 0.05 for all the samples. Nonnormality is not assumed to cause problems in panel regression as the final sample consists of hundreds of observations, implying that the distribution of the data can be ignored (see, e.g., Ghasemi & Zahediasl 2012).

17 According to Skovlunda and Fenstad (2001), the best way to analyze samples with skew distribution and unequal variances is to transform data closer to normality (e.g., by taking logs) and then use the Welch test if the variances remain unequal. This approach is tested for Tobin's Q that has both unequal variances and skewed distribution. The results remain unchanged.

Table 16. Correlation matrix

The table reports the correlation coefficients between the independent, dependent, and control variables for the whole sample. The corresponding p-value to each coefficient is presented in parenthesis.

	TQ	ROA	SIZE	LEV	IND	ESGS	ENVS	SOCS	GOVS
TQ	1.000								
ROA	0.481 (0.000)	1.000							
SIZE	-0.392 (0.000)	-0.120 (0.000)	1.000						
LEV	-0.287 (0.000)	-0.247 (0.000)	0.208 (0.000)	1.000					
IND	-0.163 (0.000)	-0.098 (0.000)	0.172 (0.000)	0.018 (0.063)	1.000				
ESGS	-0.123 (0.000)	-0.044 (0.000)	0.566 (0.000)	0.084 (0.000)	0.101 (0.000)	1.000			
ENVS	-0.167 (0.000)	-0.047 (0.000)	0.549 (0.000)	0.093 (0.000)	0.129 (0.000)	0.873 (0.000)	1.000		
SOCS	-0.095 (0.000)	-0.032 (0.001)	0.503 (0.000)	0.092 (0.000)	0.060 (0.000)	0.904 (0.000)	0.733 (0.000)	1.000	
GOVS	-0.065 (0.000)	-0.030 (0.002)	0.327 (0.000)	0.011 (0.270)	0.099 (0.000)	0.654 (0.000)	0.372 (0.000)	0.402 (0.000)	1.000

Next, the correlation tests between variables under analysis are run, and the Pearson correlation matrix is presented in Table 16. The corresponding p-value to each coefficient is presented in parenthesis. Consistent with the prior literature, leverage and size are negatively correlated with ROA and Tobin's Q, implying that the indebtedness has a negative effect on firm performance and that firm value decreases when a firm becomes larger and more diversified (see, e.g., Lang & Stulz 1994; Seo et al. 2015; Velte 2017; Yang & Baasandorj 2017; Aouadi & Marsat 2018). ESG score and individual ESG pillar scores are positively correlated with size, supporting that larger firms may need to maintain their social contract more actively by disclosing more ESG related information (Lang & Lundholm 1993; Minutolo et al. 2019). In addition, the positive correlation between industry dummy variable and environmental performance supports the previous assumption that to convince their actions are responsible, firms in sensitive industries need to put more effort into environmental practices than their non-sensitive counterparts (Richardson & Welker 2001; Andersen & Dejoy 2011; Amor-Esteban et al. 2018).

Perhaps surprisingly, both the overall ESG score and the three pillar scores are negatively correlated with ROA and Tobin's Q, preliminary suggesting a negative ESG-CFP relation. However, at this stage of the analysis, any conclusion is premature since the correlations may not observe several factors that might intervene between the variables (Aouadi & Marsat 2018). For instance, Yang and Baasandorj (2017) also find negative correlations between ESG scores and ROA and between ESG scores and Tobin's Q, but after running fixed effects regression, the relationship turns to be positive.

Most of the correlations between the independent variables stay under 0.5, indicating an absence of significant relationships among most independent variables (Yang & Baasandorj 2017). However, some of the correlations between the regressors are above 0.5 and even above 0.8, which is considered a sign of high multicollinearity (Grewal et al. 2004; Midi et al. 2010). The overall ESG score highly correlates to the environmental, social, and governance scores, 0.87, 0.90, and 0.65, respectively. This is a rationale result as the overall ESG score is the variable combining the environmental, social, and governance performance, and similar correlations are observed in the prior literature (see, e.g., Garcia et al. 2017; Yoon et al. 2018; Miralles-Quirós et al. 2018). As the overall ESG score is not considered in the same regression model with its three pillar scores, no multicollinearity problem is expected to arise from high correlations among these variables.

However, there is a high correlation between environmental and social score (0.73). This observation is in line, for example, with Yoon et al. (2018), who state this implies

that a firm with good environmental performance tends to be a firm with good social practices as well. Although the correlation is not above 0.8, Variance-Inflating Factors (VIFs) are calculated to ensure no severe multicollinearity problem. A VIF of higher than 10 is taken as a signal for possible multicollinearity (Sassen et al. 2016; Yang & Baasandorj 2017). In the sample, no VIFs exceeds 3.0, signifying an absence of multicollinearity. Especially, the highest VIFs of the environmental and social score are only 2.44 and 2.35, respectively. The result is in line with prior studies (see, e.g., Sassen et al. 2016).

The stationarity of the time series is a common presumption and a requirement for many statistical tests and models. However, the stationarity has not received much attention in traditional panel regression analysis as non-stationarity requires attention only when dealing with macro panels with large N and large T (see, e.g., Phillips & Moon 2000; Baltagi 2005, 237). It is thus understandable that many prior studies examining the ESG-CFP relationship ignore testing the stationarity when dealing with micro panels with large N and small T (see, e.g., Sassen et al. 2016; Aouadi & Marsat 2018; Petitjean 2019). As this study also deals with a micro panel where $T < N$, the possible non-stationarity of the time series is not assumed to cause problems in the regression model.

5.2 Estimation

The empirical estimation is next described. The regression models are adopted and modified based on prior ESG-CFP research (see, e.g., Yoon et al. 2018; Petitjean 2019; Minutolo et al. 2019). Four POLS and four FE models are estimated to check the hypotheses, and the models are formed for two panels: CFP is measured by ROA in Panel A and by Tobin's Q in Panel B. The specifications of the FE Models 1–4 are consistent with the corresponding POLS Models 1–4 in both Panel A and B, but instead of including the time-invariant industry dummy variable, the FE models include α_i that is the firm fixed effect and λ_t that is the time fixed effect. To save space, only POLS models are next described in detail, but all the POLS and FE models are explicitly described in Appendix 4.

As the financial performance in previous years might affect subsequent year's financial performance, this study follows Petitjean (2019) and Garcia-Castro et al. (2010) by including the first lag of the dependent variable into the regression models to control for

autocorrelation.[18] Hence, the data used in the estimations are from 2002 to 2019 for lagged variables and from 2003 to 2019 for other variables. In addition, in line with many previous studies, clustered standard errors are clustered by firm to alleviate concern about heteroskedasticity (see, e.g., Sassen et al. 2016; Aouadi & Marsat 2018; Petitjean 2019).

To examine whether there is a positive relationship between ESG and CFP, the first step is to estimate a simple model corresponding to H_1. In Panel A, POLS Model 1 examines the impact of the overall ESG score on ROA, and the specific model is estimated as

$$ROA_{it} = \beta_0 + \beta_1 ROA_{it-1} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 IND_i + \beta_5 ESGS_{it} + \varepsilon_{it},$$

where i is the subscript for each firm, t is the subscript for year, ROA_{it} is the return on assets, representing an account-based measure for the financial performance of a firm, ROA_{it-1} is one lagged variable to control for autocorrelation, $SIZE_{it}$ is the natural logarithm of a firm's total assets, LEV_{it} is the leverage, IND_i is the dummy variable that takes the value 1 if the firm i belongs to a sensitive industry and 0 otherwise, $ESGS_{it}$ is the ESG score, representing the overall ESG performance of a firm, and ε_{it} is the error term.

As Tobin's Q is a proxy for firm performance in Panel B, the POLS Model 1 in Panel B is estimated as

$$TQ_{it} = \beta_0 + \beta_1 TQ_{it-1} + \beta_2 ROA_{it} + \beta_3 SIZE_{it} + \beta_4 LEV_{it} + \beta_5 IND_i + \beta_6 ESGS_{it} + \varepsilon_{it},$$

where TQ_{it} is the Tobin's Q of a firm, representing a market-based measure for the financial performance, and TQ_{it-1} is one lagged variable to control for autocorrelation. ROA_{it} is included as a control variable, and other control and independent variables are maintained.

The second step is to examine whether there is a positive relationship between the three ESG dimensions and CFP. In line with H_{1a}-H_{1c}, POLS Model 2 examines the impact

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[18] Before adding the first lag of the dependent variable into the models, the Durbin-Watson statistic was close to 0.8 and 0.5 in POLS models in Panel A and B, respectively, and close to 1.3 and 1.0 in FE models in Panel A and B, respectively. After adding the first lag of the dependent variable, the Durbin-Watson statistic becomes close to 2.0 in all POLS and FE models in both panels, indicating no serial correlation. In addition, the adjusted R^2 significantly increases and the lagged variables turn to be statistically significant, indicating it is reasonable to include the first lag of the dependent variable into the regression.

of individual ESG pillar scores on firm performance. In Panel A, the POLS Model 2 is estimated as

$$ROA_{it} = \beta_0 + \beta_1 ROA_{it-1} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 IND_i + \beta_5 ENVS_{it} + \beta_6 SOCS_{it} + \beta_7 GOVS_{it} + \varepsilon_{it},$$

where $ENVS_{it}$ is the environmental score of a firm, representing the environmental performance of a firm, $SOCS_{it}$ is the social score, representing the social performance of a firm, and $GOVS_{it}$ is the governance score, representing the governance performance of a firm. In Panel B, the corresponding POLS model is

$$TQ_{it} = \beta_0 + \beta_1 TQ_{it-1} + \beta_2 ROA_{it} + \beta_3 SIZE_{it} + \beta_4 LEV_{it} + \beta_5 IND_{it} + \beta_6 ENVS_{it} + \beta_7 SOCS_{it} + \beta_8 GOVS_{it} + \varepsilon_{it}.$$

Next, corresponding to H_2 and H_3, it is examined whether the valuation effect of ESG is different for environmentally sensitive industries, and whether the ESG-CFP relation is specific to periods of low trust. Consequently, in Panel A, POLS Model 1 is first extended by including the interaction terms. Thus, POLS Model 3 is estimated as

$$ROA_{it} = \beta_0 + \beta_1 ROA_{it-1} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 IND_i + \beta_5 ESGS_{it} + \beta_6 ESGS_{it} \times IND_i + \beta_7 ESGS_{it} \times CRISIS_t + \varepsilon_{it},$$

where $ESGS_{it} \times IND_i$ is the interaction of ESG performance with a dummy variable that takes the value 1 if the firm i belongs to an environmentally sensitive industry and 0 otherwise, and $ESGS_{it} \times CRISIS_t$ is the interaction of ESG performance with a dummy variable set to 1 in 2008–2009 (the financial crisis) and 2011–2012 (the Eurozone crisis) and 0 otherwise. Similarly, the POLS Model 3 is estimated for Panel B as

$$TQ_{it} = \beta_0 + \beta_1 TQ_{it-1} + \beta_2 ROA_{it} + \beta_3 SIZE_{it} + \beta_4 LEV_{it} + \beta_5 IND_i + \beta_6 ESGS_{it} + \beta_7 ESGS_{it} \times IND_i + \beta_8 ESGS_{it} \times CRISIS_t + \varepsilon_{it}.$$

To examine similar relations regarding the three ESG dimensions, POLS Model 4 examines the valuation effect of environmental performance for environmentally sensitive industries, and whether the relation between environmental performance and CFP is

specific to periods of low trust. Corresponding to H_{2a} and H_{3a}, the POLS Model 2 is extended by including the interaction terms. Therefore, in Panel A, the specific model of POLS Model 4 is estimated as

$$ROA_{it} = \beta_0 + \beta_1 ROA_{it-1} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 IND_i + \beta_5 ENVS_{it} + \beta_6 SOCS_{it} + \beta_7 GOVS_{it} + \beta_8 ENVS_{it} \times IND_i + \beta_9 ENVS_{it} \times CRISIS_t + \varepsilon_{it},$$

where $ENVS_{it} \times IND_i$ is the interaction of the firm's environmental performance with a dummy variable that takes the value 1 if the firm *i* belongs to an environmentally sensitive industry and 0 otherwise, and $ENVS_{it} \times CRISIS_t$ is the interaction of the firm's environmental performance with a dummy variable set to 1 in 2008–2009 (the financial crisis) and 2011–2012 (the Eurozone crisis) and 0 otherwise. Similarly, POLS Model 4 in Panel B is

$$TQ_{it} = \beta_0 + \beta_1 TQ_{it-1} + \beta_2 ROA_{it} + \beta_3 SIZE_{it} + \beta_4 LEV_{it} + \beta_5 IND_i + \beta_6 ENVS_{it} + \beta_7 SOCS_{it} + \beta_8 GOVS_{it} + \beta_9 ENVS_{it} \times IND_i + \beta_{10} ENVS_{it} \times CRISIS_t + \varepsilon_{it}.$$

5.3 Results

5.3.1 The impact of ESG on profitability

Following Atan et al. (2018) and Garcia et al. (2017), this study focuses on the FE models when explaining the results since the fixed effects model is shown to be the best estimation model. POLS models are, however, interpreted either a supportive or not supportive results. Since the main interest of this study is to examine whether there is a relationship between a firm's ESG and financial performance, the focus is on interpreting the coefficients on the ESG variables and interaction terms. In contrast, the effect of the control variables is only briefly discussed.

The results in Panel A, where CFP is measured by ROA, are presented in Table 17. As shown, the adjusted R^2 is around 40% in POLS models and around 50% in FE models. Consequently, 40% (50%) of the variability of the dependent variable is explained by the regressors in POLS (FE) models. As the Durbin-Watson statistic is around 2.0, there is no sign of serial correlation. In addition, the p-values of F-statistics are statistically significant at a 1% significance level, implying evidence of the predictive power of the variables chosen.

Table 17. Results, Panel A, CFP measured by ROA

The table presents the results of Pooled OLS and fixed effects regression models in Panel A, where corporate financial performance is measured by ROA. Industry is treated as a time-invariant variable, so the industry dummy variable is only included in POLS models. The first lag of the dependent variable is included to control for autocorrelation. Standard errors, shown in parentheses, are clustered at the firm level to avoid heteroskedasticity. The coefficients and standard errors of ESG variables are scaled by 1000. The symbols ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The sample spans from 2002 to 2019.

	POLS Models				FE Models			
	1	2	3	4	1	2	3	4
Constant	0.0554***	0.0564***	0.0537***	0.0554***	0.1089*	0.1063*	0.1074*	0.1031*
	(0.0140)	(0.0140)	(0.0142)	(0.0142)	(0.0615)	(0.0616)	(0.0612)	(0.0614)
ROA_{t-1}	0.5919***	0.5919***	0.5952***	0.5946***	0.2953***	0.2953***	0.2933***	0.2930***
	(0.0242)	(0.0242)	(0.0241)	(0.0241)	(0.0274)	(0.0273)	(0.0272)	(0.0273)
SIZE	-0.0012	-0.0013	-0.0011	-0.0012	-0.0024	-0.0023	-0.0023	-0.0020
	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0041)	(0.0041)	(0.0041)	(0.0041)
LEV	-0.0551***	-0.0553***	-0.0542***	-0.0543***	-0.1442***	-0.1445***	-0.1438***	-0.1441***
	(0.0067)	(0.0067)	(0.0067)	(0.0067)	(0.0151)	(0.0152)	(0.0152)	(0.0152)
IND	-0.0072***	-0.0070***	-0.0055	-0.0046				
	(0.0018)	(0.0018)	(0.0052)	(0.0042)				
ESGS $\times 10^3$	-0.0125		0.0306		0.0364		0.1430*	
	(0.0392)		(0.0409)		(0.0746)		(0.0822)	
ENVS $\times 10^3$		-0.0158		0.0559		-0.0076		0.0842
		(0.0379)		(0.0391)		(0.0577)		(0.0629)
SOCS $\times 10^3$		0.0342		0.0090		0.0903		0.1014*
		(0.0410)		(0.0407)		(0.0603)		(0.0597)
GOVS $\times 10^3$		-0.0352		-0.0394		-0.0354		-0.0371
		(0.0317)		(0.0317)		(0.0493)		(0.0494)
ESGS×IND $\times 10^3$			-0.0261				-0.3760***	
			(0.0845)				(0.1420)	
ESGS×CRISIS $\times 10^3$			-0.1995***				-0.1060	
			(0.0255)				(0.0845)	
ENVS×IND $\times 10^3$				-0.0439				-0.3390***
				(0.0652)				(0.1118)
ENVS×CRISIS $\times 10^3$				-0.1932***				-0.1205*
				(0.0241)				(0.0713)

Table 17. Continued

	POLS Models				FE Models			
	1	2	3	4	1	2	3	4
Observations	10,480	10,478	10,480	10,478	10,480	10,478	10,480	10,478
Firm fixed effects	No	No	No	No	Yes	Yes	Yes	Yes
Time fixed effects	No	No	No	No	Yes	Yes	Yes	Yes
Standard errors clustered by	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Adj. R^2	40.18%	40.18%	40.48%	40.48%	50.13%	50.14%	50.19%	50.24%
F-statistic	1408.59***	1006.44***	1019.28***	792.72***	12.80***	12.80***	12.80***	12.79***
Durbin-Watson	2.14	2.14	2.14	2.14	1.97	1.97	1.97	1.97

As presented in Table 17, among the control variables, the coefficients on size and leverage are negative in all POLS and FE models in Panel A. As the coefficient on size is statistically insignificant, there is no statistical evidence that companies of a smaller size would be more profitable. This association is in line with Minutolo et al. (2019), who find that size insignificantly affects ROA. Unlike size, the coefficient on leverage is statistically significant at a 1% significance level. This finding implies that indebtedness has a negative effect on profitability, corresponding to the previous literature (see, e.g., Yang & Baasandorj 2017; Aouadi & Marsat 2018; Minutolo et al. 2019). In addition, the negative and significant coefficient on the industry dummy variable in POLS Models 1 and 2 supports the previous evidence that firms operating in sensitive industries have lower ROA than firms operating in non-sensitive industries.

Next, the results of FE Models 1 and 2 in Panel A are discussed. FE Model 1 tests whether the overall ESG performance affects CFP, whereas FE Model 2 investigates which individual pillar score matters the most. Any possible differences in the relation between ESG and CFP due to the specific industry characteristics or period of low trust are disregard at this stage.

As presented in Table 17, the link between ESG and CFP seems to be weak. The coefficients on ESG variables are close to zero, implying that ESG has no positive nor negative impact on profitability. Furthermore, neither the overall ESG score nor any individual pillar scores significantly influence ROA, although it is noted that social score remains only slightly insignificant ($p = 0.134$). Nevertheless, this means that the null hypotheses that the overall or individual pillar scores do not affect financial performance, proxied by ROA, cannot be rejected.

The results of FE Models 1 and 2 in Panel A are inconsistent with H_1 and H_{1a}-H_{1c} and contradict many prior studies (see, e.g., Minutolo et al. 2019). However, the results are consistent with Petitjean (2019) and Atan et al. (2018), who report similar, statistically nonsignificant associations between the overall and individual ESG scores and ROA when using the fixed effects regression model. In line with them, the insignificant relationship indicates that firms with higher or lower ESG performance perform equally as well as poorly in terms of profitability. Inconsistent with the stakeholder theory, this may imply that an increase in ESG score is not associated with enhanced stakeholder communication and further does not improve the firm performance.

Next, to examine whether the ESG-valuation relationship differs across specific industries, the FE Models 1 and 2 are augmented by including the interaction term between

the overall ESG score and sensitive industries and the interaction term between the environmental score and sensitive industries. Interestingly, compared to FE Model 1, the link between the overall ESG score and firm profitability turns to be positive and significant at a 10% significance level after adding the interaction terms in FE Model 3. The result supports the assumption that all else equal, for a firm operating in a non-sensitive industry, an improvement in ESG performance will lead to an increase in ROA. It also corresponds to Yoon et al. (2018), who find a positive and significant coefficient on the overall ESG score after controlling the interaction term between the overall ESG score and sensitive industries.

Moreover, FE Model 3 implies that the coefficient on the interaction variable between the overall ESG score and environmentally sensitive industries is significantly negative at a 1% significance level. This is in line with the hypothesis H_2 as firms belonging to non-sensitive industries are assumed to face a greater valuation effect of ESG performance than firms belonging to environmentally sensitive industries. The result also corresponds to Yoon et al. (2018), who find a negative coefficient on the interaction term between the overall ESG score and sensitive industries. The difference between sensitive and non-sensitive industries also corresponds to the assumption that ESG factors and further the ESG related risks vary across industries. The result is also in line with the stakeholder and legitimacy theory as the pressure from different interest groups or the regulations imposed on specific industries is assumed to vary across industries.

However, it is noteworthy that the negative influence of the interaction term between the overall ESG score and sensitive industries (-0.0004) is greater than the positive average impact of the overall ESG score variable (0.0001) on ROA in FE Model 3. In other words, firms with better ESG performance have lower profitability in the sensitive industries, further implying that the value-enhancing effect of ESG is not only lesser but even turns to be negative if a firm operates in an environmentally sensitive industry. The result contradicts Yoon et al. (2018) as, in their study, the positive coefficient on the overall ESG score is greater than the negative coefficient on the interaction term between the overall ESG score and sensitive industries. It is also inconsistent with the hypotheses H_1 as ESG is not expected to have a negative impact on CFP, even though the firm would operate in a sensitive industry. The result is, however, in line with the previously discussed cost-generating aspect of ESG practices. Recalling that since sensitive firms need to assure the stakeholders that their actions are responsible, they already have higher ESG scores than their non-sensitive counterparts. Therefore, the negative ESG-CFP relation

may be due to the increasing costs for further improving their ESG practices, reflecting declining profitability.

When dividing the ESG score into its three pillar scores in FE Model 4, similar results are gained. Interestingly, although the environmental and governance scores stay insignificant, the social score becomes positively significant at a 10% significance level after controlling the interaction variables. Recalling that the social score was only slightly insignificant in FE Model 3 ($p = 0.134$), FE Model 4 provides some stronger evidence that there may be a positive valuation effect between the social and financial performance, consistent with the presumption that social issues are especially appreciated in Europe. This finding somewhat corresponds to Yoon et al. (2018), who find that after controlling the interaction term between the social score and sensitive industries, the social score positively and significantly affects financial performance.

Corresponding to FE Model 3, the coefficient on the interaction variable between environmental performance and sensitive industries is significantly negative in FE Model 4. This may indicate that the negative coefficient in FE Model 3 is mainly driven by environmental performance, supporting the hypothesis H_{2a} and indicating that firms belonging to non-sensitive industries face a greater valuation effect of environmental performance. However, in line with FE Model 3, the negative influence of the interaction term is greater than the positive average impact of the environmental score variable, implying even a negative impact of environmental performance on CFP in sensitive industries.

As stated, both FE Model 3 and 4 provide some evidence of a negative ESG-CFP relation for sensitive industries. Moreover, FE Model 4 indicates that this might predominantly be driven by environmental performance. Following the logical reasoning of the principal-agent theory, this might be caused by managerial agency problems (Brown et al. 2006; Bénabou & Tirole 2010). Perhaps the managers in sensitive sectors are more likely to give in to the temptation to overinvest in ESG activities to build their reputation since sensitive industries are convicted of being polluting, resulting in a waste of firm resources and further decreased profitability.

In addition, one might argue that the negative ESG-CFP relation for sensitive industries corresponds to the previously discussed argument of Schuler and Cording (2006), who point out that especially when a firm makes an environmentally friendly investment, the costs of this capital investment may outweigh the benefits. Furthermore, perhaps the improvements in ESG practices, and especially in environmental practices, are relatively more expensive for sensitive than for non-sensitive firms. For instance, it might be that

improving the environmental score by one unit may require more resources from a mining company than from a media company, which generates more costs and leads to a decrease in profitability.

When reviewing the results of FE Models 3 and 4 in Panel A, there is no evidence that the ESG-CFP relation would be positively specific to periods of low trust. As presented in Table 17, the coefficient sign is negative for both interaction variables between the overall ESG score and period of low trust and the environmental score and period of low trust, although only the latter is statistically significant at a 10% significance level. Overall, the findings contrast H_3 and H_{3a} and imply some weak evidence that the ESG-CFP relationship would be negatively specific to periods of low trust. The result is in line with Petitjean (2019), indicating that better profitability might be achieved in the middle of the crisis when a firm focuses on short-term economic survival rather than improves its ESG practices.

As evidenced in Panel A, the results of FE Models 1 and 2 are supported by corresponding POLS models. For example, the coefficients on the overall ESG score and the individual pillar scores are also close to zero and statistically nonsignificant in POLS Models 1 and 2, supporting the insignificant relation between ESG and profitability. The industry dummy variables also have negative and statistically significant coefficients in POLS Models 1 and 2, supporting the assumption that firms operating in sensitive industries have lower profitability. However, FE Models 3 and 4 receive less support as it appears that the corresponding POLS model supports only the interaction term between the environmental score and periods of low trust in FE Model 4.

Although some coefficients on ESG variables have so far been statistically significant, it is highlighted that the coefficients remain relatively marginal. For example, in FE Model 3, the overall ESG score is positive and statistically significant at a 10% significance level, but the coefficient is only 0.0001. This means that when a firm operates in a non-sensitive industry, all else equal, a one-unit increase in the overall ESG score will increase the mean of ROA by 0.0001 unit. To put it simply, if a non-sensitive firm's ESG score increased by one unit, the average ROA of a firm would increase only by 0.01 percentage points, ceteris paribus. This further means that even if a firm succeeded in increasing its overall ESG score from 0 to 100, it would improve a firm's average ROA by one percentage point, ceteris paribus.

The small coefficients on ESG variables corroborate those of Petitjean (2019) and Minutolo et al. (2019), who also provide evidence of significant but indeed small coefficients. In conclusion, some models in Panel A would theoretically encourage firms in non-sensitive industries to improve their ESG or social performance with respect to ROA. However, the evidence of a positive ESG-CFP relationship seems to remain relatively weak as the coefficients remain marginal, and those coefficients that are significant are significant only at a 10% significance level.

5.3.2 The impact of ESG on firm value

Next, the regression results of Panel B are discussed. The results are illustrated in Table 18. As shown, the adjusted R^2 is substantially higher than in Panel A: R^2 is now around 80% in POLS models and 85% in FE models. This indicates that 80% (85%) of the variability of the dependent variable is explained by the regressors in POLS (FE) Models, implying better goodness of fit of the models in Panel B than in Panel A. As the Durbin-Watson statistic is around 2.0, there is no sign of serial correlation. In addition, the p-values of F-statistics are statistically significant at a 1% significance level, implying evidence of the predictive power of the variables chosen.

As illustrated in Table 18, the control variables, including size, are now statistically significant in all POLS and FE models. In line with Aouadi and Marsat (2018) and Yang and Baasandorj (2017), ROA has a positive coefficient, implying that better profitability leads to higher firm value. Size and leverage have negative coefficients, indicating that a smaller firm is valued higher than a bigger firm by the market and that a less leveraged firm will gain higher firm value. As stated by Atan et al. (2018), the rationale behind this is that the market anticipates that a smaller firm has the potential to be more valuable in the future while a firm with a high leverage ratio might be less valued. Similar results have been reported by Aouadi and Marsat (2018), whereas contrary results are provided by Yang and Baasandorj (2017), who find a positive and significant association between size and Tobin's Q and leverage and Tobin's Q.

Table 18. Results, Panel B, CFP measured by Tobin's Q

The table presents the results of Pooled OLS and fixed effects regression models in Panel B, where corporate financial performance is measured by Tobin's Q. Industry is treated as a time-invariant variable, so the industry dummy variable is only included in POLS models. The first lag of the dependent variable is included to control for autocorrelation. Standard errors, shown in parentheses, are clustered at the firm level to avoid heteroskedasticity. The coefficients and standard errors of ESG variables are scaled by 1000. The symbols ***, ** and * denote statistical significance at the 1%, 5%, and 10 % levels, respectively. The sample spans from 2002 to 2019.

	POLS Models				FE Models			
	1	2	3	4	1	2	3	4
Constant	1.0612***	1.0402***	1.0443***	1.0383***	2.7832***	2.7677***	2.8060***	2.7892***
	(0.0908)	(0.0902)	(0.0917)	(0.0908)	(0.3693)	(0.3736)	(0.3711)	(0.3739)
TQ_{t-1}	0.7841***	0.7859***	0.7862***	0.7879***	0.5317***	0.5324***	0.5331***	0.5335***
	(0.0148)	(0.0147)	(0.0147)	(0.0146)	(0.0229)	(0.0231)	(0.0230)	(0.0230)
ROA	1.4458***	1.4306***	1.4178***	1.4025***	1.2284***	1.2203***	1.2293***	1.2280***
	(0.1943)	(0.1927)	(0.1941)	(0.1914)	(0.1964)	(0.1960)	(0.1972)	(0.1976)
SIZE	-0.0594***	-0.0577***	-0.0579***	-0.0568***	-0.1520***	-0.1506***	-0.1532***	-0.1518***
	(0.0058)	(0.0058)	(0.0058)	(0.0057)	(0.0246)	(0.0249)	(0.0248)	(0.0250)
LEV	-0.2393***	-0.2378***	-0.2305***	-0.2292***	-0.3360***	-0.3306***	-0.3292***	-0.3265***
	(0.0406)	(0.0404)	(0.0404)	(0.0401)	(0.0925)	(0.0927)	(0.0930)	(0.0933)
IND	-0.0240**	-0.0218**	-0.0348	-0.0421*				
	(0.0097)	(0.0097)	(0.0330)	(0.0234)				
ESGS $\times 10^3$	1.3535***		1.7818***		1.4426***		0.9036	
	(0.2974)		(0.3222)		(0.5282)		(0.6249)	
ENVS $\times 10^3$		-0.0924		0.6134**		0.9026**		0.4785
		(0.2599)		(0.2870)		(0.4260)		(0.4736)
SOCS $\times 10^3$		1.1504***		0.8063***		0.6442		0.5630
		(0.2930)		(0.2949)		(0.4735)		(0.4714)
GOVS $\times 10^3$		0.0995		0.0412		-0.2145		-0.2403
		(0.2483)		(0.2490)		(0.3818)		(0.3829)
ESGS×IND $\times 10^3$			0.2526				-0.4314	
			(0.5323)				(0.9525)	
ESGS×CRISIS $\times 10^3$			-2.6498***				2.0010***	
			(0.1550)				(0.5492)	
ENVS×IND $\times 10^3$				0.4148				0.0524
				(0.3676)				(0.7127)
ENVS×CRISIS $\times 10^3$				-2.3023***				1.6356***
				(0.1443)				(0.4173)

Table 18. Continued

	POLS Models				FE Models			
	1	2	3	4	1	2	3	4
Observations	10,085	10,083	10,085	10,083	10,085	10,083	10,085	10,083
Firm fixed effects	No	No	No	No	Yes	Yes	Yes	Yes
Time fixed effects	No	No	No	No	Yes	Yes	Yes	Yes
Standard errors clustered by	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Adj. R^2	79.93%	80.05%	80.27%	80.32%	84.96%	85.05%	84.99%	85.08%
F-statistic	6693.02***	5058.76***	5130.77***	4116.60***	64.94***	65.23***	64.93***	65.26***
Durbin-Watson	2.09	2.08	2.08	2.07	2.00	2.00	2.00	2.00

As depicted in Table 18, compared to Panel A, Panel B implies more support for the positive ESG-CFP relationship. In FE Model 1, the coefficient on the overall ESG score is positive and significant, even at a 1% significance level. Thus, the null hypothesis that the overall ESG score does not affect financial performance, proxied by Tobin's Q, can be rejected. Similar results are found in many previous studies (see, e.g., Aouadi & Marsat 2018; Yoon et al. 2018; Minutolo et al. 2019). The finding is also aligned with H_1, implying a positive valuation effect of ESG performance in the European market. Under the stakeholder and legitimacy theory, the result implies that high-ESG improves stakeholder communication and indicates an intent of a firm to pursue moral legitimacy concerning the social contract, which is rewarded with a higher firm value.

When examining the relationship with individual pillar scores in FE Model 2, there is evidence that the value enhancement might be primarily due to the environmental performance as the environmental score is positive and significant at a 5% significance level. Neither social nor governance score is significant, although it is noted that the positive coefficient on social score remains again only slightly insignificant ($p = 0.174$). Consequently, one might argue that the results somewhat support the findings of Cheng et al. (2014), who argue that the ESG-CFP relation is mostly driven by the environmental and social dimensions of ESG. Nevertheless, the FE Model 2 is in line with H_{1a} as there seems to be a positive relationship between environmental performance and firm value. Corresponding to Sharfman and Chitru (2008), the improvement in environmental score may be interpreted as improved environmental risk management, which signals to the investors that the company is engaged in sound risk management and leads to higher firm value. Overall, although ESG would not positively affect profitability, FE Models 1 and 2 in Panel B imply that improvements in ESG practices, and especially in environmental activities, may still be valued by the market.

When adding the interaction terms in FE Model 3, the effect of ESG performance stays positive but turns slightly nonsignificant ($p = 0.148$). A similar change occurs at the environmental score in FE Model 4, although the coefficient is now clearly nonsignificant ($p = 0.312$). Interestingly, compared to Panel A, the interaction variable between the overall ESG score and sensitive industries and the interaction variable between the environmental score and sensitive industries are nonsignificant. Moreover, the coefficient on the environmental score and sensitive industry turns to be positive. Recalling the proposal made earlier in Panel A, one might argue that improving ESG practices can generate costs

and reduce profitability under some circumstances, but they will not necessarily reduce the firm value.

Compared to Panel A, the coefficient on the interaction variable between the overall ESG score and periods of low trust, and the interaction term between the environmental score and periods of low trust, are now positive and statistically significant even at a 1% significance level. Thus, there is evidence that an improvement in ESG performance, and especially in environmental performance, has an additional valuation effect on firm value during the period of low trust. This could imply that ESG performance lowers financial risk during a market crisis and that investors interpret high-ESG as a signal of risk mitigation (Broadstock et al. 2020). Hence, the result is supported by the risk management theory and social capital as high ESG performance may be interpreted as "insurance-like" protection and alleviate stakeholders' sanctions against a firm in the event of a crisis. The result also corresponds to Lins et al. (2017) and Cornett et al. (2016), who argue that financial performance is positively related to ESG score during the financial crisis. Also, although Petitjean (2019) does not find substantial evidence that the ESG-CFP relationship would be specific to the period of low trust, he still finds some supporting evidence for the importance of environmental performance during times of crisis.

As in Panel A, the industry dummy variables have negative and statistically significant coefficients in POLS Models 1 and 2, supporting the assumption that firms operating in sensitive industries have lower financial performance. Despite this similarity, Table 18 shows that the rest of the POLS and FE models' results vary considerably. Compared to those coefficients that are statistically significant at a 1% significance level in the FE models in Panel B, only FE Model 1 is supported by the corresponding POLS model as the coefficient on the overall ESG score is positive and statistically significant in POLS Model 1. Nevertheless, the contradictions between POLS and FE models are mainly assumed to be caused by POLS suffering the omitted variable bias, which is why the results of the FE models are more emphasized. It is also noted that similar discrepancies between POLS and FE models are recognized in previous research (see, e.g., Atan et al. 2018).

Although Panel B depicts some significant and positive results, it is highlighted that the coefficients remain still marginal. For example, the coefficient on the overall ESG score in FE Model 1 is only 0.0014. This means that all else equal, a one-unit increase in ESG score would increase a firm's average Tobin's Q only by 0.0014 units. This further implies that even if a firm managed to increase its ESG score from 0 to 100, it would increase about 0.140 units in the firm's average Tobin's Q, ceteris paribus.

5.3.3 Summarizing the main results

Next, the main results and the evidence for the hypotheses are briefly summarized. Table 19 presents the hypotheses and whether there is evidence to reject them. Possible support provided by corresponding POLS models is also illustrated.

In Panel A, the results suggest the rejection of most of the hypotheses. H_1 and H_{1b} are partly rejected as FE Models 1 and 2 do not find any significant link between the overall ESG score and firm profitability or between the social score and firm profitability, whereas FE Models 3 and 4 find some positive connections at a 10% significance level after interaction terms are controlled. Moreover, H_{1a} (H_{1c}) is rejected as no statistically significant evidence is found between environmental (governance) performance and ROA. Similarly, H_3 (H_{3a}) is rejected since none of the models find evidence that the relation between the overall ESG (environmental) score and ROA would be positively specific to periods of low trust. However, H_2 and H_{2a} are not rejected as FE Models 3 and 4 give statistically significant evidence that firms belonging to non-sensitive industries face a greater valuation effect of overall ESG and environmental performance than firms belonging to environmentally sensitive industries.

The results in Panel B also partly reject the hypotheses. H_{1b} (H_{1c}) is rejected as none of the FE models find a significant relationship between social (governance) score and firm value. In contrast to Panel A, H_2 (H_{2a}) is rejected as the coefficient on the interaction term between the overall ESG (environmental) score and sensitive industries remains statistically insignificant in Panel B. However, relatively strong evidence supports H_1 as a positive and statistically significant relation even at a 1% significance level between the overall ESG score and firm performance is supported by both FE and POLS models in Panel B. This relationship might be mostly driven by environmental performance as FE Model 2 and POLS Model 4 also support H_{1a}. Moreover, H_3 and H_{3a} are not rejected by the FE models in Panel B, indicating that the relationship between ESG and firm value is positively specific to periods of low trust.

Table 19. Results summary

The table presents whether the hypotheses are rejected or not according to the results of the FE models of Panel A and B. The corresponding results of POLS models are shown in parentheses. The result is considered statistically significant if the coefficient on the variable is statistically significant at a significance level of at least 10%.

	Hypothesis	Panel A: CFP measured by ROA	Panel B: CFP measured by Tobin's Q
H_1	*There is a positive and significant relationship between a firm's ESG and financial performance.*	Partly rejected (Rejected)	Not rejected (Not rejected)
H_{1a}	*There is a positive and significant relationship between a firm's environmental and financial performance.*	Rejected (Rejected)	Not rejected (Not rejected)
H_{1b}	*There is a positive and significant relationship between a firm's social and financial performance.*	Partly rejected (Rejected)	Rejected (Not rejected)
H_{1c}	*There is a positive and significant relationship between a firm's governance and financial performance.*	Rejected (Rejected)	Rejected (Rejected)
H_2	*Firms belonging to non-sensitive industries face a greater valuation effect of overall ESG performance compared to firms belonging to environmentally sensitive industries.*	Not rejected (Rejected)	Rejected (Rejected)
H_{2a}	*Firms belonging to non-sensitive industries face a greater valuation effect of environmental performance compared to firms belonging to environmentally sensitive industries.*	Not rejected (Rejected)	Rejected (Rejected)
H_3	*The value-creating effect of ESG performance is positively specific to periods of low trust.*	Rejected (Rejected)	Not rejected (Rejected)
H_{3a}	*The value-creating effect of environmental performance is positively specific to periods of low trust.*	Rejected (Rejected)	Not rejected (Rejected)

While Panel A and B provide different evidence for H_{1a} and H_{1b}, there is strong evidence to reject H_{1c}. Neither the FE nor POLS models find a significant relationship between governance practices and firm performance in either panel. This means that while there is some evidence of environmental and social performance affecting CFP, the findings cannot detect any impact of governance performance on firm performance. Although this contrasts to H_{1c}, this bolsters the presumption that due to the differences in civil and common law countries, environmental and social practices are more appreciated in Europe than governance practices. This is also in line with Sassen et al. (2016), who do not find any connection between governance and firm performance in the European market but indeed find environmental and social dimensions to affect CFP positively.

In summary, the results appear to vary between Panel A and B, depending on whether the firm performance is measured by ROA or Tobin's Q. There can be several reasons for this variation. One possible explanation could be related to the fact that ROA is an account-based variable that captures historical performance, while Tobin's Q is a market-based and forward-looking proxy for firm performance. Therefore, Panel A may not show as strong evidence of a positive ESG-CFP relationship as Panel B since ESG practices might have a different impact on account-based than market-based performance.

Furthermore, as an improvement in ESG practices incur costs, and these costs might easily be reflected in ROA, ESG investments may initially appear as lower profitability. However, the market might still appreciate the improvements due to the future potential of enhanced ESG performance in the long-term. This conclusion would correspond to Simionescu and Gherhina (2014), who also do not find a statistically positive linkage between ESG and CFP when using account-based measures but find a positive linkage while using market-based proxies.

A similar reason may also explain why there is so much variation regarding the rejection of the research hypotheses in Panel A and B. The value-enhancing impact of ESG is lesser and even negative for sensitive firms than for non-sensitive firms in Panel A, but not in Panel B. The contradiction means that the findings in Panel A suggest accepting H_2 and H_{2a}, while the findings in Panel B suggest rejecting them. As sensitive firms must firmly ensure their actions are responsible, they might need to use more resources to improve their ESG scores, and especially environmental score, as their business practices are convicted of being polluting. These investments may decrease profitability and an account-based measure but might still increase a market-based variable since the improvements in ESG practices may have future benefits that are valued by the market in

the long-term. Whereas in times of crisis, firms need to focus more on short-term survival, meaning that any extra investments in ESG might not be profitable. However, from the market perspective, high-ESG may indicate trustworthiness and imply to the market that a firm can survive through the crisis. This deduction could explain why Panel A and B also differ with respect to H_3 and H_{3a}.

5.4 Robustness check

To avoid common drawbacks of the panel regression, several adjustments have been made in this paper. The set of control variables and fixed effect model are used to avoid omitted variable bias and alleviate the endogeneity problem. To ensure the fixed effect estimate is suitable for the data, the tests such as F-test, Breusch-Pagan LM, and Hausman test are conducted. To control autocorrelation, the first lag of the dependent variable is included in the regression. After adding the lagged variables, the Durbin-Watson statistic turns close to 2.0 in all models, indicating the absence of serial correlation. Moreover, in line with many previous studies, clustered standard errors are clustered by firm to alleviate concern about heteroskedasticity.[19] In addition to these various adjustments, additional checks are conducted to determine whether the main findings are robust.

As stated previously, there is evidence that to specify the ESG-CFP relationship correctly, R&D expenditures should be controlled (see, e.g., Andersen & Dejoy 2011). However, R&D expenditures were initially excluded since R&D was owing to limited data availability in the European sample. Following prior studies (see, e.g., Sassen et al. 2016), R&D expenditures are included in the regression to test whether the inclusion of this variable impacts the results.[20] After controlling R&D, the main results of FE models are unaffected. In Panel A, all those coefficients statistically significant at a 1% significance level also remain statistically significant at a significance level of at least 5%. In Panel B, the overall ESG score still positively and significantly affects Tobin's Q in FE Model 1, and the interaction terms related to the period of low trust stay positive and statistically significant even at a 1% significance level in both FE Model 3 and 4. However, it is noted

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[19] It is noted that after the clustering, the coefficient covariance matrix is of reduced rank in some FE models due to the high unbalanced panel data. Despite this weakness, the coefficient covariance matrix of FE Model 4 in Panel B is never of reduced rank, so the main results of this study are assumed to be robust.

[20] R&D is defined as R&D expenditures scaled by total assets (Andersen & Dejoy 2011; Guenster et al. 2011; Velte et al. 2017).

that in Panel A, the overall ESG score in FE Model 3 remains positive but turns slightly nonsignificant ($p = 0.117$), while a similar change also occurs for the social score in FE Model 4. Likewise, the environmental score remains positive but becomes nonsignificant in FE Model 2 in Panel B. The detailed results after controlling R&D expenditures in Panel A and B are provided in Appendix 5 and 6.

As discussed, the ESG-CFP relationship might significantly be affected by country-specific characteristics, and the valuation effect of ESG may vary between civil and common law countries. For these reasons, it is noted that over 30% of the sample firms are from the UK, which is, alongside Ireland, the only common law country in the sample. To ensure that the UK companies do not distort the results, the regressions are run without the UK firms.[21] Despite the exclusion, the results of FE models remain mainly unchanged. In Panel A, all those coefficients that were statistically significant at a 1% significance level also remain statistically significant at a significance level of at least 10% after excluding the UK firms. In Panel B, the overall ESG score still positively and significantly affects Tobin's Q in FE Model 1, and the interaction terms related to period of low trust stay positive and statistically significant at a 5% significance level in FE Model 3 and 4. The only noteworthy changes are that the social score in FE Model 4 in Panel A remains positive but becomes slightly nonsignificant ($p = 0.185$), and the environmental score in FE Model 2 in Panel B remains positive but turns to be nonsignificant. The detailed results after excluding the UK companies from Panel A and B are showed in Appendix 7 and 8.

When addressing heterogeneity, some previous studies examining the ESG-CFP relationship reject the use of firm fixed effects as they argue that there is limited time variation in a firm's ESG scores (see, e.g., Guenster et al. 2011; Aouadi & Marsat 2018). For instance, Aouadi and Marsat (2018) point out that when there is little time series variation, the inclusion of firm fixed effects might remove the interesting cross-sectional variation that needs to be explained, making it difficult for variables that change only slowly to show their impact. In response to this criticism, the sample is run without firm fixed effects and only including time fixed effects. As firm fixed effects did not initially allow to include a time-invariant industry dummy, the industry dummy variable is now included in the FE models.

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[21] Irish firms are not excluded as they only represent 1% of the sample firms.

Although some notable changes occur after excluding the firm fixed effects, the changes mainly bolster the initial results.[22] For example, in Panel A, the ESG, environmental, and social scores remain positive and turn to be statistically significant in all FE models. In Panel B, the overall ESG score positively and significantly affects Tobin's Q, and the interaction variables related to periods of low trust remain positive and significant even at a 1% significance level. Furthermore, implying support for the positive valuation effect of social performance, the social score in FE Models 2 and 4 remains positive and turns to be significant even at a 1% significance level in Panel B. It is also noted that the interaction variables related to sensitive industries turn to be nonsignificant in Panel A, and the environmental score in FE Model 2 turns to be slightly nonsignificant ($p = 0.132$) in Panel B. The detailed results after excluding the time fixed effects and including the industry dummies in the FE models in Panel A and B are shown in Appendix 9 and 10.

Garcia-Castro et al. (2010) highlight that the fixed effect estimation has its drawbacks since it assumes that the unobserved variables that affect ESG and CFP simultaneously do not change over time and that the changes in ESG are exogenous. If these assumptions are relaxed, there would be a need to use instrumental variables to estimate an unbiased coefficient for ESG (Garcia-Castro et al. 2010). Consequently, some prior studies use instrumental variables when examining the ESG-CFP relationship (see, e.g., Garcia-Castro et al. 2010; Aouadi & Marsat 2018). However, as Sassen et al. (2016) argue, prior literature also shows that instrumental variables are challenging to identify, especially in most accounting research settings. In terms of ESG performance, the challenges of identification are particularly plausible as a well-developed theory of the determinants of ESG is still evolving. Due to this criticism, instrumental variables are not used in this study.

As with many prior studies, this paper not only employs the overall ESG performance but also considers the three dimensions of ESG as criteria to measure the ESG performance. ESG performance is thus measured for several variables obtained from the Asset4 database. As the Asset4 database is widely used in academic research and investment purposes by investment institutions, there is evidence of sufficient trust in the Asset4 database. However, the discrepancies between the different ESG rating providers' assessments are stressed. As ESG data is obtained only from one database, the ESG data may not be entirely free of subjective influences. (Sassen et al. 2016.)

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[22] After only including the time fixed effects, the estimated coefficient covariance matrix is never of reduced rank, which is desirable for robustness. As the models with only time fixed effects support the main results, the main results of this paper are assumed to be robust.

6 CONCLUSION

The main objective of this study was to investigate the relationship between ESG and corporate financial performance. More precisely, this paper aimed to contribute to an increased level of understanding about the potential financial benefits of improving ESG performance for companies. This was done by conducting a panel regression analysis with fixed effects and examining the long-term relationship between ESG and financial performance in the European market during 2002–2019. Different proxies were used for both ESG and financial performance, and the extant literature was contributed by reviewing the impact of industry and economic specific characteristics on the ESG-CFP relationship. Through a battery of various robustness checks, all the main findings of this study remained unchanged.

This study finds evidence of a positive valuation effect of ESG in the European market. The positive ESG-CFP relationship is particularly observed for non-sensitive firms when firm performance is measured with Tobin's Q. Under the stakeholder theory, this implies that high-ESG performance improves the stakeholder communication and trust towards a firm, resulting in increased firm value. Moreover, consistent with the legitimacy theory, ESG activities might be viewed as the intent of a firm to pursue moral legitimacy concerning the social contract, which is rewarded with a higher firm value.

The findings support that the positive valuation effect of ESG is mostly driven by environmental and social performance, whereas a significant impact of governance performance on CFP is not detected. Although the nonsignificant effect of governance performance contrasts the research hypothesis, one may argue that this bolsters the presumption that governance practices are less valued in the European market and civil law countries. In addition, the findings indicate that the effort of ESG practices especially pays off when the overall level of trust in corporations and markets suffers a negative shock. Thus, there is evidence that an improvement in ESG performance might lower financial risk during a market crisis and that investors may interpret high-ESG as a signal of risk mitigation. Consequently, consistent with the risk management theory and social capital, ESG performance may act as an insurance policy and alleviate stakeholders' sanctions against a firm in the event of a crisis.

The only evidence of the negative valuation effect of ESG was observed for firms operating in sensitive industries when firm performance was measured by ROA. Furthermore, the findings indicated that this negative valuation effect of ESG might mostly be

driven by environmental performance. Following the logical reasoning of the principal-agent theory, this result might be caused by managerial agency problems. Since sensitive industries are convicted of being polluting, the managers in sensitive sectors may have an added incentive to overinvest in ESG activities to improve their personal reputation. This might result in a waste of firm resources and further in decreased profitability. Consequently, it is emphasized that the results vary depending on whether the firm performance is measured by an account-based (ROA) or a market-based variable (Tobin's Q). One explanation for the variation might be that ESG activities have a different impact on the historical and forward-looking measures of firm performance. High-ESG may generate costs and reduce profitability, but the future benefits of high-ESG might be valued by the market.

It is also discovered that the coefficients on ESG variables remain small, implicating that although there is an incentive for companies to improve their ESG practices, the practical effects might remain marginal. Despite this outcome, the results of this paper provide fruitful insight into the ESG-CFP relation. First, since sustainability awareness is increasingly reflected in legislation, particularly in Europe, all ESG practices are no longer voluntary for companies. That is, regardless of how ESG investments affect firm performance, firms must adapt to the new legal requirements. Consequently, the findings provide a silver lining for the firms: although they must increasingly put effort into ESG practices to comply with the legal requirements, and although the ESG investments might reduce the profitability under some circumstances, these efforts in ESG should not negatively affect the firm value but rather have a slightly positive effect. Second, as the relationship between ESG and firm value seems to be positively specific to periods of low trust, companies may improve stakeholder confidence in crisis times by investing in ESG practices and thus be better prepared for future market crises.

Although this study aims to contribute to the body of literature, interesting settings remain to be examined. For example, the inclusion of more industry-specific dummy variables and interaction terms in the regression may shed more light on the impact of industry and economic specific characteristics on the ESG-CFP relationship. Moreover, it would be worthwhile to challenge the findings with other data set or even a combination of multiple data set as this study relied only on one ESG database. Lastly, as the terminology related to ESG is not yet well-established, additional insight might be gained by conducting qualitative research. These areas are left for future research.

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APPENDICES

Appendix 1. Sensitive industries, ICB classification

Industry code	Industry	Supersector code	Supersector	Sector code	Sector	Subsector code	Subsector
55	Basic Materials	5510	Basic Resources	551010	Industrial Materials	55101000	Diversified Materials
55	Basic Materials	5510	Basic Resources	551010	Industrial Materials	55101010	Forestry
55	Basic Materials	5510	Basic Resources	551010	Industrial Materials	55101015	Paper
55	Basic Materials	5510	Basic Resources	551010	Industrial Materials	55101020	Textile Products
55	Basic Materials	5510	Basic Resources	551020	Industrial Metals and Mining	55102000	General Mining
55	Basic Materials	5510	Basic Resources	551020	Industrial Metals and Mining	55102010	Iron and Steel
55	Basic Materials	5510	Basic Resources	551020	Industrial Metals and Mining	55102015	Metal Fabricating
55	Basic Materials	5510	Basic Resources	551020	Industrial Metals and Mining	55102035	Aluminum
55	Basic Materials	5510	Basic Resources	551020	Industrial Metals and Mining	55102040	Copper
55	Basic Materials	5510	Basic Resources	551020	Industrial Metals and Mining	55102050	Nonferrous Metals
55	Basic Materials	5510	Basic Resources	551030	Precious Metals and Mining	55103020	Diamonds and Gemstones
55	Basic Materials	5510	Basic Resources	551030	Precious Metals and Mining	55103025	Gold Mining
55	Basic Materials	5510	Basic Resources	551030	Precious Metals and Mining	55103030	Platinum and Precious Metals
55	Basic Materials	5520	Chemicals	552010	Chemicals	55201000	Chemicals: Diversified
55	Basic Materials	5520	Chemicals	552010	Chemicals	55201010	Chemicals and Synthetic Fibers
55	Basic Materials	5520	Chemicals	552010	Chemicals	55201015	Fertilizers
55	Basic Materials	5520	Chemicals	552010	Chemicals	55201020	Specialty Chemicals
60	Energy	6010	Energy	601010	Oil, Gas and Coal	60101000	Integrated Oil and Gas
60	Energy	6010	Energy	601010	Oil, Gas and Coal	60101010	Oil: Crude Producers
60	Energy	6010	Energy	601010	Oil, Gas and Coal	60101015	Offshore Drilling and Other Services
60	Energy	6010	Energy	601010	Oil, Gas and Coal	60101020	Oil Refining and Marketing
60	Energy	6010	Energy	601010	Oil, Gas and Coal	60101030	Oil Equipment and Services
60	Energy	6010	Energy	601010	Oil, Gas and Coal	60101035	Pipelines
60	Energy	6010	Energy	601010	Oil, Gas and Coal	60101040	Coal
60	Energy	6010	Energy	601020	Alternative Energy	60102010	Alternative Fuels
60	Energy	6010	Energy	601020	Alternative Energy	60102020	Renewable Energy Equipment
65	Utilities	6510	Utilities	651010	Electricity	65101010	Alternative Electricity
65	Utilities	6510	Utilities	651010	Electricity	65101015	Conventional Electricity
65	Utilities	6510	Utilities	651020	Gas, Water and Multi-utilities	65102000	Multi-Utilities
65	Utilities	6510	Utilities	651020	Gas, Water and Multi-utilities	65102020	Gas Distribution
65	Utilities	6510	Utilities	651020	Gas, Water and Multi-utilities	65102030	Water
65	Utilities	6510	Utilities	651030	Waste and Disposal Services	65103035	Waste and Disposal Services

Appendix 2. Sample firms with ESG score, grouped by year and country

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	TOTAL
United Kingdom	53	55	137	167	173	176	181	196	200	216	221	224	228	264	269	278	276	238	3,552
Germany	25	25	38	47	48	53	60	61	63	68	69	72	75	79	81	92	97	84	1,137
France	31	31	43	53	55	65	69	71	73	75	75	75	77	80	82	92	92	79	1,218
Sweden	21	21	25	29	30	30	31	31	32	32	33	34	36	48	51	56	56	51	647
Switzerland	22	22	24	26	26	30	32	36	37	37	40	41	43	43	43	46	46	40	634
Italy	13	15	18	20	20	23	25	25	25	26	26	27	27	29	30	36	37	31	453
Spain	13	13	22	25	26	28	28	29	30	33	34	34	36	37	37	39	39	30	533
Netherlands	13	13	17	20	20	23	23	23	25	27	28	29	29	29	32	33	34	30	448
Norway	8	8	11	14	15	15	15	15	15	15	15	15	16	18	18	21	23	22	279
Belgium	9	9	10	12	12	12	14	15	16	16	17	17	18	19	20	22	24	21	283
Finland	12	12	14	18	19	19	19	20	21	21	21	22	22	22	22	24	24	22	354
Denmark	10	11	11	12	12	15	15	15	17	17	17	17	18	19	19	21	22	22	290
Poland	0	0	0	0	0	1	4	6	14	16	17	17	20	20	20	23	20	11	189
Turkey	0	0	0	0	0	0	7	9	16	17	17	18	19	19	19	23	21	10	195
Austria	5	6	7	9	9	10	10	10	10	10	10	10	10	10	10	11	11	9	167
Greece	6	6	7	10	10	10	10	10	10	10	10	11	11	11	11	12	10	3	168
Ireland	2	2	2	4	4	4	4	4	5	5	7	7	7	8	8	8	8	7	96
Portugal	1	1	1	4	6	6	6	6	6	6	6	6	6	6	7	8	8	5	95
Czech Republic	0	0	0	0	0	1	2	3	3	3	3	3	3	3	3	3	3	1	34
Hungary	0	0	0	0	0	0	1	2	3	3	3	3	3	3	3	3	3	3	33
TOTAL	244	250	387	470	485	521	556	587	621	653	669	682	704	767	785	851	854	719	10,805

Appendix 3. Sample firms with ESG score, grouped by year and industry

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	TOTAL
Industrials	63	65	105	124	127	138	143	146	152	156	160	165	170	184	188	203	207	178	2,674
Consumer Discretionary	59	62	91	108	109	111	115	121	127	131	132	135	141	163	164	179	180	151	2,279
Basic Materials	18	18	32	39	43	48	53	55	62	68	70	72	73	75	78	81	79	65	1,029
Health Care	20	21	26	29	31	38	39	43	45	45	45	45	49	56	60	67	70	65	794
Consumer Staples	23	23	29	38	39	39	40	45	47	54	55	57	57	58	58	67	68	58	855
Energy	13	13	30	34	35	36	42	45	48	52	53	54	55	57	57	60	56	47	787
Real Estate	14	14	27	31	33	35	37	37	41	45	48	48	50	57	58	62	63	54	754
Technology	9	9	14	20	21	23	26	29	30	31	32	32	33	39	42	47	47	43	527
Telecommunications	15	15	16	23	23	25	29	33	34	36	39	39	40	41	41	46	47	34	576
Utilities	10	10	17	24	24	28	32	33	35	35	35	35	36	37	39	39	37	24	530
TOTAL	244	250	387	470	485	521	556	587	621	653	669	682	704	767	785	851	854	719	10,805

Appendix 4. POLS and FE model specifications

These are POLS and FE Models 1-4 used in Panel A and B, where *i* is the subscript for each firm, *t* is the subscript for year, ROA_{it} is the return on assets, representing an account-based measure for financial performance of the firm, ROA_{it-1} is one lagged variable to control for autocorrelation, TQ_{it} is the Tobin's Q, representing a market-based measure for the financial performance of a firm, TQ_{it-1} is one lagged variable to control for autocorrelation, $SIZE_{it}$ is the natural logarithm of the firm's sales, LEV_{it} is the leverage of the firm, IND_i is the dummy variable that takes the value 1 if the firm *i* belongs to a sensitive industry and 0 otherwise, $ESGS_{it}$ is the ESG score of the firm, representing the overall ESG performance of the firm, $ENVS_{it}$ is the environmental pillar score of the firm, representing the environmental performance, $SOCS_{it}$ is the social pillar score, representing the social performance, $GOVS_{it}$ is the governance pillar score, representing the governance performance, $ESGS_{it} \times IND_i$ is the interaction of ESG performance with a dummy variable that takes the value 1 if the firm *i* belongs to an environmentally sensitive industry and 0 otherwise, $ESGS_{it} \times CRISIS_t$ is the interaction of ESG performance with a dummy variable set to 1 in 2008–2009 (the financial crisis) and 2011–2012 (the Eurozone crisis) and 0 otherwise, $ENVS_{it} \times IND_i$ is the interaction of the firm's environmental performance with a dummy variable that takes the value 1 if the firm *i* belongs to an environmentally sensitive industry and 0 otherwise, $ENVS_{it} \times CRISIS_t$ is the interaction of the firm's environmental performance with a dummy variable set to 1 in 2008–2009 (the financial crisis) and 2011–2012 (the Eurozone crisis), α_i is the firm fixed effect, λ_t is the time fixed effect, and ε_{it} is the error term.

Panel A

POLS Model 1
$$ROA_{it} = \beta_0 + \beta_1 ROA_{it-1} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 IND_i + \beta_5 ESGS_{it} + \varepsilon_{it}$$

POLS Model 2
$$ROA_{it} = \beta_0 + \beta_1 ROA_{it-1} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 IND_i + \beta_5 ENVS_{it} + \beta_6 SOCS_{it} + \beta_7 GOVS_{it} + \varepsilon_{it}$$

POLS Model 3
$$ROA_{it} = \beta_0 + \beta_1 ROA_{it-1} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 IND_i + \beta_5 ESGS_{it} + \beta_6 ESGS_{it} \times IND_i + \beta_7 ESGS_{it} \times CRISIS_t + \varepsilon_{it}$$

POLS Model 4
$$ROA_{it} = \beta_0 + \beta_1 ROA_{it-1} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 IND_i + \beta_5 ENVS_{it} + \beta_6 SOCS_{it} + \beta_7 GOVS_{it} + \beta_8 ENVS_{it} \times IND_i + \beta_9 ENVS_{it} \times CRISIS_t + \varepsilon_{it}$$

Panel B

POLS Model 1
$$TQ_{it} = \beta_0 + \beta_1 TQ_{it-1} + \beta_2 ROA_{it} + \beta_3 SIZE_{it} + \beta_4 LEV_{it} + \beta_5 IND_i + \beta_6 ESGS_{it} + \varepsilon_{it}$$

POLS Model 2
$$TQ_{it} = \beta_0 + \beta_1 TQ_{it-1} + \beta_2 ROA_{it} + \beta_3 SIZE_{it} + \beta_4 LEV_{it} + \beta_5 IND_i + \beta_6 ENVS_{it} + \beta_7 SOCS_{it} + \beta_8 GOVS_{it} + \varepsilon_{it}$$

POLS Model 3
$$TQ_{it} = \beta_0 + \beta_1 TQ_{it-1} + \beta_2 ROA_{it} + \beta_3 SIZE_{it} + \beta_4 LEV_{it} + \beta_5 IND_i + \beta_6 ESGS_{it} + \beta_7 ESGS_{it} \times IND_i + \beta_8 ESGS_{it} \times CRISIS_t + \varepsilon_{it}$$

POLS Model 4
$$TQ_{it} = \beta_0 + \beta_1 TQ_{it-1} + \beta_2 ROA_{it} + \beta_3 SIZE_{it} + \beta_4 LEV_{it} + \beta_5 IND_i + \beta_6 ENVS_{it} + \beta_7 SOCS_{it} + \beta_8 GOVS_{it} + \beta_9 ENVS_{it} \times IND_i + \beta_{10} ENVS_{it} \times CRISIS_t + \varepsilon_{it}$$

Panel A

FE Model 1 $$ROA_{it} = \beta_1 ROA_{it-1} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 ESGS_{it} + \alpha_i + \lambda_t + \varepsilon_{it}$$

FE Model 2 $$ROA_{it} = \beta_1 ROA_{it-1} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 ENVS_{it} + \beta_5 SOCS_{it} + \beta_6 GOVS_{it} + \alpha_i + \lambda_t + \varepsilon_{it}$$

FE Model 3 $$ROA_{it} = \beta_1 ROA_{it-1} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 ESGS_{it} + \beta_5 ESGS_{it} \times IND_i + \beta_6 ESGS \times CRISIS_t + \alpha_i + \lambda_t + \varepsilon_{it}$$

FE Model 4 $$ROA_{it} = \beta_1 ROA_{it-1} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 ENVS_{it} + \beta_5 SOCS_{it} + \beta_6 GOVS_{it} + \beta_7 ENVS_{it} \times IND_i + \beta_8 ENVS_{it} \times CRISIS_t + \alpha_i + \lambda_t + \varepsilon_{it}$$

Panel B

FE Model 1 $$TQ_{it} = \beta_1 TQ_{it-1} + \beta_2 ROA_{it} + \beta_3 SIZE_{it} + \beta_4 LEV_{it} + \beta_5 ESGS_{it} + \alpha_i + \lambda_t + \varepsilon_{it}$$

FE Model 2 $$TQ_{it} = \beta_1 TQ_{it-1} + \beta_2 ROA_{it} + \beta_3 SIZE_{it} + \beta_4 LEV_{it} + \beta_5 ENVS_{it} + \beta_6 SOCS_{it} + \beta_7 GOVS_{it} + \alpha_i + \lambda_t + \varepsilon_{it}$$

FE Model 3 $$TQ_{it} = \beta_1 TQ_{it-1} + \beta_2 ROA_{it} + \beta_3 SIZE_{it} + \beta_4 LEV_{it} + \beta_5 ESGS_{it} + \beta_6 ESGS_{it} \times IND_i + \beta_7 ESGS_{it} \times CRISIS_t + \alpha_i + \lambda_t + \varepsilon_{it}$$

FE Model 4 $$TQ_{it} = \beta_1 TQ_{it-1} + \beta_2 ROA_{it} + \beta_3 SIZE_{it} + \beta_4 LEV_{it} + \beta_5 ENVS_{it} + \beta_6 SOCS_{it} + \beta_7 GOVS_{it} + \beta_8 ENVS_{it} \times IND_i + \beta_9 ENVS_{it} \times CRISIS_t + \alpha_i + \lambda_t + \varepsilon_{it}$$

Appendix 5. Robustness check, controlling R&D expenditures, Panel A

The table presents the results of a robustness check in Panel A, where corporate financial performance is measured by ROA and R&D expenditures are controlled. Industry is treated as a time-invariant variable, so the industry dummy variable is only included in the POLS models. The first lag of the dependent variable is included to control for autocorrelation. Standard errors, shown in parentheses, are clustered at the firm level to avoid heteroskedasticity. The coefficients and standard errors of ESG variables are scaled by 1000. The symbols ***, ** and * denote statistical significance at the 1%, 5%, and 10 % levels, respectively. The sample spans from 2002 to 2019.

	POLS Models				FE Models			
	1	2	3	4	1	2	3	4
Constant	0.0587***	0.0601***	0.0545***	0.0571***	0.2853***	0.2838***	0.2888***	0.2862***
	(0.0153)	(0.0157)	(0.0154)	(0.0157)	(0.0902)	(0.0902)	(0.0897)	(0.0903)
ROA_{t-1}	0.6209***	0.6206***	0.6230***	0.6214***	0.2768***	0.2768***	0.2748***	0.2745***
	(0.0366)	(0.0365)	(0.0366)	(0.0367)	(0.0476)	(0.0477)	(0.0475)	(0.0476)
SIZE	-0.0014	-0.0015	-0.0013	-0.0014	-0.0138**	-0.0137**	-0.0140**	-0.0138**
	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0060)	(0.0060)	(0.0059)	(0.0060)
LEV	-0.0543***	-0.0543***	-0.0538***	-0.0542***	-0.1246***	-0.1244***	-0.1242***	-0.1238***
	(0.0108)	(0.0108)	(0.0108)	(0.0108)	(0.0229)	(0.0229)	(0.0228)	(0.0226)
R&D	-0.1056**	-0.1059**	-0.1042**	-0.1038**	-0.2459*	-0.2465*	-0.2465*	-0.2464*
	(0.0499)	(0.0499)	(0.0494)	(0.0493)	(0.1275)	(0.1277)	(0.1274)	(0.1276)
IND	-0.0055**	-0.0054**	0.0063	0.0068				
	(0.0024)	(0.0024)	(0.0075)	(0.0060)				
ESGS $\times 10^3$	0.0235		0.0984*		0.0697		0.1803	
	(0.0523)		(0.0574)		(0.0999)		(0.1150)	
ENVS $\times 10^3$		0.0085		0.1004*		-0.0025		0.0818
		(0.0550)		(0.0582)		(0.0838)		(0.0891)
SOCS $\times 10^3$		0.0442		0.0237		0.0968		0.1017
		(0.0508)		(0.0499)		(0.0859)		(0.0842)
GOVS $\times 10^3$		-0.0351		-0.0353		-0.0138		-0.0168
		(0.0450)		(0.0446)		(0.0685)		(0.0682)
ESGS×IND $\times 10^3$			-0.2050*				-0.3383**	
			(0.1169)				(0.1654)	
ESGS×CRISIS $\times 10^3$			-0.1580***				-0.1056	
			(0.0289)				(0.1162)	
ENVS×IND $\times 10^3$				-0.2167**				-0.3394**
				(0.0942)				(0.1420)
ENVS×CRISIS $\times 10^3$				-0.1487***				-0.0471
				(0.0263)				(0.1192)

	POLS Models				FE Models			
	1	2	3	4	1	2	3	4
Observations	5,120	5,120	5,120	5,120	5,120	5,120	5,120	5,120
Firm fixed effects	No	No	No	No	Yes	Yes	Yes	Yes
Time fixed effects	No	No	No	No	Yes	Yes	Yes	Yes
Standard errors clustered by	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Adj. R^2	43.97%	43.96%	44.25%	44.26%	55.62%	55.61%	55.68%	55.70%
F-statistic	670.51***	503.03***	508.88***	407.52***	13.80***	13.75***	13.78***	13.74***
Durbin-Watson	2.13	2.13	2.13	2.13	1.98	1.98	1.98	1.98

Appendix 6. Robustness check, controlling R&D expenditures, Panel B

The table presents the results of a robustness check in Panel B, where corporate financial performance is measured by Tobin's Q and R&D expenditures are controlled. Industry is treated as a time-invariant variable, so the industry dummy variable is only included in the POLS models. The first lag of the dependent variable is included to control for autocorrelation. Standard errors, shown in parentheses, are clustered at the firm level to avoid heteroskedasticity. The coefficients and standard errors of ESG variables are scaled by 1000. The symbols ***, ** and * denote statistical significance at the 1%, 5%, and 10 % levels, respectively. The sample spans from 2002 to 2019.

	POLS Models				FE Models			
	1	2	3	4	1	2	3	4
Constant	1.1371***	1.1060***	1.1260***	1.1080***	2.5548***	2.5615***	2.5770***	2.5943***
	(0.1112)	(0.1112)	(0.1143)	(0.1125)	(0.6184)	(0.6226)	(0.6238)	(0.6265)
TQ_{t-1}	0.7492***	0.7484***	0.7496***	0.7488***	0.5258***	0.5261***	0.5277***	0.5274***
	(0.0216)	(0.0216)	(0.0216)	(0.0217)	(0.0334)	(0.0334)	(0.0335)	(0.0334)
ROA	1.7567***	1.7607***	1.7456***	1.7551***	1.4810***	1.4807***	1.4841***	1.4880***
	(0.2908)	(0.2907)	(0.2907)	(0.2901)	(0.4034)	(0.4033)	(0.4064)	(0.4079)
SIZE	-0.0684***	-0.0664***	-0.0673***	-0.0656***	-0.1377***	-0.1372***	-0.1384***	-0.1388***
	(0.0075)	(0.0075)	(0.0076)	(0.0075)	(0.0407)	(0.0410)	(0.0411)	(0.0413)
LEV	-0.1299**	-0.1283**	-0.1197*	-0.1170*	-0.4266***	-0.4269***	-0.4248**	-0.4280***
	(0.0633)	(0.0637)	(0.0639)	(0.0642)	(0.1640)	(0.1640)	(0.1651)	(0.1660)
R&D	1.8300***	1.8386***	1.8401***	1.8504***	2.5729**	2.5754**	2.5828**	2.5818**
	(0.4354)	(0.4336)	(0.4332)	(0.4320)	(1.0442)	(1.0437)	(1.0344)	(1.0349)
IND	-0.0024	0.0008	-0.0180	-0.0447				
	(0.0150)	(0.0150)	(0.0578)	(0.0412)				
ESGS $\times 10^3$	1.8485***		2.2524***		1.5628**		0.7841	
	(0.4669)		(0.4960)		(0.7584)		(0.8873)	
ENVS $\times 10^3$		-0.2680		0.3269		0.6168		0.0251
		(0.4235)		(0.4796)		(0.6700)		(0.7980)
SOCS $\times 10^3$		1.4091***		1.0686**		0.3781		0.1977
		(0.4543)		(0.4575)		(0.7260)		(0.7194)
GOVS $\times 10^3$		0.6075		0.5932		0.3327		0.3288
		(0.3850)		(0.3861)		(0.5310)		(0.5315)
ESGS×IND $\times 10^3$			0.2916				-0.3801	
			(0.8782)				(1.1099)	
ESGS×CRISIS $\times 10^3$			-2.4760***				2.5824***	
			(0.1938)				(0.8055)	
ENVS×IND $\times 10^3$				0.7983				0.2913
				(0.6122)				(1.0013)
ENVS×CRISIS $\times 10^3$				-2.2182***				2.0933***
				(0.1802)				(0.6580)

	POLS Models				FE Models			
	1	2	3	4	1	2	3	4
Observations	4,967	4,967	4,967	4,967	4,967	4,967	4,967	4,967
Firm fixed effects	No	No	No	No	Yes	Yes	Yes	Yes
Time fixed effects	No	No	No	No	Yes	Yes	Yes	Yes
Standard errors clustered by	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Adj. R^2	80.00%	80.01%	80.35%	80.29%	85.56%	85.55%	85.60%	85.60%
F-statistic	2839.58***	2208.83***	2257.28***	1840.05***	60.08***	59.80***	60.05***	59.77***
Durbin-Watson	2.07	2.07	2.06	2.06	2.08	2.08	2.08	2.08

Appendix 7. Robustness check, excluding the UK companies, Panel A

The table presents the results of a robustness check in Panel A, where corporate financial performance is measured by ROA and the UK companies are excluded from the sample. Industry is treated as a time-invariant variable, so the industry dummy variable is only included in the POLS models. The first lag of the dependent variable is included to control for autocorrelation. Standard errors, shown in parentheses, are clustered at the firm level to avoid heteroskedasticity. The coefficients and standard errors of ESG variables are scaled by 1000. The symbols ***, ** and * denote statistical significance at the 1%, 5%, and 10 % levels, respectively. The sample spans from 2002 to 2019.

	POLS Models				FE Models			
	1	2	3	4	1	2	3	4
Constant	0.0400**	0.0391**	0.0368*	0.0367*	0.0106	0.0094	0.0110	0.0091
	(0.0189)	(0.0188)	(0.0190)	(0.0189)	(0.0782)	(0.0782)	(0.0778)	(0.0780)
ROA_{t-1}	0.6151***	0.6149***	0.6182***	0.6174***	0.2951***	0.2948***	0.2934***	0.2932***
	(0.0327)	(0.0326)	(0.0326)	(0.0325)	(0.0394)	(0.0394)	(0.0393)	(0.0393)
SIZE	-0.0003	-0.0003	-0.0001	-0.0002	0.0036	0.0036	0.0036	0.0037
	(0.0012)	(0.0012)	(0.0012)	(0.0012)	(0.0051)	(0.0051)	(0.0051)	(0.0051)
LEV	-0.0529***	-0.0528***	-0.0521***	-0.0523***	-0.1351***	-0.1353***	-0.1353***	-0.1351***
	(0.0090)	(0.0090)	(0.0089)	(0.0089)	(0.0203)	(0.0203)	(0.0204)	(0.0203)
IND	-0.0060***	-0.0058***	-0.0004	0.0008				
	(0.0017)	(0.0017)	(0.0055)	(0.0043)				
ESGS $\times 10^3$	-0.0392		0.0181		0.0740		0.1633*	
	(0.0418)		(0.0452)		(0.0867)		(0.0970)	
ENVS $\times 10^3$		-0.0440		0.0329		-0.0084		0.0561
		(0.0421)		(0.0445)		(0.0664)		(0.0743)
SOCS $\times 10^3$		0.0213		0.0010		0.0908		0.0915
		(0.0447)		(0.0442)		(0.0704)		(0.0690)
GOVS $\times 10^3$		-0.0097		-0.0121		0.0002		-0.0014
		(0.0367)		(0.0364)		(0.0639)		(0.0640)
ESGS×IND $\times 10^3$			-0.0973				-0.2541*	
			(0.0870)				(0.1415)	
ESGS×CRISIS $\times 10^3$			-0.1980***				-0.1178	
			(0.0252)				(0.0957)	
ENVS×IND $\times 10^3$				-0.1190*				-0.2470**
				(0.0663)				(0.1100)
ENVS×CRISIS $\times 10^3$				-0.1693***				-0.0450
				(0.0213)				(0.0845)

	POLS Models				FE Models			
	1	2	3	4	1	2	3	4
Observations	7,020	7,020	7,020	7,020	7,020	7,020	7,020	7,020
Firm fixed effects	No	No	No	No	Yes	Yes	Yes	Yes
Time fixed effects	No	No	No	No	Yes	Yes	Yes	Yes
Standard errors clustered by	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Adj. R^2	43.24%	43.23%	43.61%	43.54%	53.21%	53.21%	53.25%	53.26%
F-statistic	1070.50***	764.59***	776.60***	602.42***	14.00***	13.96***	13.98***	13.94***
Durbin-Watson	2.16	2.16	2.16	2.16	1.95	1.95	1.95	1.95

Appendix 8. Robustness check, excluding the UK companies, Panel B

The table presents the results of a robustness check in Panel B, where corporate financial performance is measured by Tobin's Q and the UK companies are excluded from the sample. Industry is treated as a time-invariant variable, so the industry dummy variable is only included in the POLS models. The first lag of the dependent variable is included to control for autocorrelation. Standard errors, shown in parentheses, are clustered at the firm level to avoid heteroskedasticity. The coefficients and standard errors of ESG variables are scaled by 1000. The symbols ***, ** and * denote statistical significance at the 1%, 5%, and 10 % levels, respectively. The sample spans from 2002 to 2019.

	POLS Models				FE Models			
	1	2	3	4	1	2	3	4
Constant	1.1605***	1.1351***	1.1260***	1.1130***	2.5437***	2.5382***	2.5526***	2.5506***
	(0.1235)	(0.1220)	(0.1244)	(0.1124)	(0.4875)	(0.4921)	(0.4894)	(0.4934)
TQ_{t-1}	0.7977***	0.7974***	0.8008***	0.8003***	0.5484***	0.5486***	0.5493***	0.5494***
	(0.0186)	(0.0187)	(0.0185)	(0.0186)	(0.0304)	(0.0303)	(0.0305)	(0.0304)
ROA	1.3149***	1.3128***	1.2780***	1.2845***	1.1547***	1.1534***	1.1559***	1.1545***
	(0.2698)	(0.2700)	(0.2688)	(0.2682)	(0.3151)	(0.3152)	(0.3164)	(0.3171)
SIZE	-0.0654***	-0.0638***	-0.0629***	-0.0619***	-0.1369***	-0.1358***	-0.1372***	-0.1363***
	(0.0077)	(0.0076)	(0.0076)	(0.0075)	(0.0323)	(0.0325)	(0.0324)	(0.0326)
LEV	-0.2279***	-0.2274***	-0.2200***	-0.2204***	-0.2800**	-0.2798**	-0.2742**	-0.2747**
	(0.0528)	(0.0529)	(0.0527)	(0.0527)	(0.1239)	(0.1247)	(0.1248)	(0.1260)
IND	-0.0294***	-0.0273**	-0.0301	-0.0330				
	(0.0108)	(0.0107)	(0.0377)	(0.0275)				
ESGS $\times 10^3$	1.3350***		1.7050***		1.5243**		1.1830	
	(0.3390)		(0.3720)		(0.6324)		(0.7407)	
ENVS $\times 10^3$		-0.1214		0.5098		0.5603		0.2252
		(0.3232)		(0.3584)		(0.5306)		(0.5912)
SOCS $\times 10^3$		0.8915**		0.6031		0.5824		0.5075
		(0.3718)		(0.3733)		(0.5906)		(0.5863)
GOVS $\times 10^3$		0.5401*		0.4816		0.1570		0.1600
		(0.3020)		(0.3010)		(0.5030)		(0.5027)
ESGS×IND $\times 10^3$			0.0790				-0.3624	
			(0.5943)				(0.8160)	
ESGS×CRISIS $\times 10^3$			-2.3150***				1.3037**	
			(0.1638)				(0.6013)	
ENVS×IND $\times 10^3$				0.1365				-0.0470
				(0.4132)				(0.6414)
ENVS×CRISIS $\times 10^3$				-1.9915***				1.2015**
				(0.1467)				(0.4673)

	POLS Models				FE Models			
	1	2	3	4	1	2	3	4
Observations	6,763	6,763	6,763	6,763	6,763	6,763	6,763	6,763
Firm fixed effects	No	No	No	No	Yes	Yes	Yes	Yes
Time fixed effects	No	No	No	No	Yes	Yes	Yes	Yes
Standard errors clustered by	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Adj. R^2	80.60%	80.59%	80.88%	80.81%	85.53%	85.52%	85.54%	85.54%
F-statistic	4682.16***	3510.66***	3575.84***	2848.53***	66.11***	65.86***	65.94***	65.72***
Durbin-Watson	2.11	2.11	2.10	2.10	2.02	2.02	2.02	2.02

Appendix 9. Robustness check, excluding the firm fixed effects, Panel A

The table presents the results of a robustness check in Panel A, where corporate financial performance is measured by ROA and firm fixed effects are excluded from fixed effects regression models. Consequently, the time-invariant industry dummy variable is now included in the FE models. The first lag of the dependent variable is included to control for autocorrelation. Standard errors, shown in parentheses, are clustered at the firm level to avoid heteroskedasticity. The coefficients and standard errors of ESG variables are scaled by 1000. The symbols ***, ** and * denote statistical significance at the 1%, 5%, and 10 % levels, respectively. The sample spans from 2002 to 2019.

	POLS Models				FE Models			
	1	2	3	4	1	2	3	4
Constant	0.0554***	0.0564***	0.0537***	0.0554***	0.0638***	0.0678***	0.0634***	0.0672***
	(0.0140)	(0.0140)	(0.0142)	(0.0142)	(0.0137)	(0.0137)	(0.0140)	(0.0139)
ROA_{t-1}	0.5919***	0.5919***	0.5952***	0.5946***	0.5938***	0.5933***	0.5937***	0.5929***
	(0.0242)	(0.0242)	(0.0241)	(0.0241)	(0.0243)	(0.0243)	(0.0243)	(0.0243)
SIZE	-0.0012	-0.0013	-0.0011	-0.0012	-0.0023**	-0.0025***	-0.0023**	-0.0025***
	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)
LEV	-0.0551***	-0.0553***	-0.0542***	-0.0543***	-0.0523***	-0.0527***	-0.0523***	-0.0527***
	(0.0067)	(0.0067)	(0.0067)	(0.0067)	(0.0067)	(0.0067)	(0.0067)	(0.0067)
IND	-0.0072***	-0.0070***	-0.0055	-0.0046	-0.0071***	-0.0070***	-0.0058	-0.0048
	(0.0018)	(0.0018)	(0.0052)	(0.0042)	(0.0018)	(0.0018)	(0.0051)	(0.0041)
ESGS $\times 10^3$	-0.0125		0.0306		0.1276***		0.1463***	
	(0.0392)		(0.0409)		(0.0426)		(0.0455)	
ENVS $\times 10^3$		-0.0158		0.0559		0.0640*		0.0924**
		(0.0379)		(0.0391)		(0.0379)		(0.0404)
SOCS $\times 10^3$		0.0342		0.0090		0.0882**		0.0922**
		(0.0410)		(0.0407)		(0.0420)		(0.0420)
GOVS $\times 10^3$		-0.0352		-0.0394		-0.0370		-0.0375
		(0.0317)		(0.0317)		(0.0315)		(0.0316)
ESGS×IND $\times 10^3$			-0.0261				-0.0241	
			(0.0845)				(0.0826)	
ESGS×CRISIS $\times 10^3$			-0.1995***				-0.0531	
			(0.0255)				(0.0712)	
ENVS×IND $\times 10^3$				-0.0439				-0.0419
				(0.0652)				(0.0629)
ENVS×CRISIS $\times 10^3$				-0.1932***				-0.0930
				(0.0241)				(0.0616)

	POLS Models				FE Models			
	1	2	3	4	1	2	3	4
Observations	10,480	10,478	10,480	10,478	10,480	10,478	10,480	10,478
Firm fixed effects	No	No	No	No	No	No	No	No
Time fixed effects	No	No	No	No	Yes	Yes	Yes	Yes
Standard errors clustered by	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Adj. R^2	40.18%	40.18%	40.48%	40.48%	41.71%	41.75%	41.71%	41.76%
F-statistic	1408.59***	1006.44***	1019.28***	792.72***	358.10***	327.53***	326.95***	301.53***
Durbin-Watson	2.14	2.14	2.14	2.14	2.16	2.16	2.16	2.16

Appendix 10. Robustness check, excluding the firm fixed effects, Panel B

The table presents the results of a robustness check in Panel B, where corporate financial performance is measured by Tobin's Q and firm fixed effects are excluded from fixed effects regression models. Consequently, the time-invariant industry dummy variable is now included in the FE models. The first lag of the dependent variable is included to control for autocorrelation. Standard errors, shown in parentheses, are clustered at the firm level to avoid heteroskedasticity. The coefficients and standard errors of ESG variables are scaled by 1000. The symbols ***, ** and * denote statistical significance at the 1%, 5%, and 10 % levels, respectively. The sample spans from 2002 to 2019.

	POLS Models				FE Models			
	1	2	3	4	1	2	3	4
Constant	1.0612***	1.0402***	1.0443***	1.0383***	0.9995***	0.9925***	1.0018***	0.9959***
	(0.0908)	(0.0902)	(0.0917)	(0.0908)	(0.0895)	(0.0895)	(0.0912)	(0.0907)
TQ_{t-1}	0.7841***	0.7859***	0.7862***	0.7879***	0.8103***	0.8126***	0.8108***	0.8127***
	(0.0148)	(0.0147)	(0.0147)	(0.0146)	(0.0145)	(0.0143)	(0.0144)	(0.0143)
ROA	1.4458***	1.4306***	1.4178***	1.4025***	1.1572***	1.1396***	1.1604***	1.1483***
	(0.1943)	(0.1927)	(0.1941)	(0.1914)	(0.1808)	(0.1792)	(0.1808)	(0.1800)
SIZE	-0.0594***	-0.0577***	-0.0579***	-0.0568***	-0.0582***	-0.0571***	-0.0580***	-0.0570***
	(0.0058)	(0.0058)	(0.0058)	(0.0057)	(0.0058)	(0.0057)	(0.0058)	(0.0058)
LEV	-0.2393***	-0.2378***	-0.2305***	-0.2292***	-0.1983***	-0.1972***	-0.1966***	-0.1963***
	(0.0406)	(0.0404)	(0.0404)	(0.0401)	(0.0377)	(0.0375)	(0.0377)	(0.0375)
IND	-0.0240**	-0.0218**	-0.0348	-0.0421*	-0.0246***	-0.0235**	-0.0366	-0.0442*
	(0.0097)	(0.0097)	(0.0330)	(0.0234)	(0.0092)	(0.0091)	(0.0316)	(0.0227)
ESGS $\times 10^3$	1.3535***		1.7818***		1.6960***		0.9458**	
	(0.2974)		(0.3222)		(0.3133)		(0.3725)	
ENVS $\times 10^3$		-0.0924		0.6134**		0.3825		-0.1275
		(0.2599)		(0.2870)		(0.2538)		(0.2916)
SOCS $\times 10^3$		1.1504***		0.8063***		1.0022***		0.9353***
		(0.2930)		(0.2949)		(0.2832)		(0.2826)
GOVS $\times 10^3$		0.0995		0.0412		0.0737		0.0753
		(0.2483)		(0.2490)		(0.2324)		(0.2332)
ESGS×IND $\times 10^3$			0.2526				0.2174	
			(0.5323)				(0.5017)	
ESGS×CRISIS $\times 10^3$			-2.6498***				2.6865***	
			(0.1550)				(0.5190)	
ENVS×IND $\times 10^3$				0.4148				0.3943
				(0.3676)				(0.3506)
ENVS×CRISIS $\times 10^3$				-2.3023***				1.9097***
				(0.1443)				(0.4098)

	POLS Models				FE Models			
	1	2	3	4	1	2	3	4
Observations	10,085	10,083	10,085	10,083	10,085	10,083	10,085	10,083
Firm fixed effects	No	No	No	No	No	No	No	No
Time fixed effects	No	No	No	No	Yes	Yes	Yes	Yes
Standard errors clustered by	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Adj. R^2	79.93%	80.05%	80.27%	80.32%	82.30%	82.40%	82.35%	82.45%
F-statistic	6693.02***	5058.76***	5130.77***	4116.60***	2132.482***	1968.23***	1961.16***	1822.41***
Durbin-Watson	2.09	2.08	2.08	2.07	2.12	2.11	2.12	2.11